This is a preliminary memo.
Please do not cite or redistribute without author's permission.

Agency, Diversification, and Renegotiation in Corporate Finance: Evidence from Syndicated Loans

Amir Sufi*
MIT Department of Economics
sufi@mit.edu

March 17th, 2004

Abstract

Syndicated lending represents 51 percent of U.S. corporate finance originated and accounts for more underwriting revenue than either equity or debt underwriting. I analyze a sample of 16,947 syndicated lines of credit to U.S. non-financial corporations from 1991-2003 to explain this product, with emphasis on the syndicate members, syndicate structure, and relationships within the syndicate. I find evidence consistent with agency and diversification theoretical predictions: risky but transparent firms have relatively diffuse syndicate structures whereas opaque firms have relatively concentrated syndicate structures. In addition, when the borrowing firm is opaque, previous relationships with the borrowing firm and regional proximity to the borrowing firm are more important predictors of who is chosen as a syndicate member. I also find a strong effect of regulation on the choice of syndicate members; U.S. commercial banks (relative to investment banks, finance companies, and foreign banks) are less likely to serve as syndicate members on lines of credit to risky but transparent firms.

*I thank Bengt Holmstrom, Jim Poterba, and Philip Strahan for valuable discussions and suggestions.

1. Introduction

Syndicated loans are central to corporate finance and yet a very under-researched area. Syndicated lending represents 51 percent of corporate finance originated and accounts for more underwriting revenue than either equity or debt underwriting (about $6 billion a year). In 2002, new syndicated loans for non-financial U.S. companies neared $1 trillion. (The total debt outstanding of non-financial U.S. business sector is approximately $7 trillion.) My analysis suggests that 85 percent of the largest 750 firms in the Compustat universe obtained a syndicated loan sometime between 1995 and 2002. Despite this importance, I have found only two published articles on syndicated loans (Dennis and Mullineuax (2000) and Simons (1993)). This is in contrast to the extensive theoretical and empirical literature on equity and debt underwriting syndicates.

Syndicated loans represent an excellent laboratory for established corporate finance theory. More specifically, a syndicated loan represents a hybrid of public (or "arms-length") and private (or "relationship-driven") debt that has been the focus of major articles in corporate finance (Diamond 1991, Rajan 1992). Syndicated loans also involve interesting agency problems of moral hazard (Holmstrom 1979) and issues of renegotiation in a world of incomplete contracts (Bolton and Scharfstein 1996).

What is a syndicated loan? In a syndicated loan, two or more institutions agree jointly to make a loan to a borrower. One or more banks take a lead role, i.e., it is the lead arranger of the syndicated loan. The lead arranger negotiates the terms of the loan with the borrowing firm, coordinates the documentation process, and administers the repayments. The other banks (which are referred to as "participants") agree to lend a portion of the aggregate loan, but are outside the borrowing firm-lead arranger relationship. The defining characteristics of a lead arranger are (a) it has direct communication with the firm, and (b) it (typically) holds the largest share of the loan.

The lead arranger pitches a deal to the firm and guarantees a certain amount of funding at a price range. The lead then turns toward potential participant banks. Participant banks receive an information memorandum that contains information on the borrower (collected by the lead). Borrowing firms typically have no interaction with the participant banks—the monitoring of the firm and negotiation of the terms is the lead arranger's responsibility alone. The firm compensates the lead arranger with a fee for these services. The participant banks agree with terms offered by the lead arranger, and the loan agreement is signed by all parties involved.

There is an "agency" section of the loan agreement that designates the lead arranging bank and will give conditions for its removal. The agreement usually exculpates the lead arranger from liability to the participants except where it results from gross negligence or willful misconduct. Any renegotiation of the terms of the loan require unanimity (usually), and there are typically a number of financial covenants on the agreements that specify automatic default if the borrowing firm passes some threshold.

2. Informal Theoretical Framework

There are four critical elements in the theoretical framework I use:

1. **Diversification**: Lead arrangers are reluctant both to hold and to underwrite large loans to a single firm, either because of a pure diversification motive or because of an exogenously imposed regulatory constraint. (Dennis and Mullineaux (2000) assert that regulators limit the maximum size of any single loan to a portion of the bank's equity capital.) The baseline assumption is that in a world with perfectly observable behavior and complete contracts, diversification would be the only motivation for syndication, and this motivation would uniquely determine an optimal syndicate structure.

2. **Agency**: The key agency problem I highlight in a syndicated loan is moral hazard on behalf of the lead arranger. Lead arrangers must properly collect information and distribute that information to the participant banks. Such information collection requires costly effort, and this costly effort must be exerted independently for each lead arranger. This implies that a syndicate with two lead arrangers is inefficient relative to a syndicate structure with one lead arranger/one participant from an information collection perspective. I assume that the information collection effort exerted by the lead arranger is unobservable to participant banks. This leads to a classic moral hazard problem in which the effort exerted by the lead arranging bank decreases as less of the loan is retained by the lead arranger. The lead arranger experiences all of the cost of information collection, but must share the benefit (in terms of more certainty about the performance of the firm). This theoretical assumption has its roots in the work of Holmstrom (1979) and Diamond (1991).

3. **Renegotiation**: Banks want to eliminate a motive for strategic default by the firm, and so one motivation behind syndication is to make renegotiation harder. Because any renegotiation of loan contract terms requires unanimity of the syndicate, the attractiveness of strategic default for the borrowing firm decreases as the number of syndicate members increases. Both the probability of successfully renegotiating the contract falls as the number of syndicates increases, as well as the benefit to renegotiation if some surplus must be shared with all syndicate members. Anecdotally, practitioners suggest this is an absolutely critical element of syndicated loan negotiation; firms demand the lead arrangers retain a large portion of the loan in case the firm runs into financial difficulty. This is straight from Bolton/Scharfstein (1996).

4. **Regulated versus Unregulated Firms**: For reasons exogenous to this framework, some banks are regulated by an authority (U.S. domestically chartered commercial banks) and some are not (foreign banks, investment banks, and finance companies). Regulated financial institutions face a payoff function that involves a fixed cost in case of default, and a more steep function of earnings of the project in times of default. The justification for difference in payoff functions for regulated and non-regulated firms comes from industry and anecdotal evidence. Every year, the Federal Reserve conducts a Shared National Credit (SNC) review on regulated U.S. commercial banks in which all loans of

> $20 million or more held by at least three regulated lenders are carefully investigated. As the American Banker puts it, "the review is important because examiners can downgrade a loan below a bank's own rating and force the lender to either boost reserves or even write the loan off" (Davenport, 2003). Capital and reputation effects suggest that regulated firms face a cost in case of default that exceeds the monetary loss.

Given these four elements (diversification, cost of information collection, renegotiation, and regulated vs. non-regulated banks), we are now ready to analyze the lead arranger and participant payoff functions. Figure 1 graphs the payoff functions to banks as a function of the firm's project return realization. The contracts are standard debt contracts with a fixed required payment (interest plus principal). If the firm is unable to make the payment, the loan is determined to be in default, and the resulting payoff to each bank is an increasing function of the earnings of the project.

