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Finance Working Paper N° 548/2018
January 2018

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ECGI Working Paper Series in Finance

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Neretina gratefully acknowledges financial support from the NWO “Research Talent” Grant #406-15-242.

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Keywords: Bargaining power, Corporate bonds, Underwriting

JEL Classifications: G32, G24

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Abstract

We develop a new measure of underwriter bargaining power and a novel empirical approach, based on underwriters' comparative ability to place bonds. When an issuer has few "outside options" to take her bond to the market, the underwriter enjoys a stronger bargaining power over her. The key feature of our approach is that bargaining power varies *for a given underwriter at a given point in time* across different issuers, allowing us to separate the effects of bargaining power from those of reputation and certification with a fixed effects strategy. Using our measure, we document that powerful underwriters are able to extract rents at the expense of bond issuers. For issues with the highest underwriter bargaining power, fees and bond offering yields increase by a combined cost of USD 1.5 million, or about 7% of the average costs for the issuer. We rule out alternative mechanisms based on issuer-underwriter "loyalty". Our findings suggest that lack of competition increases underwriter bargaining power, resulting in material costs for corporate bond issuers.

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The global bond market is a major source of corporate financing. It has almost tripled in size since 2001, reaching nearly $50 trillion in outstanding value as of 2013 (Tendulkar and Hancock (2014)). At the same time, the bond underwriting industry has become increasingly more concentrated, with a handful of very large banks underwriting the bulk of deals (Levinson (2014, p. 78)): in 2013, the ten largest underwriters had a combined market share of about 80%, up from 55% in 2000 and 30% in 1990.[1] Industry practitioners as well as the financial press have raised concerns that this may give disproportionate power over the issuance process to a few large underwriters, enabling them to extract rents to the detriment of corporate bond issuers.[2] In this paper, we address this concern and ask whether, and to what extent, underwriter power has an impact on corporate bond contracts.

The main challenge for any study of bargaining power is identification, because the underwriter's power itself is unobservable and often overlaps with her reputation. For instance, at first glance, market share could seem a reasonable proxy for bargaining power. However, market share could also stand for the certification value of the underwriter's reputation as a signal of bond quality (Booth and Smith (1986)); and indeed, the literature has used it as a proxy for both power (Burch, Nanda, and Warther (2005)) and reputation/certification ability (Livingston and Miller (2000)). Similar considerations apply to alternative proxies such as past performance (Nanda and Yun (1997), Dunbar (2000)) or industry specialization (Dunbar (2000)). Disentangling the impact

[1] Based on issuance data from Mergent FISD and SDC; the deal size (par value of bonds) is fully assigned to each lead underwriter.

[2] "[S]everal senior bankers said the largest bond managers exert disproportionate influence on the size and price of new debt sales. […] the new Verizon debt […] could have been sold at a much tighter "spread" to smaller investors, which would have reduced Verizon's cost of funding. … A former syndicate banker at a large US bank described being goaded by a sales manager to alter the pricing of a bond offering to satisfy a powerful buyside client" ("How firm a foundation?" *Financial Times*, March 8, 2015).
"The biggest winners were Barclays PLC, J.P. Morgan Chase & Co., Bank of America Corp., and Morgan Stanley, which each earned about $41 million for their lead roles placing the debt with investors ("Verizon Sells a Record $49 Billion Worth of Bonds", *The Wall Street Journal*, September 11, 2013).

of the “bargaining power” and “certification” channels, therefore, requires a measure of underwriter bargaining power that is distinct from reputation.

We develop one such measure, and attempt to separate the two effects, with a novel empirical approach that departs from conventional market share-based arguments. We gauge bargaining power on the basis of how difficult it is to find or replace an underwriter for a given issue. We define our main proxy in detail below; but the intuition behind it is straightforward. Consider, for instance, two bond issues in our data by Oracle, a computer technology firm, and by AT&T Inc., a telecommunications company, both taken to the market by J.P. Morgan in 2012. On the first one, our proxy indicates that *only* J.P. Morgan can be expected to successfully take the issue to the market as lead underwriter, therefore suggesting a high bargaining power for J.P. Morgan. On the AT&T issue, our proxy indicates 10 potential replacements to J.P. Morgan, with Bank of America, Barclays, and UBS among the alternatives. The fact that a large number of other investment banks could take the issue to the market reduces J.P. Morgan’s bargaining power. In other words, the underwriter’s bargaining power is inversely related to the number of outside options available to the bond issuer.

The features of our measure help us to separate bargaining power from certification, because a given underwriter may have different bargaining power when dealing with different issuers: in our example, J.P. Morgan has a strong bargaining position vis-à-vis Oracle; in contrast, it has a weaker one vis-à-vis AT&T. Building on this example, we take advantage of the nature of competition in the market for underwriting corporate bonds in our empirical setup. Unlike traditional proxies for certification such as market share, our bargaining power measure varies *within underwriter at a given point in time*. We exploit this feature to identify the effect of bargaining power net of underwriter reputation, via a fixed effects strategy. Intuitively, whether

J.P. Morgan is underwriting an issue by Oracle or AT&T, her reputation and certification ability remain the same. In contrast, our proxy allows its bargaining power to differ across the two issues. Comparing different issues that share the same underwriter at the same point in time, therefore, enables us to absorb the impact of certification and hence identify bargaining power effects.

In addition to separating bargaining power from certification, the granularity of our measure allows us to account for the potential non-random matching between issuers and underwriters. In fact, low-quality issuers may seek higher-quality underwriters (Shivdasani and Song (2011)), or for instance if they have a pre-existing lending relationship with them (Gande, Puri, Saunders, and Walter (1997), Yasuda (2005)). Alternatively, higher-quality underwriters may screen prospective issuers, selecting only higher-quality ones (Chemmanur and Fulghieri (1994), Fernando, Gatchev, and Spindt (2005), Fang (2005)). Underwriter-issuer matching can thus bias an estimate of the relationship between underwriter power and bond contracts, and the bias itself is in general difficult to sign. Our bargaining power measure circumvents this difficulty, exploiting variation *within issuer-underwriter pair* over time. In our setting, J.P. Morgan may have a strong bargaining power vis-à-vis Oracle on a given issue, but weaker power on a later one, due to e.g. changing industry and market conditions. We can exploit the dynamics in the match between issuer and underwriter by means of pair fixed effects. By comparing different issues of Oracle, all taken to the market by J.P. Morgan, we can absorb most, if not all, variation in issue terms driven by the Oracle-J.P. Morgan match, isolating the effect of J.P. Morgan's bargaining power driven by the availability of outside options to Oracle.

Our main testable hypothesis is that, in line with the concerns mentioned above and voiced in the press, powerful underwriters are able to extract rents from issuers that have a weaker bargaining position. We examine two measures of rent extraction from the underwriters.

The first one is fees, representing the immediate monetary benefit that the underwriter can extract from the issuer. Underwriters charge fees as compensation for marketing and distributing the issue, as well as for taking on underwriting risk. A stronger bargaining position should enable the underwriter to extract larger fees from the bond issuer.

The second measure is the bond yield at the issuance date, or offering yield. Unlike fees, which result from a direct negotiation between issuer and underwriter, yields depend on the demand for the new issues generated by the underwriter via marketing to prospective investors and book-building. The pricing process and the allocation of bonds to investors, however, are not transparent to the issuers, and the absence of efficient rules regulating this process makes it difficult for the regulators to punish malpractices.[3] This creates scope for moral hazard, and two sources of agency costs. First, because the underwriter's selling effort is not verifiable, the underwriter might choose to place the issue at a lower price to exert less effort (Baron (1982)). Second, the underwriter may underprice bonds in order to cater to a clientele of investors, such as large bond funds that, in return, can generate business for the underwriter. An example of such *quid pro quo* behavior is underwriters earning trade commission revenues in exchange for underpriced bonds (e.g. Reuter (2006), Goldstein, Irvine, and Puckett (2011)). Since it should be easier for a powerful underwriter to make the issuer agree to a lower price, we expect stronger bargaining power to be associated with a higher bond offering yield.

These arguments predict that in equilibrium the bargaining power of the underwriters sustains higher fees and higher offering yields. If the underwriter can offer an exclusively high

[3] "The behind-closed-doors process by which new corporate bonds are priced and then doled out to investors means that opportunities for questionable – though not necessarily illegal – behaviour exist, these bankers say." ("How firm a foundation?" *Financial Times*, March 8, 2015). Further, regulators are "…unlikely to find wrongdoing because there were no clear cut rules around how banks should dole out bond issuances among investors". ("SEC probes Goldman and Citi bond allocations." *Financial Times*, February 28, 2014).

ability to place an issue, she will be able to set the contract terms in her favor. The bond issuer, in turn, can agree to worse contract terms if she lacks outside options. As long as (1) competing underwriters are not able to replicate the placement ability of a powerful underwriter, and (2) the issuer is better off issuing the bond than not issuing, the bargaining power rent will not be competed away (Calzolari and Denicolò (2015)). We find evidence strongly consistent with these arguments.

We run our tests on a comprehensive dataset that combines bond characteristics and underwriting information from the Mergent Fixed Income Securities (FISD) and SDC Platinum Global New Issues (SDC) databases. Our data cover 9,356 corporate bonds issued by U.S. publicly listed firms, and span a period of 45 years from 1970 to 2015. We focus on U.S. corporate bonds, since they represent the lion's share of the global market (Levinson (2014, p. 78)).

Our main findings are as follows. Consistent with our predictions and with the concerns among practitioners and in the press, underwriters with high bargaining power charge higher fees and are associated with higher offering yields. Moving from the bottom to the top bargaining power decile, we observe on average a 5.6 basis points (bps) increase in fees, or a 6.4% increase relative to the average 88bps fees in our sample. We also observe a 23.6bps increase in offering yield, or 3.3% compared to the 7.2% average yield. In dollar terms, issuers pay additional issuing costs of $1.52m, or 6.9% in comparison to the $22m cost they bear in terms of combined fees and yields on the typical bond in our data. These effects indicate that the costs associated with underwriter bargaining power are not trivial.

Our fixed effects strategy considerably raises the bar for any alternative explanation based on certification, which would require that the same underwriter, at the same point in time, have different certification ability on different issues. Although unlikely, this could still be a possibility e.g. because the issues belong to different bond market segments where the underwriter may have more or less expertise. If that were the case, the higher fees and yields might be compensation for certification. To attenuate concerns about this alternative explanation, we study how the market price of an issuer's bonds *outstanding* reacts to a new bond issue, taken to the market by a powerful underwriter. Under the certification hypothesis, the news that a reputable underwriter is taking the new issue to the market should convey positive information to all of the issuer's creditors (Booth and Smith (1986)). As a consequence, we should observe an increase in the price of bonds outstanding, or at least no decrease. In contrast, if our measure indeed reflects the underwriter's bargaining power, the issuer incurs losses that can harm the position of the existing bondholders, so that the price of bonds outstanding should decrease.

Our findings are consistent with the latter prediction. Moving from the bottom to the top underwriter power decile, we document a 64.4bps larger drop in returns on bonds outstanding upon the announcement of a new bond issue, or about 35% of the yield spread on the typical bond in our sample (185bps), suggesting that the effect we detect is economically material. Given that outstanding bondholders appear to suffer from new issues taken to the market by powerful underwriters, these estimates suggest that our measure is not likely to pick up a certification effect.

As a further check against the certification explanation, we compare the effects of underwriter power on fees and yields for issuers that are more opaque (first time on the corporate bond market, low analyst coverage) or more transparent. We do not find differences in the estimates for the two groups, consistent with the power explanation. In contrast, certification predicts stronger effects for more opaque issuers.

