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Comovement and investment banking networks☆

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ABSTRACT

We test the hypothesis that investment banking networks affect stock prices and trading behavior. Consistent with the notion that investment banks serve as information hubs for segmented groups of investors, the stock prices of firms that use the same lead underwriter during their equity offerings tend to move together. We also find that when firms switch underwriters between their initial public offering (IPO) and a seasoned equity offering (SEO), they comove less with the stocks associated with the old bank and more with the stocks associated with the new bank. This change in comovement is greater for stocks completing their first SEO and for those experiencing large changes in institutional ownership.

1. Introduction

Through repeated securities offerings, investment banks develop tight-knit, long-term relations with both their corporate clients and investors. These relations appear to generate unique networks of investors who tend to remain loyal to their primary investment bank (e.g., Binay, Gatchev, and Pirinsky, 2007; Gondat-Larralde and James, 2008; Huang, Shangguan, and Zhang, 2008). This suggests that buy-side firms self-segment through affiliation with particular investment banks, much like a social network. In this paper, we test whether such networks have a direct effect on stock prices and trading behavior through the creation of segmented capital markets.

Investment banking relationships are an ideal subject for studying the effect of information networks on asset prices because underwriters are a conduit for information flow between firms and their investors. The prospectus, the road show, and general marketing efforts during initial public offerings (IPOs) and seasoned equity offerings (SEOs) all create a segmented information flow directed at targeted groups of investors. Underwriters also provide their clients with information-intensive activities such as market making, advice on mergers and acquisitions, and analyst coverage (e.g., Ritter, 2003; and Ljungqvist, Marston, and Wilhelm, 2006), which over time create suitable conditions for investors to form strong bonds with their primary investment bank.

In this paper, we hypothesize that if different investment banks have access to different networks of investors, then the underwriting process could create segmented networks

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of investors who would hold similar stocks and share similar correlated trading patterns. As a result, a firm's underwriting relation could affect the firm's stock price behavior through market segmentation. While previous studies have shown the effect of underwriting relations on underpricing and long-run performance (e.g., Beatty and Ritter, 1986; Carter, Dark, and Singh, 1998), little evidence exists on whether the formation of investor coalitions segments markets to the extent necessary to have a real effect on stock prices.

Our predictions are based on recent theoretical models that analyze the effect of social connections on stock prices and trading behavior (e.g., DeMarzo, Vayanos, and Zwiebel, 2003; Colla and Mele, 2010; Ozsoylev and Walden, 2011; Han and Yang, 2014). If markets are complete, then switching from one underwriter to another should not affect the covariance of asset prices. However, the existence of segmented markets or an asymmetric communication flow driven by geographic, social, or institutional boundaries can lead to the formation of coalitions or networks of investors who concentrate their holdings and trading patterns in common securities. As a result, underwriter network effects can generate excess correlation.

Consider a simple example. Suppose Goldman Sachs underwrites equity offerings by firms A, B, and C. In its road show, it conveys information about the firms to a set of investors, $I_{Goldman}$, who subsequently buy shares in A, B, and C. JPMorgan similarly underwrites offerings by a different set of firms (D, E, and F) and markets them to a different set of investors, I_{Morgan}. As long as these two sets of investors do not share any information about firm fundamentals, the trading behavior of these two separate sets of investors can lead to correlations in asset prices that are driven by correlated buying and selling pressure within the investor set. Now suppose an exogenous force causes firm F to switch underwriters for its next security offering, and it moves from JPMorgan to Goldman. Now, $I_{Goldman}$ obtains better information about firm F than I_{Morgan}, which causes the stock returns of firm F to move less with D and E (its old network) and more with A, B, and C (its new network). Because buy-side groups have access to different information channels, this market segmentation can lead to network effects on asset prices.

Consistent with these predictions, we find evidence that investment banking networks generate comovement in stock prices and trading behavior. Specifically, we find that stocks sharing the same underwriter at their IPOs covary to a greater extent than simple fundamentals would suggest. This comovement increases when the firm completes an SEO, and the increase is magnified when the firm switches underwriters for the new offering. Furthermore, firms that switch underwriters begin moving less with the old bank network of stocks and move more with the new bank network of stocks after the switch.

To test for network effects, we first form a network portfolio for each investment bank by grouping all firms that had their most recent equity offering with that particular bank. We then form a time series of returns for each network portfolio. In a simple test, we find that individual stock returns are more correlated with their own network portfolio than they are with other network portfolios (or with a placebo random set of stocks). This could be true if certain investment banks endogenously match with firms along a dimension already associated with comovement. For example, if Goldman Sachs tends to underwrite large-value, high-priced stocks headquartered in the Northeast, we could simply be observing those other forms of comovement.

To mitigate the potential endogeneity of cross-sectional underwriter matching, we examine the behavior of stock comovement around SEOs. By focusing on an event window of one year before and after the SEO event, it is unlikely that other firm characteristics are driving the relative change in comovement. Our results indicate that firms using a new underwriter experience a large increase in comovement with new underwriter–affiliated portfolios relative to firms that do not switch. This change in comovement is especially large for firms completing their first SEO. Overall, the economic magnitude of the effect we show is on the same scale as the comovement induced by the nominal share price (Green and Hwang, 2009) or index additions (Barberis, Shleifer, and Wurgler, 2005).

Even for firms that switch underwriters, there could be residual endogeneity if some unobserved change in firm characteristics causes firms to strategically switch underwriters. To address this issue, we follow the methodology in Asker and Ljungqvist (2010) and examine the changes in the comovement of firms that are forced to switch underwriters because their former investment bank exits the sample through an exogenous event (e.g., merger or bankruptcy). These tests are reassuring because we find similar changes in comovement around these forced switches.

We also find strong network effects in patterns of institutional holdings around equity offerings. For firms that switch investment banks, we find large changes in the holdings of institutions in the new bank's network. As expected, the comovement effects in returns are stronger when there is a larger change in ownership. It appears that firms that switch underwriters gain access to a new network of institutional investors affiliated with the new underwriter. While Gibson, Safieddine, and Sonti (2004) show a large increase in institutional ownership around SEOs, we find that the nature of this change is especially important for firms that switch underwriters.