The payoff of the project for a given firm varies on two dimensions: its mean and its variance. While the mean is public knowledge to all lead arrangers and participants and does not change with information collection, some of the variance is dependent on such information collection. In other words, there is an ex-ante variance and costly information-collection effort can reduce the variance accordingly. In terms of empirical implementation, I focus on three types of firms. First, investment grade firms have projects with high expected value and low variance. Second, high yield firms (or firms with senior unsecured debt ratings of BBB or lower), have projects with low expected value and low variance. Third, opaque firms (or firms with no senior unsecured debt rating) have projects with medium expected value but very high variance. The confidence intervals for each type of firm are specified in Figure 1.

With the above framework and Figure 1, I make the following predictions:

Prediction 1: Diversification and renegotiation motives predict that high yield firms (who have the highest probability of default) will have larger and more diffuse syndicates. Further, this effect should be stronger as the size of the loan increases if diversification motives are paramount. If renegotiation motives are key, I predict that this effect should be independent of the size of the loan.

Prediction 2: Given the moral hazard problem with information collection, I predict that opaque firms will have a smaller and more concentrated syndicate structure. In addition, I predict that lead arrangers will engage in behavior to minimize the need for information collection, such as choosing participants that already have good information on the firm.

Prediction 3: Given the difference in the payoff functions facing regulated and non-regulated financial firms, investment banks, finance companies, and foreign banks will specialize in the high yield market.

The rest of this memo is concerned with testing these basic predictions.

Figure 1:
Bank payoff function for three types of firms

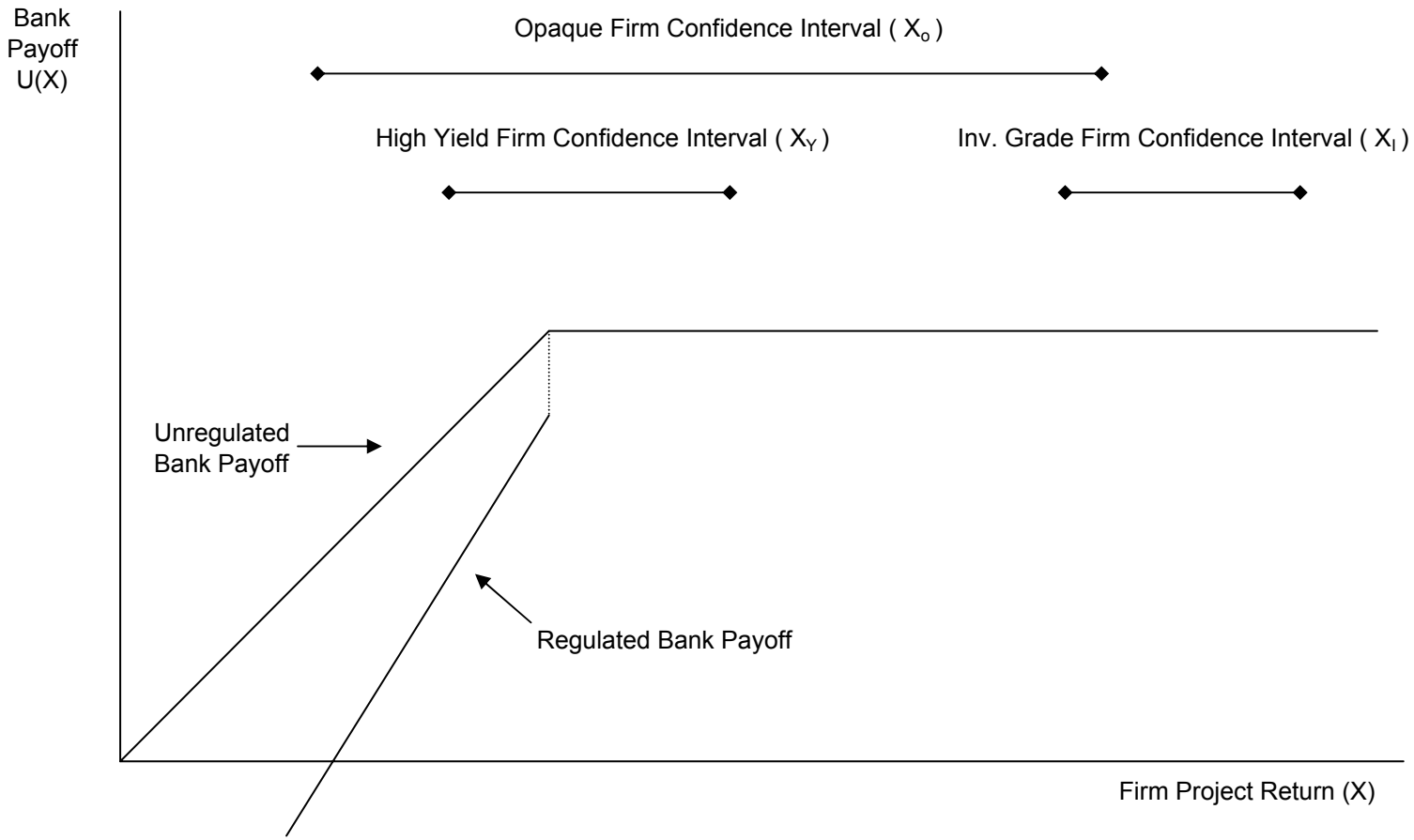


TABLE 1

Table 1 contains the summary statistics for syndicated lines of credit analyzed in this memo. The data source is Dealscan by the Loan Pricing Corporation. The sample includes 16,947 lines of credit signed between 1991 and the first half of 2003. I restrict attention to lines of credit because (a) term loans are very uncommon among investment grade firms, and (b) I can be reasonably sure that lead arrangers and participants do not sell off their portion of the loan at a later date (something that happens with term loans).

A few things to emphasize: the average size of the loan is much larger for high yield firms and even larger for investment grade firms relative to opaque firms. Controlling for the size of the loan will therefore be critical in all regressions. The syndicate structure characteristics are the key dependent variables in the regressions.

Table 1
Summary Statistics for Syndicated Lines of Credit

This table presents summary statistics on the sample of 16,947 lines of credit representing 6,952 firms from 1991-2003. An opaque firm lacks an S&P senior unsecured debt rating, a high yield firm has a rating of BBB- or lower, and an investment grade firm has a rating of BBB or higher.