A second alternative explanation is "loyalty" between issuers and underwriters, referring to the fact that issuers tend to stick to the same underwriters, e.g. because they derive some benefits (observable or otherwise) from the relationship. We rule it out with two tests. First, we compare the effects of power on fees and yields on bonds issued just before or just after the issuer switches to a new underwriter. The estimated effects are similar. In contrast, if our findings were driven by the expected benefits of a future issuer-underwriter relationship, we should observe stronger effects on bonds issued with the new underwriter right after the switch. Second, we test whether a past relationship with the same underwriter on bond, equity, or M&A transactions absorbs the effects of our measure. We find that is not the case, suggesting that loyalty is not driving our results.

These results are sustained in an extensive set of robustness checks. We consider alternative measures of bargaining power, based on the Banzhaf (1964) and Shapley and Shubik (1964) indexes of power in a coalition, and alternative filters on the set of potential "replacement" underwriters on a given bond issue. They are also robust to a broad set of control variables, alternative clustering of the standard errors, and filters on the sample of bonds in our data.

Our paper makes three main contributions. First, it provides evidence of the economic impact of underwriter bargaining power. The bond underwriting literature has so far focused on the certification effects associated with top underwriters. The certification view implies that working with a top underwriter is beneficial to the issuers: increased certification effort is associated with higher underwriting fees, but these are more than offset by the lower yields that a reputable underwriter can obtain on the market (Fang (2005)). We document a "dark side" of corporate bond underwriting, where top underwriters are able to leverage their bargaining power to extract rents at the expense of bond issuers.

Second, our work contributes to the literature on underwriter selection. Thus far, this strand of literature has highlighted driving factors such the underwriter's prestige and expertise (Ritter and Welch (2002); Liu and Ritter (2011); Logue, Rogalski, Seward, and Foster-Johnson (2002)), reputation and certification ability (Livingston and Miller (2000); Fang (2005)), and loyalty (Yasuda (2005); Burch, Nanda, and Warther (2005)). Our results point to competition among potential underwriters – or rather, lack thereof – as an additional factor. Moreover, they suggest that, when issuers have limited outside options, underwriters can earn substantial quasi-monopolistic rents at their expense.

Third, we develop a novel approach to measuring bargaining power. The prior literature has considered proxies, such as market share,[4] which do not enable a separation of reputation from bargaining power effects. Because our proxy is issue-specific, we are able to isolate power effects while controlling for reputation with underwriter × date fixed effects. Moreover, alternative measures of bargaining power such as the Banzhaf (1964) or Shapley and Shubik (1954) indexes used e.g. in the shareholder voting literature are complex (see Felsenthal and Machover (1998) for a review). Our results indicate that, at least in the context of bond underwriting, a simple count-based index as the one we propose can be as effective as those measures. The simplicity, generality, and flexibility of our approach suggest that it could be applied to a number of other settings, such as, but not limited to, other security public offerings (e.g. IPOs).

The remainder of this paper is organized as follows. Section 1 describes the data, our bargaining power proxy, and the identification strategy. Section 2 presents our main results. In section 3 we rule out alternative explanations based on certification and "loyalty". Section 4 discusses robustness checks. Section 5 concludes.

1. Data, variables of interest, and empirical strategy

[4] Among others, Megginson and Weiss (1991), Beatty and Welch (1996), Gande, Puri, and Saunders (1999), Livingston and Miller (2000), Fang (2005), Yasuda (2005) and Ljungqvist, Marston, and Wilhelm (2006) use market share-based measures to proxy for the investment bank's reputation, and Burch, Nanda, and Warther (2005) use them to proxy for bargaining power.

1.1 Data

We merge data from a number of sources. We obtain corporate bond characteristics and underwriting information from Mergent Fixed Income Securities Database (FISD) and SDC Platinum Global New Issues Database (SDC). Following the literature (Fang (2005), Yasuda (2005), Billett, King, and Mauer (2007)), we exclude bonds issued by financials (SIC codes 6000-6999), regulated utilities (SIC codes 4900-4949), non-U.S. firms, and issues in foreign currency. We also restrict our sample to newly issued straight corporate bonds, and exclude convertibles and medium-term notes. We focus on non-distressed public bond issuers with non-negative book equity from the CRSP-Compustat Merged (CCM) database, and retain bonds with non-missing offering amounts and maturities, known underwriter names, available information on fees or offering yields, and for which ratings are provided by at least one of the main rating agencies (Moody's, Standard and Poor's, or Fitch). After these filters, our sample comprises 9,356 bonds issued by 1,696 firms, over the period 1970 to 2015.[5]

We also analyze corporate bond returns on the secondary market. To do so, we collect information on bond trades from the Trade Reporting and Compliance Engine (TRACE) database, and calculate daily bond prices by applying the "trade-weighted price, trade ≥ 100k" approach of Bessembinder, Kahle, Maxwell, and Xu (2009). We use their SAS program to remove cancelled, corrected, and commission trades, as well as non-institutional trades below $100,000, and we weigh intraday transactions by trading volume.

We merge the TRACE data with our sample of bonds and retain the bonds with fixed and non-zero coupons. We compute bond returns between two trading days as: [6]

[5] Appendix B describes in detail the construction this part of our data set.
[6] When calculating returns we exclude weekends and holidays in the recommended holiday schedule for financial markets from http://www.sifma.org/services/holiday-schedule/.

$$R_t = \frac{P_t - P_{t-1} + AI_t}{P_{t-1}} \quad (1)$$

where P_t is the bond price on a day t, AI_t is the interest accrued between the two subsequent trading days $t-1$ and t.[7] We drop 586 outlier daily returns with absolute value larger than 20%, as in Bessembinder et al. (2009).[8] The final sample includes 1,257,752 daily return observations for 4,597 bonds outstanding of 756 issuers.

Table 1.A illustrates the main features of the bonds in our sample. The typical fees charged by the underwriters are 0.88% of the par issued amount. In the vast majority of our sample, the bonds are offered via a negotiated sale: the fees are negotiated between the issuer and the underwriter, and are equal to the spread between the price the issuer receives and the price at which the underwriter sells the issue to the market.[9] The yield on a typical bond amounts to 7.22%, the average issue size is $357 million, and the maturity is about 13 years. 26.21% of the bonds are below investment grade.

Table 1.B shows that the average bond issuer in our sample has market capitalization of $22.16 billion, profitability (ROA) of 6%, and leverage (total debt divided by total assets) of 31%. Table 1.C compares the issuer characteristics in our sample with two other samples of listed firms that do not issue bonds in the same year, with/without long-term maturity rated bonds outstanding. The average bond issuer is larger, slightly more leveraged, and more profitable than the average listed firm with a debt credit rating. The differences with the listed universe without a debt rating are more pronounced. These findings are in line with the findings of Faulkender and Petersen (2006) and Billett, King, and Mauer (2007).

[7] We calculate accrued interest starting from the date of accruing interest (*dated_date* FISD variable) or, when missing, from the bond issue date, and until the date of the last interest payment (*last_interest_date* FISD variable) or, when missing, until the bond maturity.
[8] In unreported checks, we find that retaining those outliers does not affect our results.
[9] Negotiated sales take place for over 90% of the issues in our sample. The alternative is a competitive sale, when the selling price to the market is defined by the competitive bids by the brokers.

Table 1.D describes underwriter characteristics. Bond underwriting syndicates are set up and coordinated by lead underwriters, so we focus our analysis on them.[10] If a given underwriter is acquired by or merges with another bank, we re-assign all future bond issues to the surviving entity.[11] There are 134 lead underwriters in our sample. About half of the bonds are co-led by multiple banks, and the average number of lead underwriters on a bond is 2.3. The average underwriter market share, measured one year before the issue, is about 12%.[12] We also consider two partitions of the corporate bond market. One is based on 12 segments, at the intersection of 6 rating and 2 maturity groups; the second by Fama-French 10 industries. We obtain slightly higher average market shares under these partitions, in both cases around 14%.

[Insert Table 1 about here]

1.2 Measuring underwriter bargaining power

To study how underwriter bargaining power affects bond contracts, we develop a novel bargaining power measure. We build on insight from the industrial organization and banking literatures (Shaked and Sutton (1982), Degryse (1996), Degryse and Ongena (2005)). The intuition behind our measure is that an underwriter will enjoy greater bargaining power over a given issuer, if the issuer has few alternatives to the underwriter to take a bond to the market. In terms of the example in the introduction, J.P. Morgan will have stronger bargaining power over Oracle, if no underwriter

[10] Existing studies typically assume that the lead underwriters are solely responsible for the underwriting of the securities (e.g. Carter and Manaster (1990), Gande, Puri, and Saunders (1999), Fang (2005), Yasuda (2005), Ljungqvist, Marston, and Wilhelm (2006), Hoberg (2007)).

[11] We aggregate subsidiaries under their parent banks, and account for the history of mergers and acquisitions following the list of the principal M&As between underwriters provided in Ljungqvist, Marston and Wilhelm (2006) for 1988-2002, integrated with data from the SDC M&A database, bank websites, and press releases. The full list of M&As of banks underwriting bonds in our sample is described in Appendix C, Figure C.1.

[12] When computing market shares, we credit each lead underwriter with the full issue size. If we split the issue size in equal parts among all lead underwriters, the resulting average market share is about 13%.

other than J.P. Morgan can take Oracle's bond issue to the market. Thus our measure, which we call $Power$, reflects how difficult it is to replace the underwriter on a given issue.

The extent to which an underwriter is "difficult to replace" depends on her ability to place an issue on the market. We conjecture that placement ability is mainly driven by (i) the size of the issue, (ii) the underwriter's specialization in a given bond market segment, and (iii) the underwriter's specialization in a given industry. In the first place, a bank's balance sheet should be large enough to underwrite the issue, as the corporate bond market is characterized by a prevalence of "commitment" underwriting, where the underwriter purchases the bond from the issuer at a discount, while guaranteeing the full proceeds (Levinson (2014, p. 78)).[13] Secondly, while a small number of very large banks provide universal services and have dominating positions in league tables across different market segments, most underwriters are more specialized, and focus on a restricted number of segments.[14] Similar considerations apply, for instance, in equity IPOs, where issue size and industry are primary drivers of the underwriter choice (Ritter and Welch (2002)).

Building on these observations, we develop our bargaining power proxy as a function of a given underwriter's expected placement ability for a given bond issue, conditional on the issue's size and rating, maturity, and issuer industry. We focus on these characteristics because they can delineate bond market segments, by determining an issue's risk profile and transparency to the underwriter and the market (Datta, Iskandar-Datta, and Patel (1997), Helwege and Turner (1999), Yasuda (2005), Fang (2005)). We partition the bonds into six groups according to their ratings

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[13] SDC reports the offering technique for 79% bonds in our sample. "Commitment" underwriting accounts for 100% of these bonds. The alternative regime is "best effort" underwriting, in which the underwriter only pledges to make the best effort to sell the issue to investors.

[14] For example, in 2013 J.P. Morgan and Bank of America Merrill Lynch have the leading ranks in both global investment grade and high yield segments. On the other hand, Deutsche Bank and Credit Suisse do not even appear in the top-ten investment grade bond underwriters, while holding the 3rd and the 4th positions on the high yield segment (Wiegmann, (2013)).

(AAA, AA, A, BBB, BB, and B and lower), calculate the bonds' years to maturity, and classify issuers into the Fama-French 10 industries. Consistent with the idea that underwriters specialize, we find that for the average underwriter in our sample, the top (top three) rating group(s) accounts for 69% (94%) of her business, the top (top three) industry (industries) accounts for 61% (86%) of her business.