We also test whether changes in the investor network can be identified through market-making activity. Using a sample of Nasdaq stocks, we find significant changes in market-making activity from pre- to post-SEO. In the 12 months around the SEO, a structural shift in trading takes place from the old to the new bank, which demonstrates a discrete change in the location and patterns of trade around the underwriter switch.

Our results are robust. In addition to the standard regression analysis employed in other studies of comovement, we develop a matched sample approach. We create matched pairs of firms based on the relative size of the offering and the time since the last equity offering. We find that the switching firms experience larger changes in comovement around the SEO than do the matched sample of firms. We also test whether our results are related to recent studies on changes in analyst coverage and find that analysts do not appear to be the main source of the comovement we identify in this paper.[3] We also find that our results are robust to a battery of sensitivity tests.

Overall, our study is related to a number of different studies. Our evidence is consistent with the theoretical predictions in several papers (e.g., DeMarzo, Vayanos, and Zwiebel, 2003; Colla and Mele, 2010; Ozsolylev and Walden, 2013) that generally show that networks enable influential agents (e.g., investment banks) to effectively communicate with or persuade other agents in the network (e.g., institutional investors). Our paper also complements the work of Hong, Kubik, and Stein (2004, 2005), who find that word-of-mouth information flow causes local mutual fund managers to buy and sell the same stocks in concert. Our paper is also related to the work of Das and Sisk (2005), who study stock market discussion forums and find that stocks with more information centrality have greater covariance with other stocks, and to the work of Feng and Seasholes (2004), who report direct evidence that interactions between investors in the same brokerage office lead to segmented groups of investors with correlated trading patterns across geographical regions in China. Our work also complements the recent findings in Ozsoylev, Walden, Yavuz, and Bildik (forthcoming), who show that traders with similar trading behavior patterns appear to receive the same private information.

Finally, our paper is also related to a large number of studies that find excess covariation across assets. For example, Shiller (1989) and Pindyck and Rotemberg (1993) find evidence that comovement cannot be explained by simple fundamentals such as dividends, size, or other firm characteristics. More recently, researchers have uncovered comovement based on factors such as index affiliation (Barberis, Shleifer, and Wurgler, 2005; Greenwood, 2008), value/growth labels (Boyer, 2011), nominal share prices (Green and Hwang, 2009), geographical proximity (Pirinsky and Wang, 2004; Ji, 2007; Chan, Hameed, and Lau, 2003) trading location (Froot and Dabora, 1999; Kaul, Mehrotra, and Stefanescu, 2006), and analyst coverage (Anton and Polk forthcoming; Hameed, Morck, Shen and Yeung, 2010; Muslu, Rebello, and Xu, 2009). Furthermore, excess comovement is related to correlated trading by both institutions (Pirinsky and Wang, 2006; Sun, 2007) and individual investors (Kumar and Lee, 2006). Our paper contributes to this literature by identifying a fundamental information-based source of comovement through the creation of segmented markets.

The remainder of the paper is organized as follows. Section 2 describes the sample selection procedure, defines the variables, and provides summary statistics. Section 3 discusses the comovement among stocks that share the same underwriter at the IPO. In Section 4, we test whether comovement changes around SEOs and examine whether firms that were exogenously forced to switch investment banks also experience changes in comovement. Section 5 examines the link between institutional holdings and changes in comovement. Section 6 tests whether our results are related to market making activity and trading volume. Section 7 provides a series of robustness checks for our results, and Section 8 presents concluding thoughts.

[3] For example, see Anton and Polk (forthcoming), Hameed, Morck, Shen and Yeung (2010), and Muslu, Rebello, and Xu (2009).

2. Sample selection and summary statistics

We create two samples of all equity offerings between 1980 and 2008 from the Securities Data Corporation (SDC) Platinum database. The first sample consists of 2,540 IPOs in which a firm uses a single lead underwriter. Moreover, we require that the underwriter be ranked in the top 25 by underwriting volume during the year of the offering. In forming the rankings, we include all offerings (including those with multiple lead underwriters) and assume that offerings led by multiple underwriters are equally divided among the lead banks. We consider only IPOs raising at least \$5 million and with at least one year until the first SEO.

Our second sample contains 2,869 SEOs in which a single underwriter leads both the SEO and the previous equity offering and for which the lead bank on the current offering is ranked in the top 25. This sample contains only SEOs that raise at least \$5 million and that occur at least six months after the most recent offering and at least six months before the next offering.

Among our sample of SEOs, 1,511 used the same bank from the previous offering and 1,358 switched investment banks. In determining which firms switched banks, we hand-check the observations when the switch could have been due to a merger of lead underwriters. For example, if a firm's 1999 offering was led by Citigroup but its 1997 offering was led by Salomon Brothers, it would not be considered in this analysis because these two underwriters merged in the interim.

For IPOs, we require Center for Research in Security Prices (CRSP) stock return data for at least six months after the offering. For SEOs, we require CRSP data for at least six months prior to and after the offering and holdings data from the Thomson 13 F institutional holdings database. Finally, given the significant change in ownership at the first SEO, especially compared with subsequent equity offerings, we might expect different changes in comovement at the first SEO relative to later ones. Thus, for most of our analysis, we divide the sample into offerings that are the firm's first SEO and those representing the firm's second or later SEO.

2.1. Defining associated firms and institutions

To measure whether investment bank networks lead to excess comovement, we first have to define how we construct our network measures. We define the set of firms associated with each bank and the set of institutions associated with the same bank. To define the set of firms associated with the lead bank, we include all firms that completed an equity offering (either IPO or SEO) within the last two years and that used the lead bank as the sole lead underwriter for their offerings. For example, consider the SEO by Michaels Stores in July 1994, which was led by CS First Boston. For each month in the event window around the SEO, we identify all firms that raised money through an IPO or SEO in the previous two years and used CS First Boston as the sole lead underwriter for their offerings. These firms are considered to be in the CS First