				Percentage of Distribution		
Deal Characteristics	N	Mean	SD	10th	50th	90th
Size of Deal ($Mln, 1996 Prices)	16947	426	813	42	169	1036
Opaque Firms	9950	210	404	33	104	453
High Yield Firms	3358	471	714	60	244	1048
Investment Grade Firms	3639	976	1314	147	518	2215
Number of Loan Tranches	16947	1.5	0.8	1	1	3
Maturity (Years)	16947	2.8	2.4	0	3	5
Rate Spread on Drawn Funds (Basis Points)	14594	154	113	30	125	300
Opaque Firms	8191	178	110	50	165	325
High Yield Firms	3147	194	109	65	175	325
Investment Grade Firms	3256	52	43	20	40	100
Firm Characteristics						
Sales ($Mln, 1996 Prices)	13662	3297.1	9340.7	83.44	719	8343
S&P Sr. Unsecured Debt Rating (1 = AAA)	6997	9.8	3.9	5	9	14
Syndicate Characteristics						
Total Number of Lenders	16947	8.3	8.0	2	5	19
Opaque Firms	9950	5.8	5.6	2	4	12
High Yield Firms	3358	10.7	9.5	2	8	24
Investment Grade Firms	3639	13.0	9.2	3	11	25
Total Number of Lead Arrangers	16947	3.4	3.8	1	2	7
Opaque Firms	9950	2.4	2.5	1	2	4
High Yield Firms	3358	3.9	4.1	1	3	9
Investment Grade Firms	3639	5.5	5.2	1	4	12
Total Number of Participant Banks	16947	4.9	6.2	0	3	13
Opaque Firms	9950	3.4	4.4	0	2	8
High Yield Firms	3358	6.8	7.7	0	5	16
Investment Grade Firms	3639	7.5	7.4	0	6	16
Lead to Participant Ratio	16947	0.50	0.31	0.14	0.43	1
Opaque Firms	9950	0.50	0.30	0.17	0.50	1
High Yield Firms	3358	0.47	0.30	0.12	0.38	1
Investment Grade Firms	3639	0.51	0.33	0.11	0.44	1
Percentage of Loan Kept By Leads	5659	51.7	25.5	18.8	50.0	90.6
Opaque Firms	3147	52.9	24.5	22.8	50.0	100.0
High Yield Firms	1191	50.7	25.9	18.5	50.0	90.0
Investment Grade Firms	1321	49.9	27.4	12.5	50.0	86.9
Concentration of Syndicate (Herfindahl)	5659	2408	1971	567.2	1744	5078
Opaque Firms	3147	3125	2016	896	2701	5509
High Yield Firms	1191	1947	1774	508	1349	4338
Investment Grade Firms	1321	1118	1017	443	808	2035

TABLE 2
Table 2 documents the major players in the syndicated loan market. The three biggest lead arrangers are Bank of America, JPMorganChase and Citigroup. Market concentration, either measured as the market share held by the top 5 or by the Herfindahl index, is relatively constant across the three markets. It is also low according to standard measures used by regulatory authorities.

The largest participants are measured by the total number of deals they were a participant on a syndicate. In the opaque market, large regional U.S. commercial banks are the most commonly chosen participants. In the high yield and investment grade market, foreign banks and New York City banks are more common.

Table 2
Top Lead Arrangers and Participant Banks, by Market

This table lists the top 5 lead arrangers (by deal amount) and top 5 participants (by total number of deals) for lines of credit in the sample from 2001-2003. Market share figures for lead arrangers split the amount of a given line of credit equally over all lead arrangers for the line of credit. The opaque market includes firms with no S&P senior unsecured debt rating, the high yield market includes firms with rating of BBB- or lower, and the investment grade market includes firms with rating BBB or higher.

Opaque Market		High Yield Market		Investment Grade Market	
Lead Arrangers					
	Mkt. Share		Mkt Share		Mkt. Share
Bank of America	0.18	Bank of America	0.13	Citigroup	0.12
JPMorganChase	0.09	JPMorganChase	0.10	JPMorganChase	0.12
Citigroup	0.08	Citigroup	0.09	Bank of America	0.09
Fleet	0.07	Fleet	0.07	Bank One	0.06
Bank One	0.06	Wachovia	0.04	ABN-AMRO	0.04
Total Amount ($bln, 1996 Prices)	304.5	Total Amount ($bln, 1996 Prices)	270.4	Total Amount ($bln, 1996 Prices)	799.1
Market Herfindahl	660	Market Herfindahl	526	Market Herfindahl	538
Participants					
	Mkt. Share		Mkt Share		Mkt. Share
U.S. Bancorp	0.07	Bank of Tokyo-Mitsubishi	0.04	Bank of New York	0.04
National City	0.04	U.S. Bancorp	0.04	Bank of Tokyo-Mitsubishi	0.04
Comerica	0.04	Wells Fargo	0.04	Mellon Financial	0.04
ABN-AMRO	0.04	Bank of New York	0.04	Northern Trust	0.04
Wells Fargo	0.04	Mizuho	0.04	Wells Fargo	0.03
Total Number of Participants	5409	Total Number of Participants	3716	Total Number of Participants	7959
Market Herfindahl	251	Market Herfindahl	207	Market Herfindahl	183

TABLES 3 & 4
These tables report the results from the following specification:

$$SyndStructureMeasure_i = \alpha + X_i'\beta + \gamma_1 HighYield_i + \gamma_2 InvGrade_i + \varepsilon_i$$

The control group includes opaque firms, and the key coefficients for the analysis are γ, or how the syndicate structure varies with the firm's credit reputation. In addition to all variables reported in the table, *X* contains industry and year dummies. Also, *X* contains very comprehensive controls for the size of the loan; the sample is split into thirds, and both the intercept and size of loan (ln(size)) is allowed to vary by the quantiles. I want to be sure that the effect of credit reputation on the syndicate structure is orthogonal to the size of the loan.

The key results from Table 3 are as follows: First, high yield firms have significantly more lead arrangers and participants than opaque firms and investment grade firms. Second, opaque firms have significantly few participants, a lower lead to participant ratio, and a more concentrated syndicate structure than high yield firms and investment grade firms. In addition, lead arrangers on opaque deals hold significantly more of the loan when compared to investment grade firms.

Table 4 reports estimates when the above specification is estimated separately for the three quantiles of size of loan. While high yield firms have a higher number of participants than opaque firms in all three categories, the result is much stronger for very large loans. This result suggests that diversification motives are key in explaining the higher number of participants on lines of credit to high yield firms. However, the results on the number of lead arrangers and the concentration of the syndicate do not really conform with the predictions made above. Table 4 suggests that both high yield and investment grade firms have more lead arrangers than opaque firms on small loans, but this difference disappears for large loans. These results need additional interpretation.

Table 3
Syndicate Structure Regressions

This table reports regression results from relating syndicate structure characteristics to the firm's credit reputation. An opaque firm lacks an S&P senior unsecured debt rating, a high yield firm has a rating of BBB- or lower, and an investment grade firm has a rating of BBB or higher. Each column represents a regression where the dependent variable is the syndicate structure characteristic listed at the top of the column. To control for the size of the loan, the sample is split into thirds and the size effect (ln(size)) is allowed to vary by each group (coefficients not reported). All regressions also include year and industry dummies, and standard errors are heteroskedasticity-robust, clustered at the firm level.