We then obtain our underwriter power measure, by comparing the bond size that the lead underwriter actually takes to the market with the bond size other banks could be expected to place. We proceed as follows. Given an underwriter u at a calendar quarter t, we consider the set of bonds taken to the market by each underwriter other than u (denoted by $-u$) over the preceding five-year period,[15] and estimate:

$$Bond\ size_b = \alpha + \sum_k \beta_k Rating(k)_b + \gamma Maturity_b + \sum_i \delta_i Ind(i)_b + \tau Trend_t + \varepsilon_b \quad (2)$$

where $Bond\ size$ denotes the natural logarithm of bond b's issue amount, $Rating(k)$ are indicator variables for the six credit rating categories, $Maturity$ is the natural logarithm of years to maturity at the bond issuance date, $Ind(i)$ are indicators for the 10 Fama-French industries, and $Trend$ denotes a time trend starting from the first quarter of 1970, when our sample begins. We obtain predicted coefficients $\hat{\alpha}_{-u}$, $\hat{\beta}_{-uk}$, $\hat{\gamma}_{-u}$, $\hat{\delta}_{-ui}$ and $\hat{\tau}_{-u}$ for each underwriter $-u$ and calendar quarter t, and obtain underwriter $-u$'s predicted placement ability on bond b as $\widehat{Bond\ size}_{-ub} = \hat{\alpha}_{-u} + \sum_k \hat{\beta}_{-uk} Rating(k)_b + \hat{\gamma}_{-u} Maturity_b + \sum_i \hat{\delta}_{-ui} Ind(i)_b + \hat{\tau}_{-u} Trend_t$. $\widehat{Bond\ size}_{-ub}$ reflects the amount that an underwriter other than u could place on the market, for a bond having characteristics such as those of bond b. We then define underwriter u's bargaining power on bond b as a function of the number of underwriters that could "replace" u as:

[15] Robustness checks, described below, reveal that our findings are not sensitive to the length of this time window.

$$Power_{ub} = -\ln\left(1 + \sum_{-u} \mathbb{I}\{\widehat{Bond\ size}_{-ub} \geq Bond\ size_b\}\right) \tag{3}$$

Intuitively, the larger the number of underwriters that could place a bond as large as b and with characteristics similar to b is, the weaker the bargaining power of underwriter u.

Table 1.E summarizes our measure of underwriter power. In a typical bond issue, the underwriter has a $Power$ of -2.48, corresponding to about 11 replacements, or about 28% of all active lead underwriters.[16] That is consistent with underwriter specialization predicting that only a relatively small number of banks are able to place a given issue. It is also line with the organizational structure of the bond market, where about ten "bulge-bracket" banks and a smaller number second-tier underwriters should be able to take the typical issue to the market. Figure 1 illustrates the variation in the average number of replacements to a set of the largest underwriters, ranked by the total underwritten amount over the sample period, broken down by segments based on bond size, rating, and time to maturity (upper panel), or issuer industry (lower panel). Darker cells indicate fewer possible replacements for the actual underwriter, i.e. stronger bargaining power. Overall, even among this set of very large banks, there is not a single underwriter with high $Power$ across all segments, suggesting that the variation in $Power$ across underwriters and segments is material.

Table 1.F presents the means of the fees and the offering yields by quintiles of $Power$. The difference in means between the top and the bottom quintiles is 20bps for the fees and 36bps for the yields, consistent with the notion that issues placed by more powerful underwriters are typically more costly for issuers. Relative to the average fee (88bps) and yield (7.22%), these effects also

[16] In Table 1.E we also report number of replacements, with an average of about 14. The discrepancy is due to the concavity of the logarithm function, via Jensen's inequality.

appear to be economically non-negligible. We test this point, which is central to our paper, using the approach discussed in the next section.

[Insert Figure 1 about here]

1.3 Empirical strategy

We exploit the features of our bargaining power proxy to address the identification challenges discussed in the introduction. The fact that $Power$ varies over time and across different issues for a given underwriter is key, because it provides us with a way to separate bargaining power from reputation, as well as to control for the underwriter-issuer matching, by means of a fixed effects strategy.

Going back to our example from the introduction, in our identification approach we compare the contract terms of bond issues by Oracle and AT&T that take place at the same time, and are both taken to the market by J.P. Morgan. Because J.P. Morgan's reputation does not vary across the two issues, by comparing the two issues we can isolate bargaining power effects. Also, since J.P. Morgan underwrites multiple issues of Oracle at different points in time, we can exploit the panel dimension of our data and control for the non-varying characteristics of the issuer-underwriter pair.

Based on this reasoning, in our baseline tests we estimate:

$$Contract\ term_{iut} = \alpha_{ut} + \beta Power_{iut} + \gamma' x_{iut} + \varepsilon_{iut} \qquad (4)$$

$Contract\ term_{uit}$ denotes the fees or the yield on a bond issued by issuer i at time t, and underwritten by underwriter u, and $Power_{iut}$ is the bargaining power of underwriter u over issuer i associated with the bond issue at t. x_{iut} is a set of issuer and bond controls, including calendar quarter indicator variables. Importantly, we include underwriter × time fixed effects (α_{ut} term above) to absorb the impact of reputation (and, indeed, any time-varying underwriter characteristics). To define the fixed effects, we focus on lead underwriters; i.e. in the terms of our example, the fixed effects group together all issues on which J.P. Morgan is the lead underwriter at a given date. Whenever there are multiple lead underwriters (in 4,726 cases, or 51% of the deals in our sample), we define fixed effects accounting for the syndicate composition; i.e. issues where J.P. Morgan and Goldman are the lead underwriters are treated separately from issues where J.P. Morgan and Morgan Stanley are the leads. Similarly, we also include issuer × underwriter fixed effects in equation (4).

2. Baseline tests

The univariate $Power$ sorts presented above indicate that powerful underwriters place bond issues at higher fees and lower prices (higher yields). These findings are consistent with powerful underwriters exploiting their bargaining power to impose less favorable contract terms on the issuers. An alternative interpretation is that weaker issuers turn to more powerful underwriters, because they would otherwise not be able to place their bonds on the market. Our identification strategy, as discussed, attempts to disentangle these two alternative stories; we now turn to those tests.

Our first set of tests looks at the relationship between underwriter bargaining power and issuance fees. Table 2.A reports the estimates of regressions of $Fees$ on $Power$, with the specification described by equation (4), where $Fees$ denotes the fees associated with a given bond issue as a percentage of bond size. Each observation is a given bond issue by issuer i, taken to the market by underwriter u, during calendar quarter t. $Power$ is our proxy for underwriter bargaining power. The control variables include a number of bond and issuer characteristics used in Fang (2005), Burch, Nanda and Warther (2005) and Yasuda (2005): bond rating indicators and log-years to maturity, and issuer size (natural logarithm of market equity), leverage, profitability (ROA), Fama-French 10 industries indicators, and calendar quarter indicators. All issuer characteristics are measured at the end of the year preceding the bond issue date. In addition to these controls, our regression specifications include increasingly stringent combinations of fixed effects. In all specifications, we cluster the standard errors by lead underwriter-issuer combinations.[17]

Specification (1) reports a statistically significant coefficient on $Power$ of 0.038, which is also economically large. An increase in $Power$ from the bottom to the top decile is associated with 7.11bps higher fees or an 8.1% increase relative to the average fees of 88bps.[18] Specification (2) also includes lead underwriter × year fixed effects, to disentangle the bargaining power and reputation effects. The coefficient on $Power$ in this specification is 0.059, so that an increase in $Power$ implies 11.04bps higher fees, or 12.5% relative to the average fee.

In specifications (3) and (4), we control for issuer and issuer × underwriter fixed effects respectively, controlling for time-invariant issuer characteristics and for the match between issuers and underwriters. We obtain coefficient estimates in line with those of specifications (1) and (2). Specification (4), which includes issuer × underwriter fixed effects, provides the most conservative estimates of 5.62 bps higher fees, or 6.4% relative to the average fees.

To assess the dollar value of the additional cost to issuers when they hire powerful underwriters, we follow the approach of Barrot and Sauvagnat (2016) as follows. We regress log-dollar fees ($\ln(Fees \times Bond\ size)$) on the full set of control variables and fixed effects of specification (4), except for $Power$. We then exponentiate the residuals for the subsamples of

[17] In robustness checks, we also cluster by issuer, by underwriter, and double-cluster by issuer and underwriter. In all cases, the statistical significance of our estimates is unaffected.

[18] The economic effects are computed as follows. The bottom-decile average level of $Power$ is –3.26; the top-decile is –1.39. Therefore $0.038 \times (-1.39 + 3.26) \times 100 = 7.11$bps. The effects discussed in the remainder of the paper are computed in the same way.

issues underwritten by the most and the least powerful banks, and take the difference, capturing the amount that the issuers lose in fees – expressed in dollar terms – when hiring more powerful banks. The average value for issues in the top decile of $Power$ is \$1.45m, while in the bottom decile it is \$0.91m, resulting in a difference of \$0.54m, or 21.7% of the \$2.51m that issuers typically pay in fees. The impact of underwriter bargaining power on issuance costs appears, therefore, substantial.

In Table 2.B we run a similar analysis on bond yields at issuance, regressing the bond's offering yield on $Power$. In all specifications, the coefficient on $Power$ is positive and statistically significant. It is also economically meaningful: Based on the estimates of specification (1), an increase in $Power$ from the bottom to the top decile is associated with a 49.6bps higher offering yield, or a 6.9% increase relative to the average offering yield of 7.22%. The other specifications imply that the effect of an inter-decile increase in $Power$ on bond yields ranges between 24 and 49.6bps, with the most conservative estimates in the specification (4) with issuer × underwriter fixed effects.

To estimate an impact in dollar terms, we follow the approach described above and regress log-dollar yields (ln ($Yield \times Bond\ size$) on the full set of control variables and fixed effects in specification (4), except $Power$. The mean value of the exponentiated residuals in the top decile of $Power$ is \$1.87m, which exceeds that of the bottom decile (\$0.89m). The difference amounts to \$0.98m, or about 5% of the \$19.61m typically dollar yield. Combining this effect with that of fees calculated above, we obtain an implied 7% (= (0.54 + 0.98) / (2.51 + 19.61)) increase total issuing costs. Overall, these findings are in line with our predictions that powerful underwriters can increase costs for bond issuers, and suggest that the implied extra cost for issuers is non-trivial.

[Insert Table 2 about here]

3. Alternative explanations

The results discussed above are consistent with the effects that we predict to be associated with underwriter bargaining power. Our fixed effects strategy, moreover, considerably raises the bar for alternative explanations. If we assume for a moment that $Power$ captures some underlying economic variable, e.g. underwriter reputation or certification, which matches issuers and underwriters, such variable must vary (i) within underwriter, at a given point in time, and (ii) within issuer-underwriter pair, over time. This restricts the potential alternative drivers for our results to a rather narrow set, and further requires that any "matching" variable changes precisely around new bond issues. To check for this possibility, and disentangle the effect of underwriter power from alternative explanations based on assortative matching, we turn to two additional sets of tests.

3.1 Certification

In our first set of tests, we address the possibility that our earlier findings are explained by underwriter certification and reputation. First, we examine the returns on bonds outstanding around the issue dates of new bonds of the same issuers. Since certification reduces the amount of adverse information about the issue or the issuer, the market should view the issuance of new underwritten bonds as good news (Booth and Smith (1986)). Thus, if certification, rather than underwriter bargaining power, drives our results, we expect a more favorable market reaction around issue dates of new bonds underwritten by banks with high $Power$. If, instead, the bargaining power mechanism dominates, the market reaction should be opposite, since worse contracts are imposed on the issuers. We would then observe more adverse market reaction the higher is the underwriter's power. In order to determine which of the two effects prevails, we compute cumulative abnormal returns (CARs) on bonds outstanding around issue dates of new bonds of the same issuers, and regress them on our bargaining power proxy. We calculate abnormal returns (ARs) following the matching portfolio approach of Bessembinder et al. (2009). We apply their "Rating & Maturity" approach, and partition the universe of bonds with available return data on a given day into 17 matching portfolios,[19] and compute, for each portfolio, value-weighted returns.[20]

Figure 2 illustrates the returns on bonds outstanding around new bond issues, for issues taken to the market by more versus less powerful underwriters (above/below median $Power$). The main conclusion from this test is already visible in the graph: when the underwriter of the new issue has higher $Power$, the price of existing bonds on the secondary market drops by around 36bps, over twice as much as when the underwriter has low $Power$.