Table 1
Summary statistics.
This table presents summary statistics for the two main samples used in the paper. The initial sample consists of 2,540 initial public offerings (IPOs) over the period 1980–2008. We require that the firm use a single lead underwriter for the offering that was ranked in the top 25 banks by underwriting volume during the year of the offering. Only IPOs with at least one year until the first seasoned equity offering (SEO) are included. The second sample consists of 2,869 SEOs that used a single lead underwriter for both the SEO and their most recent equity offering and for which the lead bank on the current offering is ranked in the top 25. Only SEOs with at least six months after the most recent offering and with at least six months until the next offering are included in the sample. All IPOs and SEOs must be at least $5 million in size. *Offering Size* is the amount (in millions) raised in the offering. *#Firms in Bank Portfolio* is the average number of firms in the portfolio associated with the bank leading the offering. For IPOs, *#Firms in Bank* 1(2) *Portfolio* is the average number of firms in the portfolio associated with the bank ranked directly above (below) the bank leading the IPO in terms of underwriting volume in the year of the IPO. *Total # Institutions* is the number of institutions holding a stake in the firm immediately following the IPO or SEO. For SEOs, *Years Since Last Offering* is the number of years since the firm's last equity offering, and *Relative Offering Size* is offering size divided by the market capitalization of the firm in the month prior to the SEO.

	Mean	25th percentile	Median	75th percentile
Panel A: IPO Sample (2,540 offerings)				
Offering size (millions of dollars)	70.66	24.80	40.60	70.40
#Firms in bank portfolio	49.22	28.99	46.46	68.38
# Firms in bank 1 portfolio	48.48	27.27	45.76	69.62
# Firms in bank 2 portfolio	41.98	22.03	37.78	59.38
Total # institutions	19.41	5.00	16.00	28.00
Panel B: SEO Sample (2,869 offerings)				
Did not switch investment bank (1,511 offerings)				
Offering size (millions of dollars)	91.81	31.20	57.00	103.50
Relative offering size	0.16	0.09	0.13	0.20
Years since last offering	1.89	0.83	1.28	2.27
# of Firms in bank portfolio	46.61	27.68	43.87	63.47
Total # institutions	75.13	35.00	57.00	92.00
Switched investment banks (1,358 offerings)				
Offering size (millions of dollars)	89.51	29.40	54.60	100.00
Relative offering size	0.18	0.09	0.15	0.23
Years since last offering	3.87	1.45	2.69	4.97
# of Firms in bank portfolio	42.24	20.39	36.92	61.93
Total # institutions	80.69	34.00	58.00	101.00

Boston network for the purposes of this offering by Michaels Stores in 1994.

To define the set of institutions associated with CS First Boston for this offering, we again examine all firms that completed an IPO with CS First Boston as the sole lead underwriter in the two years prior to the SEO by Michaels Stores. We rank all institutions that hold a stake in at least one of these bank network firms in the quarter immediately following the firm's IPO by the fraction of firms held in the network. From these institutions, we select those above the 75th percentile and consider them to be associated with CS First Boston for the purposes of this offering by Michaels Stores. The concept here is that we have identified institutions that tend to hold many of the stocks underwritten by CS First Boston.

2.2. Summary statistics

Panel A of Table 1 presents statistics for our sample of IPOs. The average offering size of the IPOs in our sample is approximately $70 million, with a median size of approximately $41 million. The average number of firms in the portfolio associated with the investment bank leading the offering is approximately 49, and the average number of institutions holding a stake in the firm immediately after the IPO is approximately 19. Panel B presents statistics for the sample of SEOs. The average offering size for firms that did not switch investment banks is approximately $92 million, and the corresponding figure for firms that did switch is approximately $90 million. The two subsamples of SEOs are fairly similar, except that firms that switched investment banks tend to wait longer to issue again. Unsurprisingly, the average number of institutions holding a stake in the firm immediately after an equity issue is much larger for SEOs than for IPOs.

3. Bank network comovement around IPOs

In this section, we test whether stocks with the same underwriter tend to move together after their IPOs. We perform this test by estimating the following regression model using our sample of IPO firms:

$$R_{i,t} = \alpha_i + \beta_{Lead,i} R_{Lead,t} + \varepsilon_{i,t}, \quad (1)$$

where $R_{i,t}$ is the return on stock i in period t and $R_{Lead,t}$ is the return on a value-weighted portfolio of all firms associated with the bank that led the IPO, excluding firm i. For an offering to be included in our sample, we require this portfolio to have an average of at least five firms per month. As described in Section 2, our definition of the bank network or association is based on whether the bank was a lead underwriter for the firm's most recent equity offering within the last two years. Intuitively, the portfolio return, $R_{Lead,t}$, is our benchmark for firms in the same underwriter network. Therefore, our estimate of $\beta_{Lead,i}$ for each firm measures the

Table 2
Comovement with other stocks associated with same bank following the initial public offering (IPO).
This table reports the average adjusted R^2 of the following regression models:

$$R_{i,t} = \alpha_i + \beta_{Lead,i} R_{Lead,t} + \varepsilon_{i,t},$$
$$R_{i,t} = \alpha_i + \beta_{Bank\ 1,i} R_{Bank\ 1,t} + \varepsilon_{i,t},$$
$$R_{i,t} = \alpha_i + \beta_{Bank\ 2,i} R_{Bank\ 2,t} + \varepsilon_{i,t},$$

and the average beta coefficients from the following regression model:

$$R_{i,t} = \alpha_i + \beta_{Lead,i} R_{Lead,t} + \beta_{Bank\ 1,i} R_{Bank\ 1,t} + \beta_{Bank\ 2,i} R_{Bank\ 2,t} + \varepsilon_{i,t}$$

where $R_{i,t}$ is the return on stock i in period t, $R_{Lead,t}$ is the return on a value weighted portfolio of all other firms associated with the bank that led the IPO, and $R_{Bank\ 1,t}$ ($R_{Bank\ 2,t}$) is the return on a value weighted portfolio of all firms associated with the bank ranked directly above (below) the bank leading the IPO in terms of underwriting volume in the year of the IPO. A bank is considered to be associated with a firm if it was the sole lead underwriter for the firm's IPO or seasoned equity offering (SEO) within the last two years. The sample consists of all IPOs that were led by a single underwriter that ranked among the top 25 banks in terms of underwriting volume in the year of the IPO. In addition, we consider only offerings in which the firm did not have another equity offering in the 12 months following the IPO. The regressions are estimated over the one-year period following the IPO. For the average coefficients and average R^2 values for the control bank portfolios, we test for significant differences relative to those for the portfolio of firms associated with the bank leading the offering. *** (**) [*] represents significant differences at the 1% (5%) [10%] level. Standard errors are clustered by offering month.