Dependent Variable:	(1) # Lenders	(2) # Lead Arrangers	(3) # Participants	(4) Lead to Part Ratio	(5) % Held by Leads	(6) Herf. of Syndicate
High Yield Firm	1.57**	0.21**	1.36**	-0.035**	-1.34	-263.4**
	(0.16)	(0.07)	(0.15)	(0.008)	(1.01)	(61.6)
Investment Grade Firm	0.66**	0.02	0.64**	-0.032**	-4.18**	-310.7**
	(0.22)	(0.12)	(0.21)	(0.010)	(1.25)	(68.5)
Maturity Dummies						
1-3 years	0.79**	-0.01	0.80**	-0.070**	-0.18	-2.0
	(0.11)	(0.05)	(0.11)	(0.006)	(0.94)	(55.6)
4-5 years	1.21**	0.10	1.11**	-0.083**	-0.34	-28.5
	(0.13)	(0.06)	(0.11)	(0.014)	(0.97)	(59.4)
6-10 years	2.16**	0.42**	1.74**	-0.067**	0.92	-163.3
	(0.25)	(0.11)	(0.23)	(0.011)	(1.55)	(91.8)
11 or more years	0.48	0.13	0.28	-0.060	7.35	0.6
	(1.42)	(0.69)	(1.16)	(0.060)	(8.91)	(473.4)
Number of Loan Tranches	0.47**	0.04	0.43**	-0.007	1.92**	316.3**
	(0.10)	(0.04)	(0.10)	(0.004)	(0.61)	(0.47)
Constant	-2.45**	-0.53**	-1.92**	0.687	72.4**	8570.1**
	(0.36)	(0.14)	(0.35)	(0.031)	(6.79)	(567.4)
N	16947	16947	16947	16947	5659	5659
R^2	0.49	0.46	0.28	0.08	0.16	0.52

**Significant at 1 percent level, *Significant at 5 percent level

Table 4
Syndicate Structure Regressions, by Size of Loan

This table reports regression results from relating syndicate structure characteristics to the firm's credit reputation. An opaque firm lacks an S&P senior unsecured debt rating, a high yield firm has a rating of BBB- or lower, and an investment grade firm has a rating of BBB or higher. The regressions in this section replicate the regressions in Table 3, but each column regression is performed separately on the smallest third, the middle third, and the largest third of lines of credit in the sample. Each column in this table therefore represents three different regressions.

Dependent Variable:	(1) # Lenders	(2) # Lead Arrangers	(3) # Participants	(4) Lead to Part Ratio	(5) % Held by Leads	(6) Herf. of Syndicate
SMALL LOANS (N=5708)						
High Yield Firm	0.66**	0.15**	0.50**	-0.012	-2.96	-481.8**
	(0.12)	(0.04)	(0.11)	(0.013)	(1.78)	(122.4)
Investment Grade Firm	1.50**	0.35**	1.15**	-0.037	-4.99	-620.0
	(0.33)	(0.13)	(0.32)	(0.027)	(4.32)	(351.2)
MEDIUM LOANS (N=5641)						
High Yield Firm	0.90**	0.12*	0.78**	-0.012	-0.05	-154.4
	(0.15)	(0.06)	(0.14)	(0.007)	(1.47)	(93.5)
Investment Grade Firm	0.84**	0.41**	0.43*	-0.003	-1.89	-214.4*
	(0.18)	(0.09)	(0.17)	(0.015)	(1.83)	(96.3)
LARGE LOANS (N=5598)						
High Yield Firm	2.64**	0.14	2.50**	-0.061**	-2.43	-140.8
	(0.43)	(0.22)	(0.39)	(0.015)	(1.86)	(85.8)
Investment Grade Firm	1.16**	0.23	1.40**	-0.062**	-6.24**	-277.6**
	(0.40)	(0.22)	(0.37)	(0.016)	(1.73)	(81.4)

**Significant at 1 percent level, *Significant at 5 percent level

TABLES 5 & 6

For the rest of this memo, I have reshaped the data to focus on the choice of participant bank. More specifically, each observation of the data set employed in the rest of the memo is a participant bank on a given line of credit (so if a given line of credit had 10 participants, there are now 10 observations for that line of credit). To make this section manageable, I restricted the analysis to the top 100 lead arrangers and top 100 participant banks in the sample. Because of overlap, this resulted in 122 participant banks that make up over 90 percent of the lead arrangers in the sample, and over 80 percent of the total participants in the sample.

Table 5 lists the summary statistics for the 66,195 participants in the sample.

Table 6 examines the summary statistics by credit reputation. The results in Table 6 support the predictions made above. First, high yield firms are significantly more likely to have foreign and non-commercial banks as participants on deals. Second, Table 6 suggests that lead arrangers are more likely to choose participants that are in the same region, census division, or state as the borrowing firm when the borrowing firm lacks a credit history. The results under former relationships between the firm and the participant bank should be viewed with some caution because high yield and investment grade firms have (a) far more deals than opaque firms, and (b) far more participants per deal than opaque firm. It should come as no surprise therefore that they have had more previous interactions with the chosen participants.

Table 5
Characteristics of Participants in Sample

This table presents summary statistics for the 66,195 participants on syndicated lines of credit described in Table 1.

	N	Mean	SD
General Characteristics			
Total Assets ($bln)	66195	251	222
Equity to Total Assets Ratio	66195	0.06	0.03
Commercial Bank Indicator Variable	66195	0.96	0.19
Location			
Foreign	66195	0.50	0.50
Canada	66195	0.09	0.29
Asia	66195	0.15	0.36
Europe	66195	0.25	0.44
Northeast U.S.	66195	0.20	0.4
South U.S.	66195	0.09	0.29
Midwest U.S.	66195	0.15	0.35
West U.S.	66195	0.06	0.23
Borrowing Firm-Participant Variables			
In Same Region as Borrowing Firm	66195	0.19	0.39
In Same Census Division as Borrowing Firm	66195	0.12	0.33
In Same State as Borrowing Firm	66195	0.06	0.23
Conditional on Firm having Previous Loan:			
Former Lead for Firm Indicator Variable	53316	0.16	0.36
Frac of Total Previous Firm Loans Lead On	53316	0.06	0.17
Conditional on Firm having Previous Synd. Loan:			
Former Participant for Firm Indicator Variable	49447	0.54	0.50
Frac of Total Previous Firm Synd Loans Part. On	49447	0.31	0.37

Table 6
Characteristics of Participants, by Borrowing Firm Credit Reputation

This table examines participant characteristics for three different groups of firms. An opaque firm lacks an S&P senior unsecured debt rating, a high yield firm has a rating of BBB- or lower, and an investment grade firm has a rating of BBB or higher. There are a total of 26,677 participants for opaque firms, 16,730 for high yield firms and 22,788 for investment grade firms.