We replicate this test in a regression framework, estimating:

$$CAR_{iut} = \alpha + \beta Power_{iut} + \gamma' x_{iut} + \varepsilon_{iut} \tag{7}$$

where CAR is the cumulative abnormal return on outstanding bonds. The set of controls mirror those of Table 2, i.e. bond rating and maturity, issuer size, profitability and leverage and calendar quarter fixed effects. Additionally, we control for the maturity and ratings of the bonds outstanding. We include in the sample all bonds whose issuers have a new issue in our sample period, with available price information from TRACE, and non-missing returns on day 0 relative to the new issue date. As before, we augment the regressions with fixed effects, and cluster standard errors by lead underwriter-issuer combinations.

The results are reported in Table 3. Across all specifications, we find a strong negative relationship between $Power$ and issue announcement returns. In economic terms, an increase in

[19] First, bonds are partitioned into six rating groups (AAA, AA, A, BBB, BB and B and below). The bonds in each rating group are then further partitioned by years to maturity. The cutoffs for A-rated bonds is 0 and 7 years to maturity, for other investment-grade bonds they are 0, 5 and 10 years to maturity, and for non-investment grade bonds they are 0, 6 and 9. The cutoffs are designed to ensure approximately equal-sized groups. In the robustness presented below, we show that partitioning bonds by rating only (the alternative approach suggested by Bessembinder et al. (2009)) yields very similar results. Renneboog, Szilagyi and Vansteenkiste (2017) come to a similar conclusion about using both rating and maturity or only rating partitions when studying bond returns.

[20] Similar results obtain if we equal-weight bonds in the matching portfolios.

$Power$ from the bottom to top decile is associated with a drop in the three-day CAR[-1,+1] by 66.1bps (specification (1)). Nearly identical effects (64.4bps) obtain if we control for issuer × underwriter fixed effects (specification (2)). In specifications (3) and (4), we compute abnormal returns over a longer window, from 10 days prior to 10 days after the new bond issue, to account for potential thin trading and stale prices of corporate bonds. Here too, a higher underwriter $Power$ is associated with a more negative market reaction to the new bond issue, and the implied impact of $Power$ appears even stronger.

To assess the economic significance of these findings, we compare the effects with the risk premium on a typical bond. In our sample, the mean yield spread over Treasury bonds with matching maturity is equal to 185bps. Thus, the additional drop in the outstanding bond returns over there-day period is equal to 35% (= 66.4 / 185) relative to the typical risk premium, which appears economically substantial.

[Insert Figure 2 and Table 3 about here]

In a second check, we isolate bond issuers who can benefit more from underwriter reputation and certification ability, and ask if we observe stronger effects of $Power$ on those issuers. We identify two sets of issuers with higher certification needs: (i) first-time issuers, who have never issuer a bond in the past, and (ii) issuers with low analyst coverage, below the industry median in the calendar quarter preceding the bond issue.

We estimate regression specifications analogous to those reported in Table 2, augmented by interacting indicators for first-time issuers and low-analyst coverage issuers with $Power$. The results are reported in Table 4. In both the fees' and the yields' regressions, the impact of $Power$ does not appear stronger, statistically or economically, for issuers with higher certification needs. The baseline effect of $Power$, on the other hand, appears in line with our baseline estimates.

In sum, the evidence from returns around new issues and from more opaque issuers suggests that $Power$ is unlikely to capture the effects of certification and underwriter reputation.

[Insert Table 4 about here]

3.2 Loyalty

In a second set of checks, we focus on loyalty. This is a version of the underwriter-issuer matching argument, suggesting that the issuer's choice of a given underwriter is due to the value of a continued relationship (Fernando, Gatchev, and Spindt (2005), Ljungqvist, Marston, and Wilhelm (2006)). Given our results so far, it is not obvious why issuers who can switch underwriter would stick with a given underwriter if that entails bearing higher issuance costs and, based on the findings of the previous section, no material certification benefit. Having said that, it is possible that some unobservable long-term benefit accrues to loyal issuers, motivating them to rely on the same underwriter. To check for this possibility, we perform two separate tests.

First, we restrict the attention to cases in which the issuer switches from an "old" to a "new" underwriter. We look at two subsamples: (i) bonds whose issuer and underwriter are matched for the first time (i.e. after a switch), and (ii) bonds whose issuer and underwriter are matched for the last time (i.e. before a switch). If loyalty drives our results, the expected benefits of the new relationship should be the highest, and the effect of $Power$ should far exceed its effect in the second case, when the issuer and underwriter meet the last time before the switch. The results in Table 5 show that, contrary to this argument, $Power$ increases issuer costs in both cases. The effects are similar across the two subsamples, and also similar to our baseline estimates of Table 2. This evidence is consistent with the notion that loyalty does not have a major impact on our tests.

[Insert Table 5 about here]

Second, we model loyalty and directly control for its impact on our tests. To do so, we resort to a two-stage procedure based on Heckman's (1979) selection model. In the first stage, we estimate a probit regression for the probability that a given issuer hire a given underwriter, as a function of having worked with the underwriter in the past on (a) a bond issue, (b) an equity issue, or (c) an M&A transaction. These variables reflect the existence of a past relationship between issuer and underwriter, and capture loyalty. To estimate the first stage, we create an indicator variable equal to one if an investment bank is the lead underwriter in a given bond issue and zero for all the alternative investment banks that are not hired to lead this particular issue, but have been "active" over the five years prior to the bond issue quarter and could potentially substitute underwriters. We also control for bond and issuer characteristics as in the baseline specification of Table 2, as well as calendar quarter indicators.

The estimates are reported in Table 6.A (fees) and Table 6.B (yields). The four specifications differ in the way we define "active" underwriters. We consider underwriters that in the past five years prior to the bond issue quarter placed: (1) any bond; (2) bonds of the same rating group, (3) same maturity group (below or about 10 years), or (4) same industry. Consistent with the evidence on loyalty from the literature (Fang (2005), Ljungqvist, Marston, and Wilhelm (2006)), all three variables have a strong, positive impact on the choice of a given underwriter in all the first stage regressions.

Based on the first-stage estimates, we derive inverse Mills ratios, which we include in the second-stage regressions. The inverse Mills ratios reflect the likelihood of a given underwriter-issuer match *as a function of loyalty*; i.e. they allow us to explicitly control for the impact of loyalty (as captured by past relationships between the issuer and the underwriter) in our estimates. The inverse Mills ratios appear to affect yields; the coefficients are negative indicating yields are decreasing in loyalty. However, they have at best a minor positive impact on fees. Importantly, controlling for loyalty does not have a material impact on our findings: the coefficients on $Power$ in all the specifications are very close to the estimates of specification (1) of Table 2.A and 2.B.

Taken together, the results of these tests reject the hypothesis that $Power$ captures the effect of certification or loyalty, and are more consistent with the predicted effects of underwriter bargaining power.

[Insert Table 6 about here]

4. Robustness

We conduct a series of robustness tests, summarized in Table 7. For brevity, that table only reports the estimates of the key coefficients and the associated t-statistics; but all regressions include the same sets of controls and fixed effects as in Table 2.A, specification (4) (fees tests), Table 2.B, specification (4) (yields tests), and Table 3, specifications (2) and (4) (announcement returns tests).

First, we consider alternative definitions of $Power$ (Table 7.A). A first set of alternative indexes builds on the literature on bargaining power in coalitions (Felsenthal and Machover (1998)). A large number of issues in our data (51%) have multiple lead underwriters, and implicitly our baseline $Power$ measure treats all alternative underwriter "coalitions" as equally relevant outside options for the issuer. That ignores the fact that a given underwriter might be critical to the forming of a given coalition, thus narrowing the range of alternatives effectively available to the issuer. The indexes of Banzhaf (1964) and Shapley and Shubik (1954) account for this. We thus develop measures of bargaining power based on those indexes, as described in Appendix A, and replicate our main tests using those measures instead of $Power$. The results, presented in Table

7.A, are very similar to the ones discussed in the previous section,[21] suggesting that a simple count-based index as $Power$ can provide an adequate measure of underwriter bargaining power. In a second set of robustness checks, presented in Table 7.A we also demonstrate that our results are not sensitive to the length of the estimation window used to define "replacement" underwriters, nor to restricting potential replacements to underwriters active in a given rating, industry, or maturity group. The parameter estimates of $Power$ and their statistical significance are similar to the baseline.

Second, we also consider the alternative ways of clustering standard errors (Table 7.B). We find that our estimates are robust to clustering by underwriters, or issuers, or to double-clustering by underwriters and issuers simultaneously.

Third, in about 10% of our sample, issuers offer multiple types of bonds on the same date. In Table 7.C, we aggregate these observations (weighting their characteristics by the size of each bond). We obtain similar, and actually slightly stronger results than our baseline estimates. We also consider alternative definitions of fees and yields and ways to compute CARs. In Table 7.C we estimate the impact of $Power$ on log-dollar fees, as well as on yield spreads relative to Treasuries of matching maturities. In Table 7.D, we use alternative definitions of the matching portfolios used to compute CARs for the announcement returns test. Instead of using value-weighted maturity-rating portfolios, we calculate (i) equally-weighed maturity-rating benchmark bond portfolios and (ii) bond portfolios based on six rating groups only. In both panels C and D, the results are in line with our baseline estimates.

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[21] The economic effects are computed as follows. The bottom-decile average level of Banzhaf (1954)-power index is 2.63; the top-decile is 7. Therefore, the economic effect on fees is $0.019 \times (7 - 2.63) \times 100 = 8.31$bps. Correspondingly, the economic effect on yields is 25.81bps and the economic effect on CAR[-1;+1] is 118.5bps. The bottom-decile average level of Shapley and Shubik (1964)-power index is 1.51; the top-decile is 11.02. Therefore, the economic effect on fees is $0.015 \times (11.02 - 1.51) \times 100 = 14.27$bps. Correspondingly, the economic effect on yields is 33.29bps and the economic effect on CAR[-1;+1] is 78bps.

Fourth, Table 7.E applies various sample filters. Our results appear robust to dropping: (i) issues that take place during the financial crisis of 2007-2008; (ii) issuers who use their financial subsidiary as underwriter (not reported);[22] (iii) issues with ratings below B- (as in Bessembinder et al. (2009)); and (iv) bonds issued prior to 2004, when TRACE was completed to cover corporate bonds of any size and rating.

[Insert Table 7 about here]

5. Conclusions

We study the impact of underwriter bargaining power on corporate bond contracting. We rely on a novel bargaining power proxy, which measures the extent to which an underwriter can be replaced by its competitors to place a bond issue. Because our measure varies *within underwriter, at a given point in time* across different bond issuers, we are able to disentangle the impact of bargaining power from the underwriter's reputation and certification ability using underwriter × date fixed effects. Comparing different issues that share the same underwriter at the same point in time, therefore, enables us to absorb the impact of certification, and hence identify bargaining power effects.