Panel A: Daily returns

		Univariate regressions Average R^2			Multivariate regression Average betas		
Time period	N	Lead bank	Bank 1	Bank 2	Lead bank	Bank1	Bank2
Panel A: Daily returns							
1980–1989	546	0.068	0.061***	0.060***	0.289	0.215***	0.191***
1990–1999	1,647	0.053	0.047***	0.044***	0.326	0.234***	0.212***
2000–2009	347	0.087	0.078***	0.071***	0.339	0.245***	0.186***
1980–2009	2,540	0.061	0.054***	0.051***	0.320	0.231***	0.204***
Panel B: Weekly returns							
1980–1989	546	0.127	0.112***	0.115***	0.369	0.235***	0.267**
1990–1999	1,647	0.102	0.092***	0.086***	0.410	0.278***	0.227***
2000–2009	347	0.147	0.136***	0.122***	0.396	0.305*	0.271*
1980–2009	2,540	0.113	0.102***	0.097***	0.399	0.273***	0.242***

responsiveness of the IPO firms' returns to the returns of stocks associated with the same underwriter.

Our regression coefficients could measure the systematic risk associated with both the portfolio return and the IPO firm. To assess whether the economic magnitude of the coefficient is significant, we compare our estimate for the network portfolio (the treatment bank) with estimates from the same regressions using an unassociated or non-network portfolio (the control bank). To construct this non-network portfolio, we first rank investment banks in terms of underwriting volume in the year of the offering. We then take the two investment banks ranked by volume that are one rank above and one rank below our treatment bank. If the treatment bank is at the top of the list, then control bank 1 is the bank ranked #2 and control bank 2 is the bank ranked #3. Similarly, if the treatment bank is at the bottom of the list, then control bank 1 is the bank ranked #24 and control bank 2 is the bank ranked #23.[4] The idea here is to identify control firms that are affiliated with an investment bank of a similar size to that of the treatment group.

To benchmark the comovement of stocks in our IPO sample using firms outside their network, we estimate the following regression models

$$R_{i,t} = \alpha_i + \beta_{Bank\ 1,i} R_{Bank\ 1,t} + \varepsilon_{i,t},$$
$$R_{i,t} = \alpha_i + \beta_{Bank\ 2,i} R_{Bank\ 2,t} + \varepsilon_{i,t},$$
$$R_{i,t} = \alpha_i + \beta_{Lead,i} R_{Lead,t} + \beta_{Bank\ 1,i} R_{Bank\ 1,t} + \beta_{Bank\ 2,i} R_{Bank\ 2,t} + \varepsilon_{i,t}, \tag{2}$$

where $R_{Bank\ 1,t}$ ($R_{Bank\ 2,t}$) is the return on a value-weighted portfolio of all firms associated with the bank one rank above (below) the bank leading the IPO in terms of underwriting volume in the year of the IPO.[5] The remaining variables are the same as in Eq. (1).

Our estimation of Eqs. (1) and (2) yields a sample of associated and unassociated bank coefficients and adjusted R^2 estimates across all the IPO firms in our sample. We compute the average of these parameters across all regressions and report them in Table 2. If firms with the same underwriter tend to move together, the coefficients and adjusted R^2 estimates for the associated portfolio (IPO bank) should be larger than those of the unassociated portfolio (banks 1 and 2). In Panel A, we present the results for daily returns, and Panel B shows the results for weekly returns.

Consistent with our main hypothesis, we find larger betas and R^2 values for within-network regressions. Panel A shows that over the period 1980–2009, the average adjusted R^2 for regressions using the associated bank

[4] We also construct an unassociated portfolio that consists of all the stocks associated with the bank that most closely matches the associated bank in terms of average size of the firms contained in the portfolio and find that our results are robust to this alternative matching approach.

[5] We also require these control bank portfolios to have at least five firms per month for an offering to be included in our sample.

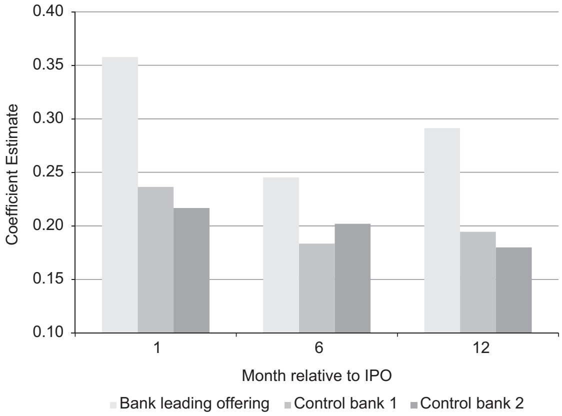

Fig. 1. Average coefficients from multivariate regressions. This figure depicts the evolution over time of the estimated coefficients of the following regression model:

$$R_{i,t} = \alpha_i + \beta_{Lead,i} R_{Lead,t} + \beta_{Bank\ 1,i} R_{Bank\ 1,t} + \beta_{Bank\ 2,i} R_{Bank\ 2,t} + \varepsilon_{i,t},$$

where $R_{i,t}$ is the return on stock i in period t, $R_{Lead,t}$ is the return on a value weighted portfolio of all firms associated with the bank which led the initial public offering initial public offering (IPO), $R_{Bank\ 1,t}$ ($R_{Bank\ 2,t}$) is the return on a value weighted portfolio of all firms associated with the bank ranked directly above (below) the bank leading the IPO in terms of underwriting volume in the year of the IPO. A bank is considered to be associated with a firm if it was a lead underwriter for the firm's IPO or SEO within the last two years. The sample consists of all IPO's which were led by a single underwriter that ranked in the top 25 banks in terms of underwriting volume in the year of the IPO. In addition, we consider only offerings in which the firm did not have another equity offering in the 12 months following the IPO. The regressions are estimated using daily returns separately over the three event windows of 1, 6, and 12 months.