	Opaque	High Yield	Inv. Grade
General Characteristics			
Total Assets ($bln)	226.2*	253.2*	277.8*
Equity to Total Assets Ratio	0.064*	0.061	0.060
Commercial Bank Indicator Variable	0.96*	0.94*	0.98*
Previous Year Lead Market Share	0.017*	0.015*	0.020*
Location			
Foreign	0.46*	0.52*	0.54*
Canada	0.10	0.09	0.09
Asia	0.14*	0.17*	0.15*
Europe	0.22*	0.25*	0.29*
Conditional on being in U.S.			
Northeast U.S.	0.37*	0.42*	0.45*
South U.S.	0.19	0.19	0.19
Midwest U.S.	0.33*	0.27	0.26
West U.S.	0.11	0.12	0.10
Borrowing Firm-Lead Arranger Variables			
Conditional on being in U.S.			
In Same Region as Borrowing Firm	0.40*	0.35	0.35
In Same Census Division as Borrowing Firm	0.28*	0.22	0.23
In Same State as Borrowing Firm	0.13*	0.09*	0.10*
Conditional on Firm having Previous Loan:			
Former Lead for Firm Indicator Variable	0.11*	0.17*	0.19*
Frac of Total Previous Firm Loans Lead On	0.05*	0.06	0.06
Conditional on Firm having Previous Synd. Loan:			
Former Participant for Firm Indicator Variable	0.47*	0.53*	0.62*
Frac of Total Previous Firm Synd Loans Part. On	0.31*	0.26*	0.33*

*Significantly different from the other two categories at 5 percent level (based on t distribution)

Table 7
The data set employed for regressions in Table 7 includes all POTENTIAL participants in addition to the participants actually chosen. The set of potential participants is limited the 122 institutions described above who were a participant on at least one loan in the year of the loan in question. In other words, if 100 of the 122 institutions served as participants on at least one loan in 2002, then there will be 100 potential participants for each loan in 2002.

I use this data set to estimate the following probit choice specification:

$$\Pr(Participant = Bank_{ij}) = f(\alpha + \beta * Loan_i + \gamma * Bank_j + \varepsilon_{ij})$$

That is, the probability bank *j* is chosen as a participant on loan *i* is a function of the loan characteristics and the bank characteristics. The key vector of coefficients of interest is γ, or the effect of bank characteristics on being chosen as a participant. For example, I want to answer questions like, what is the effect of being a foreign bank on the probability that the bank is chosen as participant on a loan? Even more importantly, I estimate the above probit specification interacting bank characteristics with the firm's credit quality reputation. I want to know how being a foreign bank affects the probability of being chosen as a participant, AND I want to know how that coefficient varies by the credit reputation of the firm.

Table 7, column 4 provides support to the hypotheses developed above. Being a former lead or participant for the borrowing firm has a powerful effect on the probability of being chosen as a participant on the current deal, but the effect is differentially lower for high yield and investment grade firms (compared with opaque firms). Likewise, being in the same region is a powerful predictor of being chosen as a participant, and again this effect is differentially lower for high yield and investment grade firms. Both of these results suggest that lead arrangers are more likely to choose banks that are familiar with the borrowing firm when that firm is opaque. Foreign firms and non-commercial banks are more likely to be chosen when the borrowing firm is a high yield firm. Also, smaller, and better capitalized participants are more likely to be chosen when the borrowing firm is opaque.

One other interesting result: being a large lead arranger in the previous year has a strong effect on the probability of being chosen as a participant, but this effect is mostly driven by investment grade firms. In other words, banks that are large market share leads are more likely to be participants on deals with investment grade firms. This result is developed more in the next section.

Table 7
Participant Choice Probits

This table presents results from a probit estimation explaining the probability of being chosen as participant on a syndicated loan. The choice set includes all banks that participated on at least one loan in the year of the loan in question. Estimations include all deal level controls described in Table 3, year and industry dummies, and the constant is allowed to vary by credit reputation group (coefficients not reported). Coefficients represent marginal changes in probability for continuous variables, and the change in probability when going from 0 to 1 for indicator variables.

Dep. Variable: {0,100} if participant (Mean: 4.1)	Without Relationships		With Relationships	
	(1)	(2)	(3)	(4)
Former Lead Indicator			3.3*	3.7*
			(0.10)	(0.20)
High Yield				-0.3*
				(0.11)
Investment Grade				-0.2
				(0.11)
Former Participant Indicator			19.8*	23.9*
			(0.16)	(0.30)
High Yield				-1.1*
				(0.05)
Investment Grade				-0.9*
				(0.05)
Previous Year Lead Market Share	29.7*	19.8*	12.2*	6.9*
	(0.58)	(0.83)	(0.74)	(1.19)
High Yield		7.9*		1.3
		(1.47)		(1.86)
Investment Grade		23.7*		10.4*
		(1.29)		(1.69)
Same Region as Firm Indicator	2.9*	3.6*	2.0*	2.6*
	(0.06)	(0.09)	(0.06)	(0.11)
High Yield		-0.6*		-0.6*
		(0.07)		(0.08)
Investment Grade		-0.6*		-0.6*
		(0.07)		(0.08)
Foreign Indicator	-0.7*	-0.8*	-0.9*	-0.9*
	(0.03)	(0.05)	(0.04)	(0.07)
High Yield		0.3*		0.3*
		(0.09)		(0.11)
Investment Grade		-0.2		-0.4*
		(0.08)		(0.09)
Commercial Bank Indicator	3.0*	2.9*	2.5*	2.6*
	(0.02)	(0.03)	(0.03)	(0.05)
High Yield		-1.0*		-1.2*
		(0.09)		(0.10)
Investment Grade		2.7*		1.0*
		(0.22)		(0.19)
Log (Total Assets)	1.0*	0.9*	0.9*	0.8*
	(0.01)	(0.02)	(0.02)	(0.03)
High Yield		0.1		-0.1
		(0.03)		(0.04)
Investment Grade		0.4*		0.2*
		(0.03)		(0.04)
Equity to Total Assets Ratio	10.5*	14.2*	12.1*	16.3*
	(0.5)	(0.67)	(0.6)	(0.91)
High Yield		-4.9*		-5.9*
		(1.14)		(1.37)
Investment Grade		-8.9*		-9.0*
		(1.18)		(1.42)
N	1,615,695	1,627,524	993,921	993,921
R^2	0.12	0.13	0.25	0.26

* Significant at the 1 percent level

TABLES 8-10 & FIGURES 2-4

The above choice analysis ignores possible relationships between lead arrangers and participants. The critical agency problem I emphasize is that the lead arranger may shirk in its information collection duties. One could imagine that establishing a reputation with a participant bank could minimize the relative payoff of cheating and thus help mitigate the agency problem. In other words, one might predict that lead arranger-participant relationships would be more persistent in the market for opaque firms, where cheating is more common.

In order to analyze this issue, I must restrict the sample to lines of credit with exactly one lead arranger. In the case of multiple lead arrangers, my data do not allow me to distinguish which lead arranger brought which participant to the table. I therefore cannot establish with certainty a relationship between a lead arranger and participant unless there is only one lead arranger.

Tables 8 through 10 replicate Tables 5 through 7 on this sub-sample of lines of credit, paying particular attention to lead arranger-participant relationship variables. There is some evidence that supports the above argument that reputation effects are important when the borrower is an opaque firm. Table 9 shows that lead arrangers are significantly more likely to choose participants from their own region when the borrowing firm is opaque. When I exclude lead arrangers from New York, this effect is quite strong. However, when I examine previous direct relationships with the lead arranger, it actually looks like the opposite is true: the persistence of lead arranger-participant relationships is higher in the investment grade sector. This fact is documented both in Table 9 (last four rows) and in the probit estimation in Table 10 (coefficients at bottom of column 2).