Our main findings are consistent with the view that powerful underwriters are able to extract rents from issuers that have a weaker bargaining position, in the form of higher underwriting fees and lower offering yields. On a sample of all corporate bond issues by publicly listed U.S. firms over a 45-year period (1970 to 2015), we find that going from an underwriter in the bottom bargaining power decile to an underwriter in the top decile is associated with a 6.4% increase in fees in relative terms, and a 3.3% relative increase in yields. In dollar terms, this amounts to a

[22] In our sample there is only a handful of such bonds, underwritten by General Electric Capital. Since our estimates are not sensitive to these observations, we omit these results for brevity.

$1.52 million extra cost for the typical issue, or about 7% higher costs for the average issuer in our sample.

Further checks attenuate concerns that our findings are explained by assortative matching between issuers and underwriters, driven by (a) certification, or (b) loyalty. First, the issuer's bonds outstanding exhibit negative returns around the issuance of a new bond taken to the market by a powerful underwriter; in contrast, the matching alternative would predict a positive, or at least non-negative, return. Second, when comparing issuers that are more opaque (first time on the corporate bond market, low analyst coverage) or more transparent, we do not observe any difference between the two types; in contrast, the matching alternative would predict stronger effects for more opaque issuers. Third, we obtain similar results on bonds issued just before or just after issuers switch the underwriters; the matching alternative would predict estimates on the new matches to be much higher driven by the expected benefits of the future issuer-underwriter relationship. Fourth, past hires of the same underwriter on bond, equity or M&A transactions do not erode our estimates on the underwriter power in the two-stage selection framework.

Overall, our results suggest that the effects of underwriter bargaining power are economically substantial. Underwriter bargaining power rents are not competed away, and lack of underwriter competition has material costs.

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Table 1: Descriptive statistics

The sample includes non-convertible $-denominated corporate bonds issued by U.S. firms from 1970 to 2015 and excludes exchange offers, medium-term notes, and bonds issued by financials and regulated utilities. The bond characteristics and the underwriting data come from Fixed Income Securities Database (FISD) and SDC Platinum Global New Issues (SDC). Issuer characteristics come from CRSP-Compustat Merged (CCM) Fundamentals Annual. Panel A presents the bond characteristics. Panel B presents the issuer characteristics computed at the end of the fiscal year prior to the bond issue date. Panel C compares characteristics of the issuers in our sample (1) with the characteristics of other firms from CCM with debt rating (2) or those without a debt rating (3). ***, **, and * denote significance levels of 0.01, 05 and 0.1, respectively, for the t-statistics of the mean difference test of (1) versus (2) and (1) versus (3). Panel D presents the characteristics of lead underwriters. Panel E describes our underwriter power proxy. Panel F computes the means of the fees and the yields in the quintiles of the power proxy, where t-statistics are on the differences between the top and the bottom quintiles and are clustered by lead underwriter-issuer combinations. For co-led bonds, we average the underwriter characteristics. All the dollar values are expressed in constant January 1, 2010 U.S. dollars. All the variables are winsorized at the 1st and 99th percentiles. Table A1 describes all the variables.

A. Bond characteristics	Mean	Median	St. Dev.	Min	Max	Obs.
Fees (%)	0.88	0.65	0.72	0.00	3.50	7,971
Yield (%)	7.22	7.13	2.93	0.00	15.00	9,029
Bond size ($mln)	357	203	413	1	2,205	9,356
Maturity (years)	12.87	10.02	9.05	2.00	40.04	9,356
Bonds in rating group (%)	AAA	AA	A	BBB	BB	B and below
N=9,356	1.08	8.68	30.17	33.86	11.49	14.72

B. Issuer characteristics	Mean	Median	St. Dev.	Min	Max	Obs.
Market capitalization ($mln)	22,158	5,382	42,923	42	231,814	9,348
Profitability	0.06	0.06	0.06	-0.16	0.27	9,124
Leverage	0.31	0.29	0.15	0.01	0.74	9,332

C. Comparison with CCM firms (at firm-year level)	(1) Our sample		(2) Rest of CCM with debt rating		(3) Rest of CCM without debt rating	
	Mean	Obs	Mean	Obs	Mean	Obs
Market capitalization ($mln)	9,522	5,277	6,062***	23,134	566***	155,425
Profitability	0.05	5,273	0.04***	22,415	0.00***	140,510
Leverage	0.35	5,267	0.33***	23,162	0.20***	157,694

D. Underwriter characteristics	Mean	Median	St. Dev.	Min	Max	Obs.
Co-led	50.51	100.00	50.00	0.00	100.00	9,356
Number of lead underwriters	2.29	2.00	1.76	1.00	9.00	9,356
Market share	12.15	12.63	5.64	0.00	25.41	9,355
Segment market share	13.75	13.14	9.72	0.00	56.36	9,355
Industry market share	13.56	13.16	9.78	0.00	55.12	9,355

E. Underwriter power proxy	Mean	Median	St. Dev.	Min	Max	Obs.
Power	-2.48	-2.64	0.69	-3.58	-0.69	9,350
Replacements	13.61	13.00	8.15	1.00	35.00	9,350
All active underwriters	38.87	40.00	9.22	1.00	58.00	9,355
Banzhaf (1954)-power index	4.75	4.45	2.01	1.71	13.45	9,350
Shapley and Shubik (1964)-power index	5.80	5.07	4.14	0.61	22.19	9,350

F. Fees and yields by power	High	Q2	Q3	Q4	Low	High-Low	t-stat
Fees (%)	0.99	0.93	0.84	0.83	0.79	0.20	5.13***
Offering yield (%)	7.33	7.33	7.24	7.16	6.97	0.36	2.26**

Table 2: Fees, yields and underwriter power

The table presents the estimation results of the regression of the fees and the bond yield to maturity at the issue date on the underwriter bargaining power proxy ($Power$), a set of controls, and fixed effects. In Panel A, the dependent variable is the fees paid by the issuer to the underwriters to bond size at par, expressed in percentage points. In Panel B, the dependent variable is bond yield to maturity at the issuance date, expressed in percentage points. $Power = -\ln(1 + Replacements)$, where $Replacements$ is the number of underwriters that could replace a lead underwriter on a given bond. t-statistics clustered by lead underwriter-issuer combination are in parentheses. ***, **, and * denote significance levels of 0.01, 05 and 0.1, respectively. All the variables are winsorized at the 1st and 99th percentiles. Table A1 describes all the variables.

A. Fees	(1)	(2)	(3)	(4)
Power	0.038***	0.059***	0.032***	0.030***
	(3.84)	(4.74)	(2.67)	(2.87)
Maturity	0.175***	0.173***	0.182***	0.185***
	(25.85)	(20.10)	(23.39)	(26.69)
Issuer size	-0.105***	-0.112***	-0.128***	-0.104***
	(-13.14)	(-9.97)	(-4.96)	(-3.17)
Profitability	0.330***	0.348**	-0.106	0.045
	(3.00)	(1.99)	(-0.47)	(0.19)
Leverage	0.077	0.136*	-0.106	-0.200
	(1.50)	(1.69)	(-0.78)	(-1.24)
Observations	7,782	6,570	6,094	5,404
R-squared	0.72	0.81	0.86	0.88
Rating f.e.	Yes	Yes	Yes	Yes
Quarter f.e.	Yes	Yes	Yes	Yes
Fama-French industry 10 f.e.	Yes	Yes		
Issuer f.e.			Yes	
Underwriter × year f.e.		Yes	Yes	
Underwriter × issuer f.e.				Yes

B. Yields	(1)	(2)	(3)	(4)
Power	0.265***	0.233***	0.162***	0.128***
	(9.66)	(5.39)	(3.83)	(3.30)
Maturity	0.868***	0.859***	0.890***	0.917***
	(34.19)	(28.76)	(29.55)	(33.31)
Issuer size	-0.348***	-0.323***	-0.498***	-0.382***
	(-16.51)	(-10.46)	(-6.94)	(-4.09)
Profitability	-1.830***	-1.294**	-1.314**	-1.150
	(-4.50)	(-2.11)	(-2.02)	(-1.35)
Leverage	-0.243	0.210	0.360	0.437
	(-1.56)	(0.89)	(0.94)	(0.91)
Observations	8,758	7,355	6,748	5,777
R-squared	0.76	0.82	0.91	0.92
Rating f.e.	Yes	Yes	Yes	Yes
Quarter f.e.	Yes	Yes	Yes	Yes
Fama-French industry 10 f.e.	Yes	Yes		
Issuer f.e.			Yes	
Underwriter × year f.e.		Yes	Yes	
Underwriter × issuer f.e.				Yes

Table 3: CARs of bonds outstanding and underwriter power

The table presents the estimation results of the regressions of the cumulative abnormal returns (CARs) of bonds outstanding around the dates of new bond issues by the same issuers (day 0) on the underwriter bargaining power proxy ($Power$) for the banks underwriting new bonds, a set of controls, and fixed effects. The abnormal returns (ARs) are cumulated over [-1,+1] and [-10,+10] and are computed relative to the matching portfolio following Bessembinder et al. (2009). In the matching portfolios, which are constructed for rating and maturity groups, we use all available returns, which we value-weight each day. The weights are the market value of the bonds on the previous day. In all the regressions we require non-missing ARs on day 0. $Power = -\ln(1 + Replacements)$, where $Replacements$ is the number of underwriters that could replace a lead underwriter on a given bond. t-statistics are clustered by lead underwriter-issuer combinations and presented in parentheses. If a firm issues multiple bonds on a given date, we weight the characteristics of these bonds by bond size. ***, **, and * denote significance levels of 0.01, 05 and 0.1, respectively. All the variables are winsorized at the 1st and 99th percentiles. Table A1 describes all the variables.

	(1)	(2)	(3)	(4)
	CAR [-1,+1]	CAR [-1,+1]	CAR [-10,+10]	CAR [-10,+10]
Power	-0.395***	-0.344**	-0.633***	-0.658**
	(-3.53)	(-2.44)	(-3.26)	(-2.32)
Maturity	-0.244***	-0.231**	-0.275**	-0.137
	(-2.90)	(-2.13)	(-2.22)	(-0.66)
Maturity of bonds outstanding	-0.221***	-0.219***	-0.253***	-0.251***
	(-6.87)	(-7.57)	(-5.68)	(-6.24)
Issuer size	-0.230	-1.281**	-0.156	-1.516**
	(-0.75)	(-2.39)	(-0.40)	(-2.11)
Profitability	-0.489	-0.083	1.881	6.522*
	(-0.35)	(-0.05)	(0.62)	(1.75)
Leverage	-2.244**	-2.828	0.302	-0.865
	(-2.21)	(-1.41)	(0.18)	(-0.39)
Observations	3,309	3,212	3,309	3,212
R-squared	0.46	0.47	0.44	0.45
Rating f.e.	Yes	Yes	Yes	Yes
Rating of bonds outstanding f.e.	Yes	Yes	Yes	Yes
Quarter f.e.	Yes	Yes	Yes	Yes
Issuer f.e.	Yes		Yes	
Underwriter f.e.	Yes		Yes	
Underwriter × issuer f.e.		Yes		Yes

Table 4: Fees, yields and underwriter power and certification needs

The table presents the estimation results of the regression of the fees and the bond yield to maturity at the issue date on the underwriter bargaining power proxy ($Power$) interacted with proxies for certification needs (*First time on the market* and *Low analyst coverage*), and a set of controls and fixed effects. Fees is the fees paid by the issuer to the underwriters to bond size at par, expressed in percentage points. Yield is bond yield to maturity at the issuance date, expressed in percentage points. $Power = -\ln(1 + Replacements)$, where $Replacements$ is the number of underwriters that could replace a lead underwriter on a given bond. *First time on the market* is an indicator variable equal to one for the first bonds of a given issuer, and 0 otherwise. *Low analyst coverage* is an indicator variable equal to one if the number of I/B/E/S estimates in the quarter before the bond issue date is lower than that of the industry × quarter median or is missing, and 0 otherwise. The set of controls and fixed effects is the same as in Table 2.A and Table 2.B, specification (1) for the fees and the yields respectively. t-statistics clustered around lead underwriter-issuer combinations are in parentheses. ***, **, and * denote significance levels of 0.01, 05 and 0.1, respectively. All the variables are winsorized at the 1st and 99th percentiles. Table A1 describes all the variables.