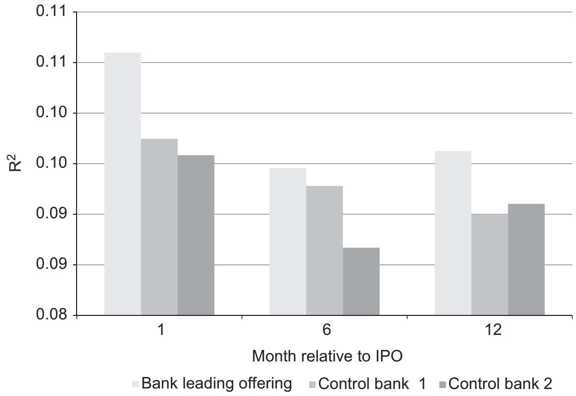

Fig. 2. Average adjusted-R^2 from univariate regressions. This figure depicts the evolution over time of the adjusted-R^2 of the following regression models:

$$R_{i,t} = \alpha_i + \beta_{Lead,i} R_{Lead,t} + \varepsilon_{i,t},$$
$$R_{i,t} = \alpha_i + \beta_{Bank\ 1,i} R_{Bank\ 1,t} + \varepsilon_{i,t},$$
$$R_{i,t} = \alpha_i + \beta_{Bank\ 2,i} R_{Bank\ 2,t} + \varepsilon_{i,t},$$

where $R_{i,t}$ is the return on stock i in period t, $R_{Lead,t}$ is the return on a value-weighted portfolio of all firms associated with the bank which led the initial public offering (IPO), and $R_{Bank\ 1,t}$ ($R_{Bank\ 2,t}$) is the return on a value weighted portfolio of all firms associated with the bank ranked directly above (below) the bank leading the IPO in terms of underwriting volume in the year of the IPO. A bank is considered to be associated with a firm if it was a lead underwriter for the firm's IPO or seasoned equity offering within the last two years. The sample consists of all IPOs that were led by a single underwriter that ranked among the top 25 banks in terms of underwriting volume in the year of the IPO. In addition, we consider only offerings in which the firm did not have another equity offering in the 12 months following the IPO. The regressions are estimated using daily returns separately over the first, sixth, and 12th months following the IPO.

portfolio is 6.1%, and that of the regressions using unassociated bank portfolios is, on average, less than 5.4%. The coefficients and R^2 estimates for the unassociated banks might seem high, but these portfolios contain numerous stocks and, as such, we expect significant correlation with any portfolio that contains a significant amount of systematic variation in equity returns. Our main result here is that the coefficients and R^2 estimates are significantly lower for unassociated banks.[6] The results from the multivariate regressions indicate that the average coefficient on the associated bank portfolio over the period 1980–2009 is 40% larger than the unassociated bank portfolio (0.32 versus 0.23). The weekly return results in Panel B exhibit similar patterns.

Correlations are higher with the stocks in the same bank network, especially at the weekly frequency. It is important to note that the differences in adjusted R^2 estimates and betas between the associated-portfolio and unassociated-portfolio regressions are statistically significant at the 1% level in nearly all cases. The evidence in Table 2 demonstrates that stocks with the same underwriter exhibit greater comovement than stocks affiliated with a different bank.

To better understand the dynamics of stock price comovement, we also examine the time series behavior of betas and R^2 estimates after IPOs. To conduct this analysis, we estimate Eq. (2) for our sample of IPOs over three different event windows. First, we estimate the treatment (network) and control (unassociated) coefficients and R^2 estimates in the first month after the IPO based on daily returns. Next, we estimate the coefficients over the sixth month following the IPO and the 12th month following the IPO. We then compute the equally weighted cross sectional average of the estimates for each of the three time periods. Figs. 1 and 2 present our results. The differences in betas and R^2 estimates between the associated and unassociated portfolios are largest during the first month after the IPO, but the differences persist for up to 12 months following the offering. A slight increase is evident in the difference from six to 12 months (although it is not statistically significant). Overall, the comovement effects appear immediately following the IPO and persist through the first year of trading.

Finally, to determine whether IPOs create distinct coalitions of investors, we test whether bank affiliations translate into significant changes in ownership patterns. We first measure holdings in the first quarter after the IPO for institutions that are associated with the bank leading the IPO. As in the analysis above, we form a control group of institutions associated with the banks ranked directly above and below the investment bank leading the IPO in terms of underwriting volume. Institutions are associated

[6] In Section 7.2, we show that our results are robust to the inclusion of market returns and other risk factors.

Table 3
Institutional holdings in the first quarter after the initial public offering (IPO).

This table presents average measures of institutional holdings for institutions that are associated with the bank leading the IPO of a given firm as well as the holdings of institutions associated with the two control banks. An institution is considered to be associated with a bank if it ranks above the 75th percentile in terms of the fraction of bank-associated firms that it holds a position in during the quarter immediately following the firm's IPO. We exclude institutions that are associated with more than one of the three banks considered. Panel A presents the fraction of the firm held by institutions, and Panel B presents the total number of such institutions with a position in the stock. For control banks 1 and 2, we test for differences relative to the holdings of the bank leading the IPO. *** (**) represents significance at the 1% (5%) level.

Time Period	N	IPO Bank	Control 1	Control 2
Panel A: Fraction of firm held by associated institutions				
1980–1989	546	0.013	0.007***	0.005***
1990–1999	1647	0.018	0.011***	0.007***
2000–2009	347	0.013	0.010**	0.007***
1980–2009	2540	0.016	0.010***	0.007***
Panel B: Number of associated institutions				
1980–1989	546	1.046	0.641***	0.473***
1990–1999	1647	1.995	1.305***	0.866***
2000–2009	347	2.274	1.867***	1.135***
1980–2009	2540	1.829	1.239***	0.819***

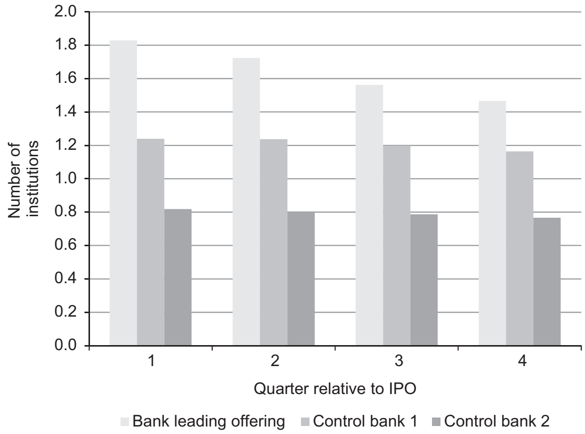

Fig. 4. Number of associated institutions. This figure depicts the evolution of the number of institutions holding shares of the initial public offering (IPO) that are connected with the lead investment bank and the banks ranked directly above (Control bank 1) and below (Control bank 2) the lead bank in terms of underwriting volume in the year of the IPO. The sample consists of all IPOs that were led by a single underwriter that ranked among the top 25 banks in terms of underwriting volume in the year of the IPO. In addition, we consider only offerings in which the firm did not have another equity offering in the 12 months following the IPO.