To further explain the relationships between lead arrangers and participants, I present diagrams of market structure in Figures 2 through 4, which correspond to the market of syndicated loans for opaque, high yield, and investment grade firms respectively. The figures show the top 5 lead arrangers, who their main participant partners are, and how much of their business they give to those partners (reflected in thickness of arrows). The figures help explain why relationships appear to be more persistent in the market for investment grade borrowers. In the market for opaque borrowing firms, the top five lead arrangers usually deal with a participant OUTSIDE the top 5. However, in the market for investment grade firms, the top lead arrangers syndicate a large portion of their loans to other top lead arrangers. The market for investment grade firms therefore seems to reflect much more of a “club” type atmosphere, in which a few major players act as both lead arrangers and participants, and have common interaction with each other.

Table 8
Characteristics of Participants on Deals with One Lead Arranger

This table examines participants on a subset of the sample described in Table 1. The subsample includes only syndicated lines of credit with one lead arranger. This sample includes 21,934 participants on 6,327 lines of credit.

	N	Mean	SD
General Characteristics			
Total Assets ($bln)	21934	209.2	192.9
Equity to Total Assets Ratio	21934	0.06	0.03
Commercial Bank Indicator Variable	21934	0.97	0.18
Location			
Foreign	21934	0.43	0.50
Canada	21934	0.10	0.30
Asia	21934	0.12	0.32
Europe	21934	0.21	0.41
Northeast U.S.	21934	0.23	0.42
South U.S.	21934	0.11	0.31
Midwest U.S.	21934	0.17	0.37
West U.S.	21934	0.07	0.25
Borrowing Firm-Participant Variables			
In Same Region as Borrowing Firm	21934	0.23	0.42
In Same Census Division as Borrowing Firm	21934	0.17	0.37
In Same State as Borrowing Firm	21934	0.08	0.27
Conditional on Firm having Previous Loan:			
Former Lead for Firm Indicator Variable	15900	0.12	0.33
Fraction of Loans Former Lead for Firm	15900	0.05	0.18
Conditional on Firm having Previous Synd. Loan:			
Former Participant for Firm Indicator Variable	13834	0.60	0.49
Fraction of Synd. Loans Former Participant for Firm	13834	0.41	0.42
Lead Arranger-Participant Variables			
In Same Region as Lead Arranger	21934	0.24	0.42
In Same Census Division as Lead Arranger	21934	0.17	0.37
In Same State as Lead Arranger	21934	0.10	0.31
On a deal with Lead Arranger in previous quarter	21934	0.54	0.50
On a deal with Lead Arranger in previous year	21934	0.80	0.40
Frac of Synd. Loans with L.A. in previous quarter	20664	0.11	0.15
Frac of Synd. Loans with L.A. in previous year	21653	0.11	0.11

Table 9
Characteristics of Participants, by Borrowing Firm Credit Reputation

This table examines participant characteristics for three groups of firms for the subsample of lines of credit described in Table 11. An opaque firm lacks an S&P senior unsecured debt rating, a high yield firm has a rating of BBB- or lower, and an investment grade firm has a rating of BBB or higher. There are a total of 12,531 participants for opaque firms, 4,045 for high yield firms, and 5,358 for investment grade firms.

	Opaque	High Yield	Inv. Grade
General Characteristics			
Total Assets ($bln)	204.2	207.6	222.0*
Equity to Total Assets Ratio	0.067*	0.063*	0.060*
Commercial Bank Indicator Variable	0.96*	0.95*	0.99*
Location			
Foreign	0.40*	0.45*	0.50*
Conditional on being in U.S.			
Northeast U.S.	0.35*	0.43*	0.49*
South U.S.	0.19	0.18	0.17
Midwest U.S.	0.34*	0.27*	0.21*
West U.S.	0.12	0.13	0.13
Borrowing Firm-Participant Variables			
Conditional on being in U.S.			
In Same Region as Borrowing Firm	0.43*	0.39	0.36
In Same Census Division as Borrowing Firm	0.31*	0.27	0.24
In Same State as Borrowing Firm	0.15*	0.12	0.12
Conditional on Firm having Previous Loan:			
Former Lead for Firm Indicator Variable	0.11	0.17*	0.11
Fraction of Loans Former Lead for Firm	0.05	0.07*	0.05
Conditional on Firm having Previous Synd. Loan:			
Former Participant for Firm Indicator Variable	0.54*	0.58*	0.70*
Fraction of Synd. Loans Former Participant for Firm	0.40*	0.36*	0.48*
Lead Arranger-Participant Variables			
In Same Region as Lead Arranger	0.25*	0.21	0.21
In Same Census Division as Lead Arranger	0.17	0.14*	0.17
In Same State as Lead Arranger	0.10	0.09	0.12*
Excluding New York Lead Arrangers:			
In Same Region as Lead Arranger	0.25*	0.18	0.16
In Same Census Division as Lead Arranger	0.17*	0.11	0.11
In Same State as Lead Arranger	0.09*	0.06	0.07
On a deal with Lead Arranger in previous quarter	0.50*	0.56*	0.63*
On a deal with Lead Arranger in previous year	0.76*	0.80*	0.89*
Frac of Synd. Loans with L.A. in previous quarter	0.10	0.11	0.13*
Frac of Synd. Loans with L.A. in previous year	0.10	0.10	0.13*