	Fees		Yields	
	(1)	(2)	(3)	(4)
Power	0.039***	0.032**	0.264***	0.253***
	(3.89)	(2.41)	(9.87)	(5.87)
Power × *First time on the market*	-0.022		-0.036	
	(-0.96)		(-0.46)	
First time on the market	0.010		0.062	
	(0.18)		(0.31)	
Power × *Low analyst coverage*		0.009		0.015
		(0.65)		(0.30)
Low analyst coverage		0.034		0.062
		(0.89)		(0.46)
Bond and issuer controls	Yes	Yes	Yes	Yes
Observations	7,804	7,804	8,779	8,779
R-squared	0.73	0.73	0.75	0.75
Rating f.e.	Yes	Yes	Yes	Yes
Quarter f.e.	Yes	Yes	Yes	Yes

Table 5: Fees, yields and underwriter power around underwriter switches

The table presents the estimation results of the regression of the fees and the bond yield to maturity at the issue date on the underwriter bargaining power proxy ($Power$), and a set of controls and fixed effects. Fees is the fees paid by the issuer to the underwriters to bond size at par, expressed in percentage points. Yield is bond yield to maturity at the issuance date, expressed in percentage points. $Power = -\ln(1 + Replacements)$, where $Replacements$ is the number of underwriters that could replace a lead underwriter on a given bond. *New underwriter* denotes the subsample of the bond issues underwritten by a new underwriter after the issuer switches underwriter from the old underwriter to the new one. *Past underwriter* denotes the subsample of the bond issues underwritten by an old underwriter before the issuer switches underwriter. t-statistics clustered around lead underwriter-issuer combination are in parentheses. ***, **, and * denote significance levels of 0.01, 05 and 0.1, respectively. All the variables are winsorized at the 1st and 99th percentiles. Table A1 describes all the variables.

	Fees		Yields	
	(1) *New underwriter*	(2) *Past underwriter*	(3) *New underwriter*	(4) *Past underwriter*
Power	0.052***	0.048**	0.191***	0.376***
	(2.59)	(2.10)	(3.02)	(4.71)
Maturity	0.154***	0.145***	0.733***	0.726***
	(10.06)	(8.83)	(13.84)	(12.72)
Issuer size	-0.107***	-0.102***	-0.315***	-0.334***
	(-7.98)	(-6.96)	(-8.66)	(-7.47)
Profitability	-0.133	-0.137	0.079	-0.420
	(-1.17)	(-1.24)	(0.27)	(-1.18)
Leverage	0.366	-0.181	-2.118***	-1.082
	(1.61)	(-0.73)	(-3.15)	(-1.21)
Observations	2,125	2,112	2,445	2,265
R-squared	0.70	0.71	0.79	0.72
Rating f.e.	Yes	Yes	Yes	Yes
Quarter f.e.	Yes	Yes	Yes	Yes
Fama-French industry 10 f.e.	Yes	Yes	Yes	Yes
Underwriter f.e.	Yes	Yes	Yes	Yes

Table 6: Fees, yields and underwriter power

The table presents estimation results for the two-stage Heckman (1979) selection model. In the first stage probit model, the dependent variable is equal to 1 if the underwriter was the lead underwriter of a given bond issue and 0 if he was not selected to lead this bond issue but was an active underwriter at any bond issue in the prior five years. In Columns (1)-(4), as potential substitute underwriters of a given bond, we only consider underwriters that placed: (1) any bond; bonds of the same (2) rating group, (3) maturity group (below or about 10 years), or (4) industry. There are six rating groups (AAA, AA, BBB, B, B and below), two maturity groups (bonds with below and above ten years to maturity), and ten Fama-French industries. The independent variables are indicators capturing past relationships between underwriters and issuers in the bond market, equity markets, and in merger and acquisition (M&A) transactions, all of which are constructed using SDC Platinum data. We consider past underwriting of all the bonds including the ones outside of our sample, and of both primary and secondary equity offerings. In the second stage, we regress the fees and bond yield to maturity at the offering date on underwriter bargaining power proxy ($Power$), a set of controls and fixed effects, and inverse Mill's ratios from the first stage regressions. Our proxy also changes with the definition of *active* underwriter, since it restricts the set from which we define potential replacements. In Panel A, the dependent variable at the second stage is the fees paid by the issuer to the underwriters to bond size at par, expressed in percentage points. In Panel B, the dependent variable at the second stage is bond yield to maturity at the issuance date, expressed in percentage points. $Power = -\ln(1 + Replacements)$, where $Replacements$ is the number of underwriters that could replace a lead underwriter on a given bond. t-statistics clustered around lead underwriter-issuer combination are in parentheses. *** denotes 0.01, ** denotes 0.05 and * denotes 0.1 significance levels. All the variables are winsorized at the 1st and 99th percentiles. Table A1 describes all the variables.

A. Fees	All	Active in rating group	Active in maturity group	Active in industry
1st stage: Choice of underwriter	(1)	(2)	(3)	(4)
Past bonds underwriter	1.479***	1.379***	1.446***	1.369***
	(61.59)	(55.62)	(59.74)	(54.08)
Past equity underwriter	0.725***	0.686***	0.712***	0.655***
	(19.05)	(17.84)	(18.69)	(16.88)
Past M&A advisor	0.793***	0.722***	0.769***	0.680***
	(15.27)	(13.92)	(14.84)	(13.11)
Bond and issuer controls	Yes	Yes	Yes	Yes
Observations	348,552	202,763	293,101	173,500
χ^2 for ρ=0	2.29	2.33	2.29	2.64
P-value for χ^2	0.13	0.13	0.13	0.10
Rating f.e.	Yes	Yes	Yes	Yes
Quarter f.e.	Yes	Yes	Yes	Yes
2st stage:	(1)	(2)	(3)	(4)
Power	0.039***	0.028***	0.038***	0.031***
	(3.80)	(3.38)	(3.95)	(4.02)
Inverse Mills' ratio	0.013	0.014	0.013	0.015
	(1.51)	(1.53)	(1.51)	(1.63)
Bond and issuer controls	Yes	Yes	Yes	Yes
Observations	7,789	7,780	7,783	7,780
R-squared	0.71	0.72	0.71	0.70
Rating f.e.	Yes	Yes	Yes	Yes
Quarter f.e.	Yes	Yes	Yes	Yes

Table 6 continues on the next page.

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B. Yields	All	Active in rating group	Active in maturity group	Active in industry
1st stage: Choice of underwriter	(1)	(2)	(3)	(4)
Past bonds underwriter	1.420***	1.315***	1.385***	1.304***
	(49.07)	(44.48)	(47.64)	(43.34)
Past equity underwriter	0.795***	0.753***	0.781***	0.722***
	(20.77)	(19.50)	(20.40)	(18.51)
Past M&A advisor	0.784***	0.712***	0.760***	0.670***
	(15.21)	(13.83)	(14.77)	(13.01)
Bond and issuer controls	Yes	Yes	Yes	Yes
Observations	349,528	203,739	294,077	174,476
χ^2 for $\rho=0$	8.62	7.49	8.63	7.90
P-value for χ^2	0.00	0.01	0.00	0.00
Rating f.e.	Yes	Yes	Yes	Yes
Quarter f.e.	Yes	Yes	Yes	Yes
2st stage:	(1)	(2)	(3)	(4)
Power	0.257***	0.184***	0.248***	0.198***
	(9.51)	(8.27)	(9.89)	(9.17)
Inverse Mills' ratio	-0.070***	-0.071***	-0.072***	-0.075***
	(2.84)	(2.65)	(2.84)	(2.72)
Bond and issuer controls	Yes	Yes	Yes	Yes
Observations	8,765	8,756	8,759	8,756
R-squared	0.79	0.79	0.79	0.79
Rating f.e.	Yes	Yes	Yes	Yes
Quarter f.e.	Yes	Yes	Yes	Yes

Table 7: Robustness

This table presents the robustness test of the results presented in Tables 2 and 3. The dependent variables are: fees, yields, and CARs on bonds outstanding. In all the panels, the set of controls and fixed effects is the same as in Table 2.A and Table 2.B, specification (4) for the fees and the yields respectively, and Table 3 specification (2) for CAR[-1,+1] and specification (4) for CAR[-10,+10]. Panel A varies the ways we compute our bargaining power proxy. First, we consider alternative measures of bargaining power based on Banzhaf (1964) and Shapley and Shubik (1954) indices. Second, to estimate the placement ability model (equation (2)), we use (i) three years of past issues or (ii) all past issues. Third, as potential substitute underwriters of a given bond, we only consider underwriters that placed bonds of the same (iii) rating, (iv) maturity group or (iv) industry, within the five years prior to a bond issue quarter. Rating groups are AAA, AA, A, BBB, BB, B, and B and below, maturity is split into two groups by the median value of ten years to maturity at the issuance date, and industries are 10 Fama-French industries. Panel B clusters t-statistics by underwriter, issuer, or employs double clustering by lead underwriter and issuer simultaneously. Panel C repeats the results for the bonds issued by a given firm on the same date are grouped with their characteristics weighted by the bond size. It also presents the estimation results for the logarithm of the fees expressed in million dollars and the yield spread relative to the Treasury bond benchmark with matching maturity. Panel D presents the results for CARs equations based on matching portfolios with equally weighted returns or on returns partitioned into six rating groups. Panel E removes the crisis years 2007 and 2008 from the sample. Also, it excludes bonds rated worse than B- and bonds issued before October 1, 2004 (before the stage III of TRACE introduction). ***, **, and * denote significance levels of 0.01, 05 and 0.1, respectively. All the variables are winsorized at the 1st and 99th percentiles. Table A1 describes all the variables.