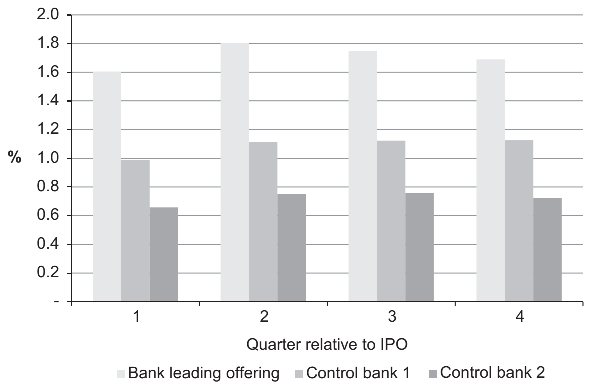

Fig. 3. Fraction of firm held by associated institutions. This figure depicts the evolution of the fraction of the initial public offering (IPO) firm held by institutions associated with the lead investment bank and the banks ranked directly above (control bank 1) and below (control bank 2) the lead bank in terms of underwriting volume in the year of the IPO. The sample consists of all IPOs that were led by a single underwriter that ranked among the top 25 banks in terms of underwriting volume in the year of the IPO. In addition, we consider only offerings in which the firm did not have another equity offering in the 12 months following the IPO.

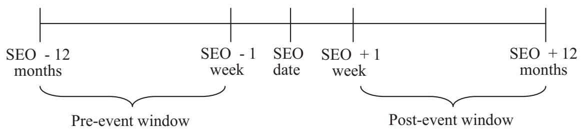

Fig. 5. Timeline used for pre- and post-seasoned equity offering (SEO) regressions.

with a bank if they rank above the 75th percentile in terms of the fraction of bank-associated firms that it owns during the quarter immediately following those bank-associated firms' IPOs. An institution is considered associated with the lead bank only if it is not associated with either of the two control banks.

Table 3 reports the results of this analysis. Panel A shows that the share of the IPO firm held by institutions that are associated with the bank leading the IPO is much larger than the share held by unassociated banks (1.6% versus 1.0% for the institutions of control bank 1). Similarly, Panel B shows that the average number of institutions holding shares in the IPO firms is much larger for the institutions associated with the bank leading the IPO than for unassociated banks (1.83 versus 1.24 for control bank 1 institutions).

To examine the time series behavior of institutional investors after the IPO, Figs. 3 and 4 depict our two measures of institutional holdings over the four quarters following the IPO. Consistent with the notion that coalitions of investors remain loyal to their investment banks, Fig. 3 shows that the fraction of the IPO firm held by institutions associated with the bank leading the IPO remains relatively high over time. Although Fig. 4 shows that the average number of affiliated institutions holding shares in the IPO firms declines over the four quarters following the IPO, this number remains relatively high compared with the number of unaffiliated institutions. For example, in the fourth quarter after the IPO, approximately 1.4 affiliated institutions hold shares in the IPO firms, and approximately 1.2 of the control bank 1 and 0.8 of the control bank 2 institutions hold shares.

4. Changes in comovement around seasoned equity offerings

The results presented in Section 3 could be the result of endogenous matching between underwriters and firms at their IPOs. If all firms underwritten by a certain bank tend to come from a similar geographic area or industry this could induce comovement that is unrelated to the investor

Table 4
Comovement with other stocks associated with the bank leading the seasoned equity offering (SEO).

This table reports the estimated coefficients of the following regression model:

$$R_{i,t} = \alpha_i + \beta_{Lead,i} R_{Lead,t} + \varepsilon_{i,t},$$

where $R_{i,t}$ is the return on stock i in period t, $R_{Lead,t}$ is the return on a value weighted portfolio of all other firms associated with the bank that led the SEO. A bank is associated with a firm if it was the sole lead underwriter for the firm's initial public offering (IPO) or SEO in the last two years. The sample is all SEOs led by a single underwriter ranked in the top 25 by underwriting volume in the year of the IPO and that had a single underwriter lead their most recent equity offering. Offerings are divided into two categories: those in which the firm used the same underwriter as its most recent offering and those with a new underwriter. Regressions are estimated for a pre-SEO and post-SEO window of one year before and after the offering, excluding the week before and the week after the offering. "Diff" is the difference between the post-offering coefficient and the pre-offering coefficient. *T*-tests are performed to determine whether the cross-sectional mean of "Diff" is significantly different from zero. The standard errors for the *t*-statistics are clustered by offering month, and the *t*-statistics are reported in parentheses. The columns labeled "Difference" present *t*-statistics for the tests of the null hypothesis that the means are equal between the switching and nonswitching firms.