* Statistically Different from other 2 categories at 5 percent level

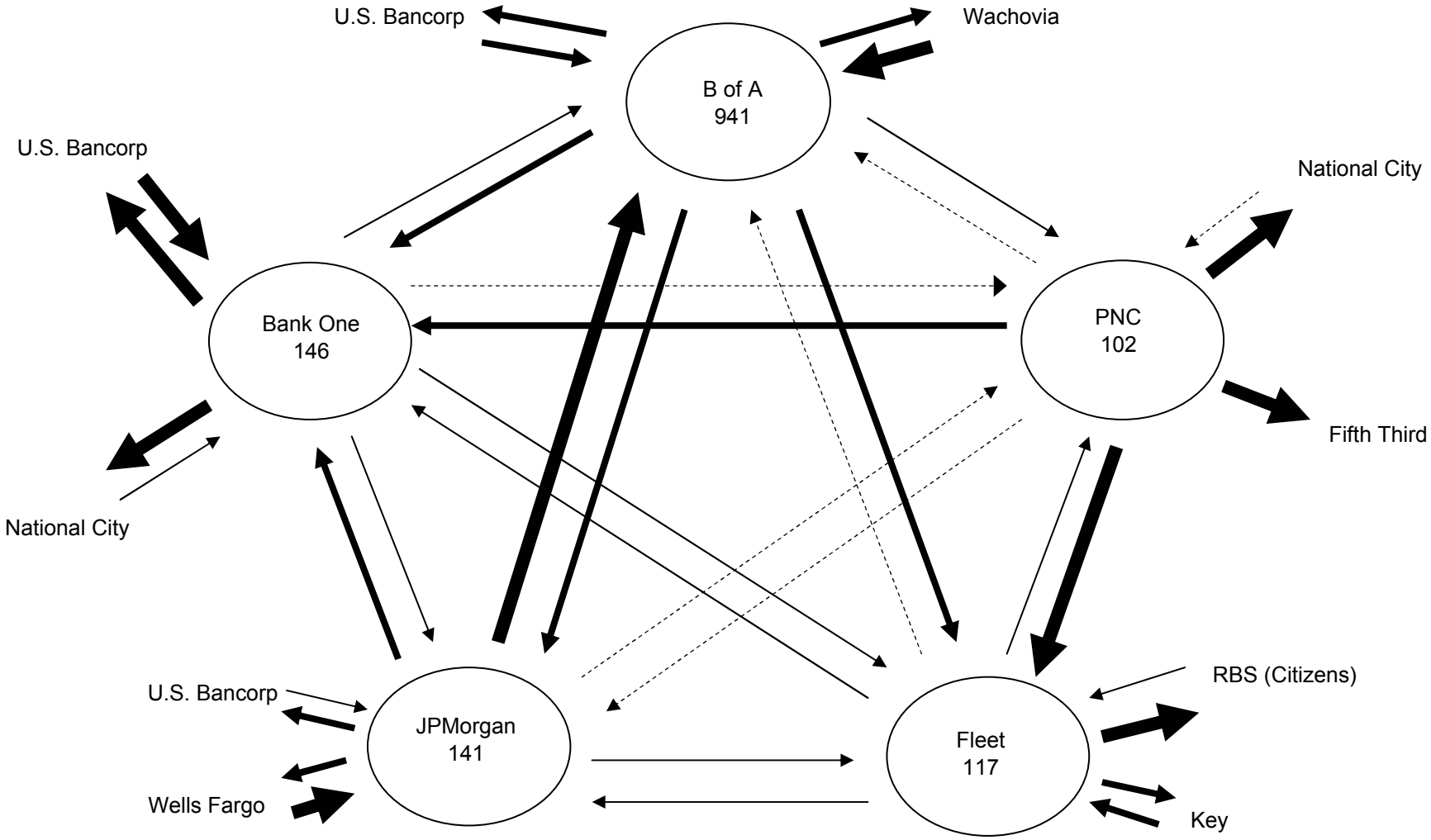
Table 10
Participant Choice Probits for Sub-Sample

This table replicates Table 10 on the subsample of deals where there is only one lead arranger with two additional variables that examine the importance of lead arranger-participant relationships: an indicator variable switched on if the participant is in the same region as the lead arranger, and an indicator switched on if the participant served on a syndicate with the lead arranger in the previous quarter.

Dep. Variable: {0,1} if participant (Mean: 4.1)	Without Relationships		With Relationships	
	(1)	(2)	(3)	(4)
Former Lead Indicator			3.9*	4.5*
			(0.22)	(0.34)
High Yield				0.0
				(0.17)
Investment Grade				-0.7*
				(0.11)
Former Participant Indicator			26.2*	29.3*
			(0.37)	(0.55)
High Yield				-0.9*
				(0.05)
Investment Grade				-0.4*
				(0.08)
Previous Year Lead Market Share	21.1*	13.7*	9.9*	4.4*
	(0.72)	(0.93)	(0.95)	(1.30)
High Yield		6.0*		0.9
		(1.95)		(2.35)
Investment Grade		23.1*		15.3*
		(1.69)		(2.14)
Same Region as Firm Indicator	2.7*	2.9*	1.7*	2.0*
	(0.10)	(0.11)	(0.10)	(0.14)
High Yield		-0.2		-0.3
		(0.11)		(0.11)
Investment Grade		-0.3		-0.5*
		(0.11)		(0.11)
Foreign Indicator	-0.3*	-0.5*	-0.4*	-0.5*
	(0.04)	(0.05)	(0.06)	(0.07)
High Yield		0.2		0.2
		(0.13)		(0.15)
Investment Grade		0.3		0.2
		(0.14)		(0.17)
Commercial Bank Indicator	2.1*	2.0*	1.4*	1.5*
	(0.03)	(0.04)	(0.04)	(0.05)
High Yield		-0.7*		-0.9*
		(0.12)		(0.12)
Investment Grade		10.1*		3.9*
		(1.56)		(0.92)
Same Region as Lead Arranger Indicator	0.7*	0.8*	0.5*	0.4*
	(0.05)	(0.06)	(0.06)	(0.08)
High Yield		-0.3*		0.0
		(0.09)		(0.13)
Investment Grade		0.0		0.1
		(0.11)		(0.15)
Participant with Lead Arranger in previous quarter	2.6*	2.3*	1.8*	1.5*
	(0.05)	(0.06)	(0.06)	(0.08)
High Yield		0.4*		0.3
		(0.10)		(0.11)
Investment Grade		0.4*		0.3
		(0.10)		(0.12)
N	631,564	631,564	315,434	315,434
R2	0.16	0.17	0.36	0.37