A. Construction of Power	Fees	Yields	CAR [-1,+1]	CAR [-10,+10]
Banzhaf (1954)-power index	0.019***	0.059**	-0.271***	-0.270
	(2.76)	(2.23)	(-3.18)	(-1.62)
Shapley and Shubik (1964)-power index	0.015***	0.035**	-0.082	-0.221*
	(3.74)	(2.57)	(-1.05)	(-1.81)
3 years of past issues	0.022**	0.162***	-0.451***	-0.697**
	(2.14)	(4.38)	(-2.99)	(-2.38)
All past issues	0.041***	0.174***	-0.529**	-0.904**
	(3.15)	(3.64)	(-2.39)	(-2.21)
Active in rating group	0.026***	0.118***	-0.423***	-0.566***
	(2.85)	(3.32)	(-3.86)	(-2.60)
Active in maturity group	0.034***	0.134***	-0.343***	-0.482*
	(3.11)	(3.71)	(-2.64)	(-1.75)
Active in industry	0.022**	0.106***	-0.306***	-0.357*
	(2.39)	(3.36)	(-3.08)	(-1.86)

B. Clustering of standard errors	Fees	Yields	CAR [-1,+1]	CAR [-10,+10]
By issuer	0.030***	0.128***	-0.344**	-0.658**
	(2.64)	(3.27)	(-2.43)	(-2.10)
By underwriter	0.030**	0.128***	-0.344**	-0.658**
	(2.08)	(3.12)	(-2.19)	(-2.42)
By issuer and underwriter	0.030**	0.128***	-0.344**	-0.658**
	(1.99)	(3.09)	(-2.18)	(-2.17)

C. Grouping bonds and changing dependent variables	Grouped within issuer-date		ln($ Fees)	Yield spread
	Fees	Yields		
	0.091***	0.203***	0.751***	0.072**
	(4.34)	(2.60)	(36.13)	(2.37)

Table 7 continues on the next page

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D. Matching portfolios to compute abnormal bond returns	Equally weighted		Grouped by rating	
	CAR [-1, +1]	CAR [-10, +10]	CAR [-1, +1]	CAR [-10,+10]
	-0.379***	-0.808***	-0.412***	-0.799***
	(-2.81)	(-2.71)	(-2.81)	(-3.12)
E. Sample filters	Excluding 2007-2008			
	Fees	Yields	CAR [-1, +1]	CAR [-10, +10]
	0.034***	0.131***	-0.356**	-0.513***
	(3.05)	(3.17)	(-2.27)	(-2.66)
	Since October 1, 2004		Excluding bonds rated below B-	
	CAR [-1, +1]	CAR [-10, +10]	CAR [-1, +1]	CAR [-10, +10]
	-0.319**	-0.719**	-0.341**	-0.656**
	(-2.02)	(-2.41)	(-2.44)	(-2.32)

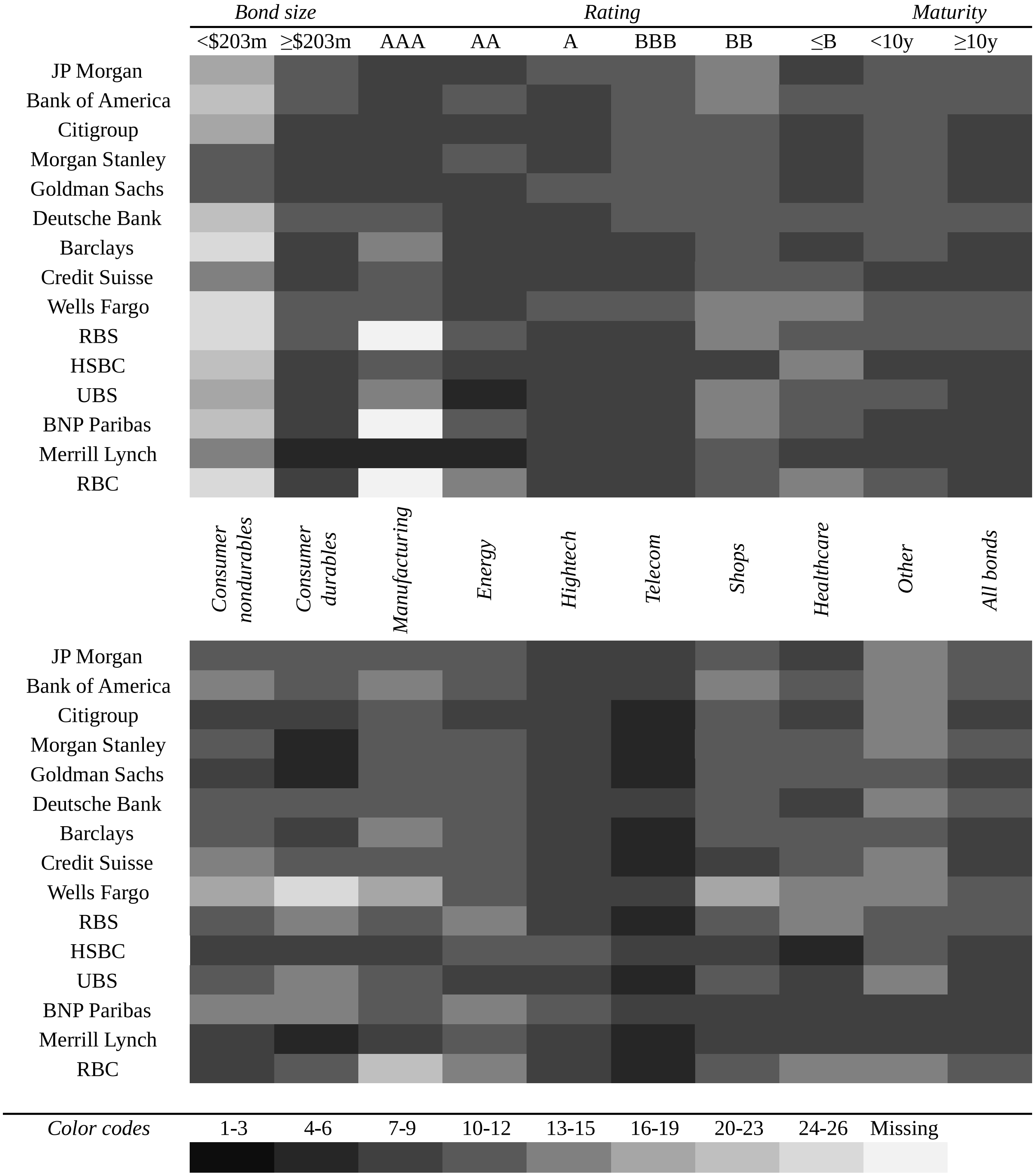

Figure 1: Underwriter power by segments and industries

The table shows the average number of replacements for the underwriters listed on the vertical axis, in the groups listed on the horizontal axis. Replacements are defined as the number of underwriters that could replace a lead underwriter on a given bond, on the basis of our estimated placement ability. Darker areas correspond to fewer replacements, implying a higher bargaining power. Bond size of $203m (in constant 2010 U.S. dollars) and maturity of 10 years are the median values. Industries are the ten Fama-French industry groups.

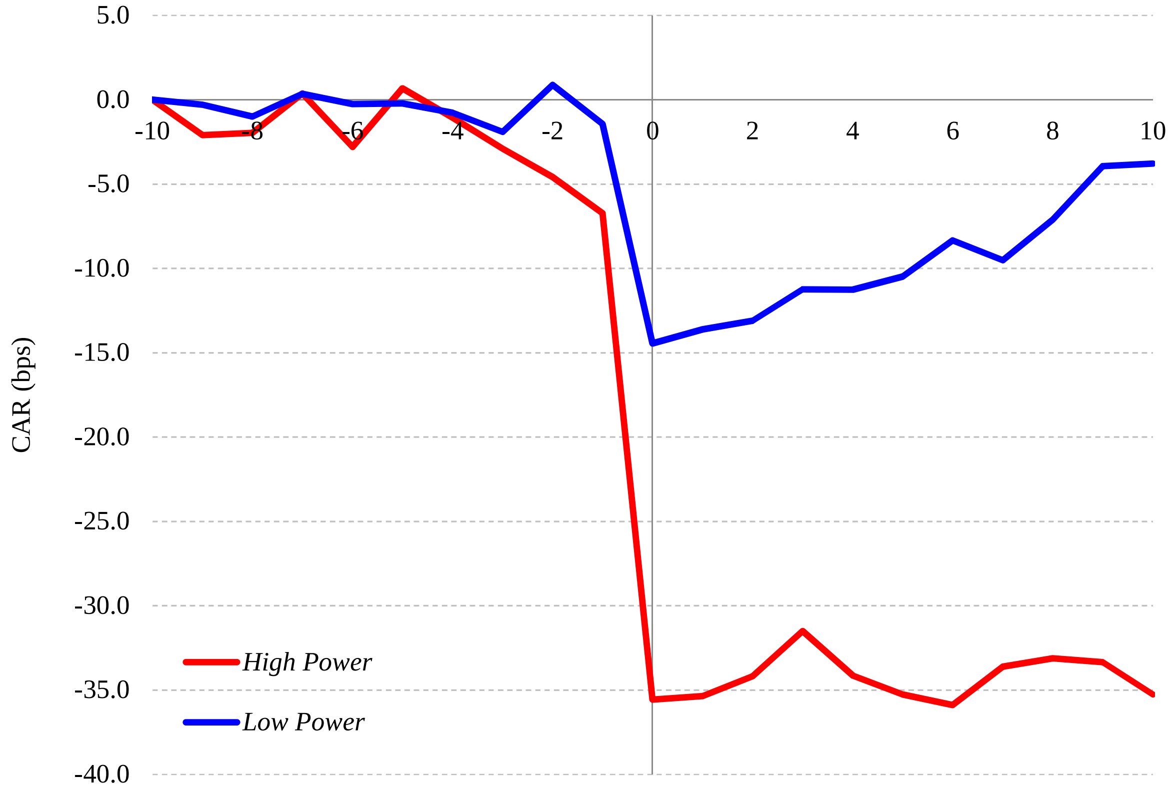

Figure 2: Returns on bonds outstanding and underwriter power
The graph presents cumulative abnormal returns (CARs) on bonds outstanding around the dates of new bond issues (day 0) by the same issuer. The CARs are split by the median value of underwriter bargaining power ($Power$) for banks taking the new bonds to the market. Abnormal returns (ARs) are value-weighted on each day, and then cumulated. The ARs are computed relative to matching portfolios based on rating and maturity groups following Bessembinder et al. (2009). The high (low) power group refers to new bonds underwritten by banks with above (below) median $Power$. If a firm issues multiple bonds on a given date, we weight the power of the underwriters of these bonds by the bond size.

Appendix A

Table A1: Description of variables

The sample includes non-convertible, U.S. dollar-denominated corporate bonds issued by U.S. firms from 1970 to 2015, excluding exchange offers, medium-term notes, and bonds issued by financials and regulated utilities. Bond characteristics and underwriting data are retrieved from the Fixed Income Securities Database (FISD) and SDC Platinum Global New Issues (SDC). Issuer characteristics come from CRSP-Compustat Merged (CCM) Fundamentals Annual. Issuer characteristics are computed at the end of the fiscal year prior to the bond issue date. "Dollar" variables are expressed in constant 2010 U.S. dollars, deflated using the Producer Price Index.

Variables	Description
Bond characteristics	
Fees	The sum of managing fees, underwriting fees, and selling concessions expressed as a percentage of par. It is equal to FISD *Gross_spread* divided by FISD *Principal_amt.* If *Gross_spread* is missing, it is equal to SDC *GPCT*. We also replace FISD values by the SDC fee values when SDC reports positive fee values whereas FISD does not reports fees.
Yield	Bond yield at issuance date. It is equal to FISD *Offering_yield*, and if missing to SDC *Y*. We replace FISD values by SDC values when SDC reports positive yield values whereas FISD reports zero or below zero yields.
Bond size	Par value of initially issued bond that are gross proceeds from the bond issue. It is equal to FISD *Offering_amt* and, if missing, to SDC *AMT*.
Large bond	Indicator variable equal to one if bond size is larger than the median bonds size value ($203m), and zero otherwise.
Rating groups	Six bond rating groups AAA, AA, A, BBB, BB, B and below, based on the FISD *Rating* closest to the bond issue date and, if missing, based on SDC rating variables *QMOODY*, *QSP*, and *QFITCH*. We compute averages across Moody's, Standard and Poor's and Fitch ratings, round values to a notch, and then allocate them to a group such that e.g. AA includes AA+/AA- bonds, A includes A+/A- bonds, etc.
Maturity	Difference between principal due date minus issuance date, divided by 365. Principal due date is equal to FISD *Maturity*, and, if missing, to SDC *FINALMATURITY_YYYY*. Issue date is equal to FISD *Offering_date* and, if missing, to SDC *D*.
Issuer characteristics	
Market capitalization	Share price (Compustat data item *rpcc_f*) multiplied by the number of shares (*csho*).
ROA	Net income (Compustat data item *ni*) divided by lagged total assets (*at*).
Leverage	Sum of long term debt (Compustat data item *dltt*) and debt in current liabilities (*dlc*) divided by total assets (*at*).
First time on the market	An indicator variable equal to one if on a given year the firm issues a bond for the first time, and 0 otherwise.
Low analyst coverage	An indicator variable equal to one if the number of I/B/E/S estimates in the quarter before the bond issue date is lower than the industry-quarter median or missing, and 0 otherwise.
Underwriter characteristics	
$Power$	The main measure of underwriter bargaining power in a given bond issue. Given a lead underwriter u at date (calendar quarter) t, we consider the set of bonds taken to the market by each underwriter other than u (denoted by $-u$) over the preceding five-year period, and estimate: $Bond\ size_b = \alpha + \sum_k \beta_k Rating(k)_b + \gamma Maturity_b + \sum_i \delta_i Ind(i)_b + \tau Trend_t + \varepsilon_b$, where $Bond\ size$ is the natural logarithm of the gross proceeds of bond b, $\mathbb{I}\{Rating_b\}$ are indicator variables for the six credit rating categories, $Maturity$ is the natural logarithm of bond years to maturity at the bond