	Used same bank for SEO as previous offering							Used different bank for SEO								
		Average beta			Average R^2				Average Beta			Average R^2			Difference	
	N	Pre	Post	Diff	Pre	Post	Diff	N	Pre	Post	Diff	Pre	Post	Diff	Beta	R^2
Panel A: Daily returns																
First SEO	655	0.62	0.70	0.08	0.062	0.084	0.022	550	0.54	0.68	0.13	0.050	0.080	0.030	2.32	1.77
				(4.15)			(5.36)				(6.43)			(7.21)		
Later SEO	856	0.63	0.68	0.04	0.096	0.104	0.007	808	0.58	0.66	0.08	0.080	0.101	0.021	1.87	3.19
				(2.90)			(1.76)				(5.02)			(4.60)		
Full sample	1,511	0.63	0.69	0.06	0.081	0.095	0.014	1,358	0.57	0.67	0.10	0.068	0.093	0.025	2.85	3.51
				(4.37)			(3.80)				(7.05)			(6.41)		
Panel B: Weekly Returns																
First SEO	655	0.77	0.78	0.01	0.114	0.127	0.013	550	0.62	0.76	0.14	0.084	0.124	0.040	3.14	3.58
				(0.43)			(1.88)				(4.25)			(6.54)		
Later SEO	856	0.71	0.75	0.04	0.144	0.152	0.007	808	0.64	0.71	0.07	0.116	0.138	0.022	1.20	2.12
				(1.72)			(1.05)				(3.25)			(3.64)		
Full sample	1,511	0.74	0.76	0.03	0.131	0.141	0.010	1,358	0.63	0.73	0.10	0.103	0.132	0.029	3.08	3.81
				(1.39)			(1.71)				(4.77)			(5.77)		

networks. In this section, we test for changes in comovement surrounding equity offerings using our sample of SEOs. We first run regressions for a one-year period prior to the SEO (*Pre*) and following the SEO (*Post*), excluding one week on either side of the offering. The timing we use is illustrated in Fig. 5. We estimate the average change in the beta coefficient and R^2 from the *Pre* to *Post* SEO period in the following regression:

$$R_{i,t} = \alpha_i + \beta^{Pre}_{Lead,i} R_{Lead,t} + \varepsilon_{i,t}$$

$$R_{i,t} = \alpha_i + \beta^{Post}_{Lead,i} R_{Lead,t} + \varepsilon_{i,t} \quad (3)$$

Here, $R_{i,t}$ is the return on stock i in period t, and $R_{Lead,t}$ is the return on a value-weighted portfolio of all firms associated with the bank leading the SEO. Our estimate of the change in comovement with the underwriter is simply $\Delta\beta_{Lead,i} = \beta^{Post}_{Lead,i} - \beta^{Pre}_{Lead,i}$. We estimate these changes for the full sample and then compare the change in beta between firms that switched underwriters and firms that did not, thus providing a clean difference-in-differences estimate.

Table 4 reports the results from the estimation of Eq. (3). Panel A presents results using daily returns, and Panel B presents results using weekly returns. The changes in beta and adjusted R^2 are generally significant for firms retaining the same underwriter and those switching. However, the changes are larger for firms that switch underwriters. Using daily returns, we find that the average change in beta (adjusted R^2) for nonswitchers is 0.06 (0.014) and for switchers is 0.10 (0.025). Using weekly returns, the average change in beta (adjusted R^2) for nonswitchers is 0.03 (0.010) and for switchers is 0.10 (0.029). The difference-in-differences for betas and R^2 estimates are statistically significant.

Following previous studies (e.g., Barberis, Shleifer, and Wurgler, 2005; Green and Hwang, 2009), we also consider the changes in coefficient estimates from bivariate regressions for firms that use a different bank as lead managers of their SEOs relative to their previous equity offerings:

$$R_{i,t} = \alpha_i + \beta^{Pre}_{New,i} R_{New,i,t} + \beta^{Pre}_{Old,i} R_{Old,i,t} + \varepsilon_{i,t}$$

$$R_{i,t} = \alpha_i + \beta^{Post}_{New,i} R_{New,i,t} + \beta^{Post}_{Old,i} R_{Old,i,t} + \varepsilon_{i,t} \quad (4)$$

where $R_{i,t}$ is the return on stock i in period t, $R_{New,i,t}$ is the return on a value-weighted portfolio of all firms associated with the new investment bank, and $R_{Old,i,t}$ is the return on a value-weighted portfolio of all firms associated with the old investment bank. As in the univariate estimation, we compute the change in comovement as the difference between the *Pre* and *Post* SEO coefficient estimates. In this specification, we can test for changes in comovement with the new bank portfolio while controlling for changes in comovement with the old bank portfolio.

Table 5 presents results for our bivariate regressions.[7] Panel A presents the results for daily returns, and Panel B

[7] The sample size in these regressions diminishes significantly relative to the number of switching firms in Table 4, as this sample requires data not only on the lead bank portfolios and institutions but also on old bank portfolios and institutions. This leads to a significant reduction in the number of firms meeting our data requirements.

Table 5
Comovement around seasoned equity offerings (SEOs).

This table reports changes in the slope and the fit of regressions of returns for firms issuing seasoned equity. For each firm which uses a different bank as lead manager for its SEO relative to its previous offering, we regress stock returns on the returns of a value-weighted portfolio of firms associated with the old investment bank and the new investment bank. Firms are considered to be associated with a bank if their IPO or SEO was led by that bank in the last two years. For each offering, we estimate bivariate regressions separately for the one-year period before (pre) and after (post) SEOs as follows:

$$R_{i,t} = \alpha_i + \beta_{New,i} R_{New,i,t} + \beta_{Old,i} R_{Old,i,t} + \varepsilon_{i,t},$$

where $R_{i,t}$ is the return on stock i in period t, $R_{New,i,t}$ is the return on a value-weighted portfolio of all firms associated with the new investment bank, and $R_{Old,i,t}$ is the return on a value-weighted portfolio of all firms associated with the old investment bank. Firm i is eliminated from these portfolios, and we exclude the week before and after the SEO. "Diff" is the difference between the post-offering coefficient and the pre-offering coefficient. T-tests are performed to determine whether the cross-sectional mean of "Diff" is significantly different from zero. The standard errors for the t-statistics are clustered by offering month and the t-statistics are reported in parentheses. Panel A shows the results for daily returns, and Panel B shows the results for weekly returns.