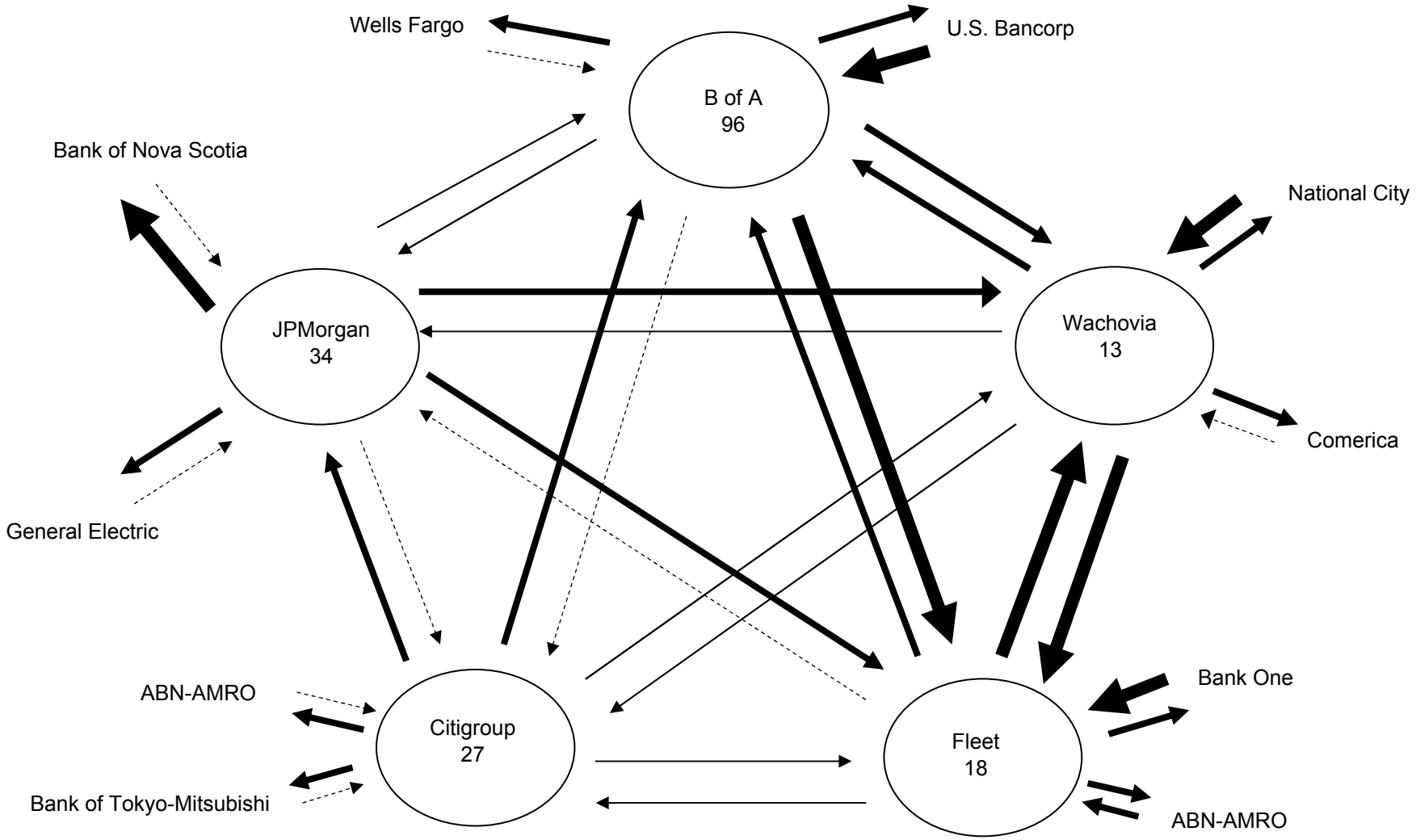
* Significant at the 1 percent level

Figure 2: Lead Arranger-Participant Relationships: Loans to Non-Rated Firms



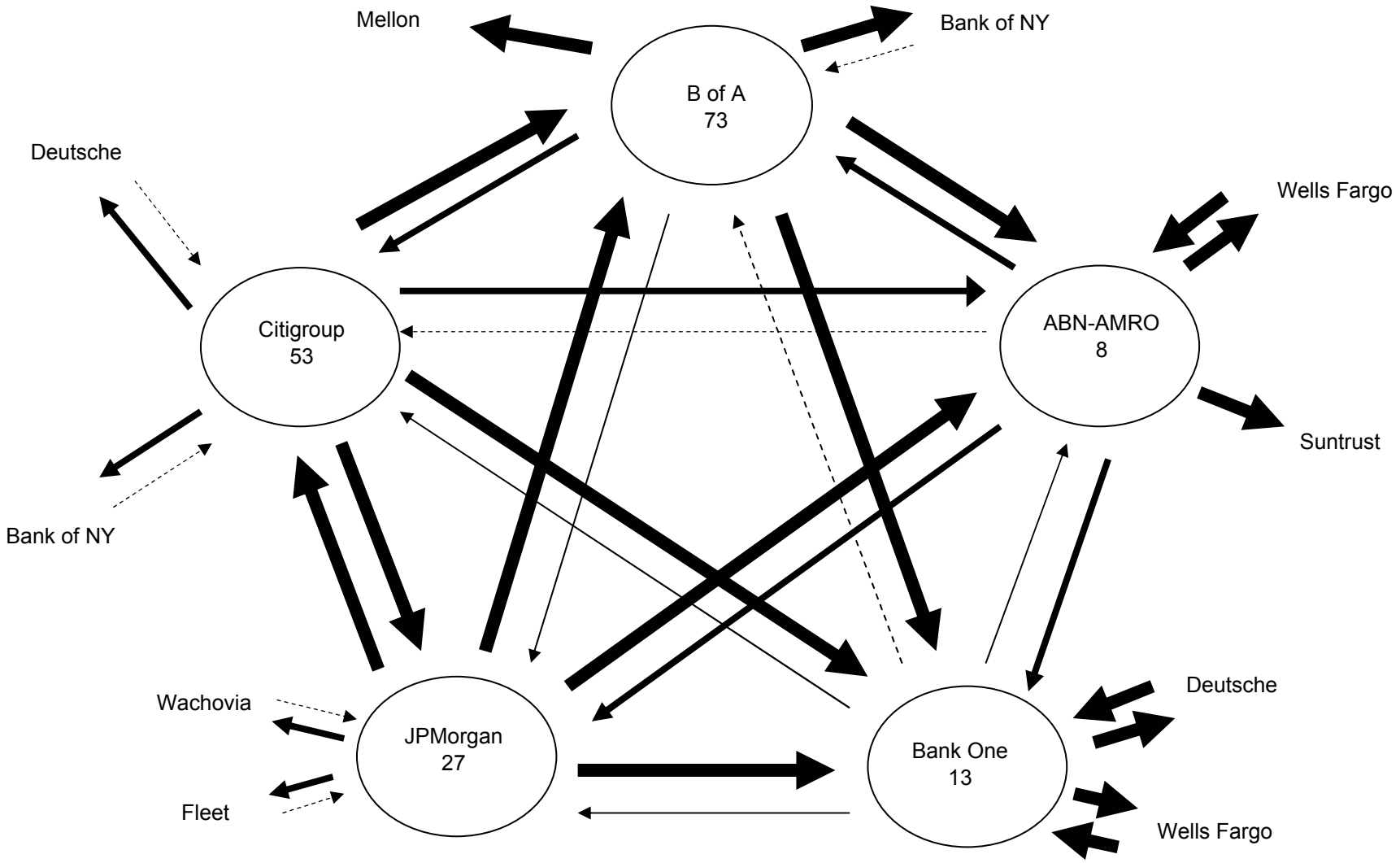
Notes: This figure maps lead arranger-participant bank relationships from 1999-2002 for lines of credit to firms with no senior unsecured debt rating (opaque firms). The five largest lead arrangers (total loans in parentheses) are in circles. The arrows start from the lead arranger and point to the participant bank. The thickness of the the arrows is increasing in the percentage of the lead arrangers' total lines of credit syndicated out to the participant in question, with the five thickness levels indicating less than 1 percent, 1 to 2.5 percent, 2.5 to 5 percent, and 5 percent or more.

Figure 3: Lead Arranger-Participant Relationships: Loans to High Yield Firms



Notes: This figure maps lead arranger-participant bank relationships from 1999-2002 for lines of credit to firms with senior unsecured debt ratings of BBB or lower (high yield firms). The five largest lead arrangers (total loans in parentheses) are in circles. The arrows start from the lead arranger and point to the participant bank. The thickness of the the arrows is increasing in the percentage of the lead arrangers' total lines of credit syndicated out to the participant in question, with the five thickness levels indicating less than 1 percent, 1 to 2.5 percent, 2.5 to 5 percent, and 5 percent or more.

Figure 4: Lead Arranger-Participant Relationships: Loans to Investment Grade Firms



Notes: This figure maps lead arranger-participant bank relationships from 1999-2002 for lines of credit to firms with senior unsecured debt ratings of BBB+ or higher (investment grade firms). The five largest lead arrangers (total loans in parentheses) are in circles. The arrows start from the lead arranger and point to the participant bank. The thickness of the the arrows is increasing in the percentage of the lead arrangers' total lines of credit syndicated out to the participant in question, with the four thickness levels indicating less than 1 percent, 1 to 2.5 percent, 2.5 to 5 percent, and 5 percent or more.