	issuance date, $\mathbb{I}\{Und_b = u\}$ are indicator variables for the lead underwriters, based on the 10 Fama-French industries, and $Trend$ is time trend starting in the first quarter of 1970 (where our sample begins). We thus obtain underwriter $-u$'s predicted placement ability as $\widehat{Bond\ size}_{-ub} = \hat{\alpha}_{-u} + \sum_k \hat{\beta}_{-uk} Rating(k)_b + \hat{\gamma}_{-u} Maturity_b + \sum_i \hat{\delta}_{-ui} Ind(i)_b + \hat{\tau}_{-u} Trend_t$, where ˆ denotes predicted coefficients. We then define underwriter u's bargaining power on bond b as $Power_{ub} = -\ln\left(1 + \sum_{-u} \mathbb{I}\left\{\widehat{Bond\ size}_{-ub} \geq Bond\ size_b\right\}\right)$.
Banzhaf (1954)-power index	For an underwriter u, the measure equals to the number of coalitions that would not be able to place a bond b without u, divided by the number of all coalitions that could place the bond. The index is expressed in percentage points. Any underwriters active in the past five years can form a coalition, i.e. jointly underwrite a bond, and if the amount they could jointly underwrite exceeds the bond size, the coalition could place the bond b. The actual underwriters of bond b are assumed to contribute an amount equal to the bond size divided by the number of lead underwriters on the bond. Other underwriters contribute the amount predicted by our underwriter placement ability model, where the bond size is divided by the number of lead underwriters on the bond.
Shapley and Shubik (1964)-power index	The measure is similar to the Banzhaf (1954)-power index, with the difference that the order in which underwriters enter a coalition matters. For an underwriter u, Shapley and Shubik (1964) power index equals to the number of coalitions that become able to place the bond b after u joins the coalition, divided by the number of all such "sequential" coalitions. The index is expressed in percentage points.
Co-led	Indicator variable equal to one if the number of lead underwriters on a bond is greater than one, and zero otherwise.
Number of lead underwriters	Number of lead underwriters underwriting a given bond.
Market share	The sum of the offering amount of all bonds placed by a given underwriter over a four-quarter rolling window, divided by the corresponding sum over all active underwriters. In co-led bonds, we credit each lead underwriter with the full bond size.
Segment market share	Market share, as defined above, computed on each of 12 segments formed at the intersection of six rating groups (AAA, AA, A, BBB, BB, B and below) and two maturity groups (below and above ten years to maturity at the issue date).
Industry market share	Market share, as defined above, computed on each of the ten Fama-French industries.
Scope of past relationship	This variable is computed following Fang (2005): it is equal to the sum of three indicator variables that are equal to 1 if a lead underwriter was involved in any past issues of (1) bonds or (2) equities, or (3) was advising the issuer on past mergers and acquisitions over the ten-year period prior the bond issue date. We consider past underwriting of all the bonds including the ones outside of our sample, and of both primary and secondary equity offerings. The data for this variable come from the SDC Global New Issues and SDC Mergers and Acquisitions.

Appendix B. Sample construction

We obtain corporate bond characteristics and underwriting data from Mergent Fixed Income Securities database (FISD) and SDC Platinum Global New Issues database (SDC). The coverage of these datasets presents slight differences, and in general FISD provides information on a broader range of bonds. The intersection of FISD and SDC covers 78.5% (7,347 bonds) of the bonds in our sample, while 19.3% (1,806 bonds) comes only from FISD, and 2.2% (203 bonds) comes only from SDC. In contrast to the SDC database, FISD comprises only bond data and provides a wider range of bond characteristics (such as detailed information on covenant protection, rating updates, details of interest payments, etc.). SDC comprises both equity and bond data and is widely used in securities underwriting studies (e.g. Fang (2005), Burch, Nanda and Warther (2005)) as it provides more information on underwriters such as the current parent bank of the underwriter, or underwriting allocations. The corporate bond coverage of the two databases does not completely overlap, and sets of missing values across FISD and SDC for jointly defined variables also differ. The two databases are also complementary in their coverage of the list of underwriters on a given bond. For these reasons, combining the two datasets yields a more comprehensive coverage.

First, we merge the datasets by either 8-digit CUSIP or ISIN and security issue date.[23] For a small number of issues, SDC does not report an 8-digit CUSIP. In those cases, we merge by issuer 6-digit CUSIP and security characteristics, requiring the bonds to be uniquely identified by issuer CUSIP, bond issue date, bond size, and maturity. This allows us to retrieve information available in SDC but not in FISD.

We restrict the attention to bonds issued by companies in the CRSP/Compustat merged (CCM) database. To merge CCM with our sample of bond issues, we match bonds to issuers on

[23] CUSIP and ISIN codes can be re-assigned; we thus match by security identifier and issuance date.

the basis of their historical issuer 6-digit CUSIP and date. In some cases, we can match an issuer before and after a given issue date t, but not at t. When that happens, we use the issuer's PERMCO identifier from CRSP, which does not change over time, to fill in the link information on date t. In such cases, the FISD issuer name (*prospectus_issuer_name*), the SDC issuer name (*issuer*), the FISD issuer identifier (*issuer_id*), or the SDC issuer identifier (*SDC ID*) do not vary between the earlier and later dates.

Following the literature, we exclude the bond issues by financials (SIC 6000-6999), utilities (SIC 4900-4949), non-U.S. firms, firms with negative book value of equity at the end of the last fiscal year before the bond issue date. We apply these filters, and also require availability of information on issuer country and SIC code of the issuer. Finally, we exclude all issues in foreign currency, equity-linked (including convertibles) and equity-like bonds, medium-term notes, and exchange offers. Exchange offers are an exchange of one security for another and 97% have missing information on underwriting fees and offering yields or report zero fees. Medium-term notes allow issuers to receive short-term financing and to avoid registration with the Securities and Exchange Commission. The typical medium-term note in our sample is about 8 times smaller in size than the typical bond. We also drop bonds issued before 1970 since the information on them is very sparse. These filters restrict our sample to 9,356 newly issued straight corporate U.S. dollar-denominated bonds, issued by 1,696 U.S. firms over 45 years.

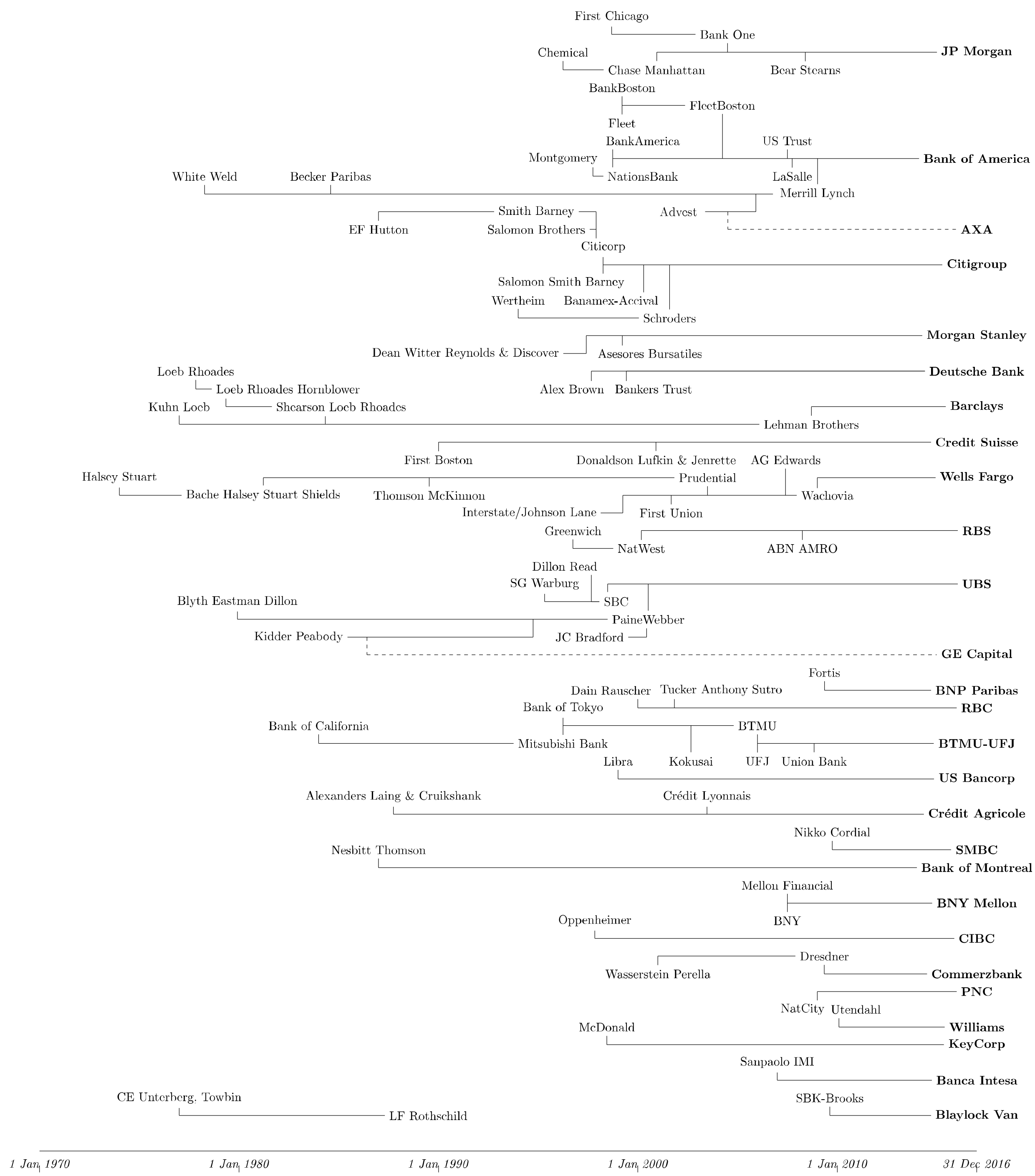

Figure C.1: Mergers and acquisitions among bond underwriters over 1970-2015

This figure describes mergers and acquisitions among the banks underwriting bonds in our sample, over the 1970-2015 period. The horizontal axis plots the timeline. The vertical lines originate from the target banks and touch the horizontal lines of the surviving banks at the date of the merger. Bold font highlights the banks still active as of 2015, at the end of our sample. In contrast, e.g. LF Rothschild filed for bankruptcy on June 30, 1989, and as a result the horizontal line for this bank stops. If after the acquisition the target bank is sold to another acquirer, we draw a connection to the former acquirer with a dashed line and a connection to the subsequent acquirer with a solid line. Banks for which we do not observe any M&A activity during our sample period, e.g. Goldman Sachs, are not presented on the graph.

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