		New bank – average beta			Old bank – average beta			
	N	Pre	Post	Diff	Pre	Post	Diff	Diff (new) - Diff (old)
Panel A: Daily returns								
First SEO	393	0.39	0.50	0.11	0.33	0.32	0.00	0.11
				(4.83)			(−0.08)	(3.41)
Later SEO	647	0.39	0.44	0.05	0.34	0.35	0.01	0.04
				(3.27)			(0.66)	(1.73)
Full sample	1,040	0.39	0.46	0.07	0.34	0.34	0.01	0.06
				(5.66)			(0.46)	(3.85)
Panel B: Weekly returns								
First SEO	393	0.44	0.55	0.11	0.37	0.35	−0.02	0.12
				(2.53)			(−0.42)	(1.76)
Later SEO	647	0.42	0.48	0.06	0.38	0.34	−0.04	0.11
				(2.38)			(−1.85)	(2.50)
Full sample	1,040	0.43	0.51	0.08	0.38	0.34	−0.03	0.11
				(3.38)			(−1.57)	(2.98)

presents the results for weekly returns. In Panel A, the coefficient estimate β_{New} increases by nearly 20%, from 0.39 to 0.46 after the SEO. The results are especially strong for the first SEO, with the coefficient estimate increasing by an average of 0.11, more than twice as large as the increase for later offerings. These results are consistent with the notion that the first offering has an especially large impact on the ownership structure of the firm and, hence, on the comovement of stock returns. Also of note is the coefficient on the old bank portfolio. The results indicate that β_{Old} does not change after the SEO and that the difference-in-differences are statistically insignificant. The results for weekly returns are similar, with one notable exception. For the subsequent SEO subsample, the average coefficient estimate for the old bank portfolio in the bivariate regressions declines significantly. This magnifies the difference-in-differences in the correlation of the firm's returns with those of the old and new bank portfolios.

The economic magnitude of the effect is large. The univariate regressions in Table 4 show that the average R^2 across the entire sample of switching firms increases by 2 to 3 percentage points. This means that the association with the new investment bank accounts for 2% to 3% of the variation in returns that was not present prior to the offering. To put this result in perspective, it is useful to consider the change in comovement shown in other studies. For example, Green and Hwang (2009) show a similar increase (2–3% change in R^2) in price-based comovement around stock splits. Similarly, Barberis, Shleifer, and Wurgler (2005) find a similar increase in magnitude (0.10–0.15 coefficient change) for stocks added to the Standard and Poor's 500. Overall, our basic results are at least as large in economic magnitude as the effects identified in other comovement studies.

The previous analysis is unable to fully control for missing factors that could be simultaneously related to the decision to switch underwriters and the change in comovement we find. To address this issue, we form a subsample in which the decision to switch is exogenous. Here, we follow Asker and Ljungqvist (2010) and consider only firms that switch banks following a merger involving the bank that led their last offering.[8] Furthermore, as in Asker and Ljungqvist (2010), we require that the investment bank merger causes the firm to share an underwriter with another firm with the same four-digit standard industrial classification code and that is ranked among the top ten in sales in that industry. As shown by Asker and Ljungqvist (2010), such firms appear to be concerned about information leakage through the underwriter, and thus, are much more likely to switch banks for their next offering. Because this approach yields only 26 offerings, we supplement this sample with firms that switched banks because their old investment banks ceased operations. Specifically, we include firms that used either Drexel Burnham Lambert or Robertson Stephens to lead their last offering.[9]

[8] We thank Alexander Ljungqvist for providing the sample of bank mergers.

[9] Drexel Burnham Lambert was forced into bankruptcy in February 1990, and Robertson Stephens was closed in July 2002 by its parent, FleetBoston. We consider offerings only by firms that switched from Drexel Burnham Lambert or Robertson Stephens after those dates.

Table 6
Comovement with other stocks associated with the bank leading seasoned equity offering SEO – bank mergers and closures.

This table reports the estimated coefficients and adjusted R^2 values of the following regression model:

$$R_{i,t} = \alpha_i + \beta_{Lead,i} R_{Lead,t} + \varepsilon_{i,t},$$

where $R_{i,t}$ is the return on stock i in period t, $R_{Lead,t}$ is the return on a value weighted portfolio of all firms associated with the bank that led the SEO. A bank is considered to be associated with a firm if it was the sole lead underwriter for the firm's initial public offering (IPO) or SEO within the last two years. The sample consists of all SEOs that were led by a single underwriter that ranked among the top 25 banks in terms of underwriting volume in the year of the IPO and had a single underwriter lead their most recent equity offering. This table reports results for a sample of firms that switched banks due to a merger of their former lead bank or the closure of their former lead bank. The regressions are estimated for a pre-SEO and post-SEO window of one year before and after the offering, excluding the week before and the week after the offering. "Diff" is the difference between the post-offering coefficient and the pre-offering coefficient. T-tests are performed to determine whether the cross-sectional mean of "Diff" is significantly different from zero. The standard errors for the t-statistics are clustered by offering month and the t-statistics are reported in parentheses.

		Average beta			Average R^2		
	N	Pre	Post	Diff	Pre	Post	Diff
Panel A: Daily returns							
First SEO	20	0.507	0.778	0.271	0.066	0.096	0.030
				(2.67)			(1.83)
Later SEO	26	0.636	0.776	0.139	0.075	0.126	0.051
				(2.46)			(3.08)
Full sample	46	0.580	0.777	0.197	0.071	0.113	0.042
				(3.64)			(3.56)
Panel B: Weekly returns							
First SEO	20	0.600	0.894	0.294	0.090	0.145	0.055
				(1.72)			(1.67)
Later SEO	26	0.717	0.802	0.086	0.123	0.167	0.044
				(0.64)			(1.41)
Full sample	46	0.666	0.842	0.176	0.108	0.157	0.049
				(1.65)			(2.14)

Using this sample of firms forced to switch banks, we test for changes in comovement after the SEO. Table 6 presents the results of these regressions. Using daily (weekly) returns, we find that the beta coefficient increases by an average of 0.20 using daily returns and 0.18 using weekly returns. The adjusted R^2 increases by 4–5 percentage points for daily and weekly returns. These findings are similar to (or larger than) our full sample results reported in Table 4. Overall, these results provide evidence that the changes in comovement shown in this paper are statistically and economically significant even after controlling for potential endogeneity issues.

5. Changes in institutional holdings and changes in comovement

In this section, we link changes in comovement to changes in institutional holdings. As above, we consider an institution to be associated with a bank if it ranks above the 75th percentile of institutions in terms of the fraction of bank-associated firms that it owns during the quarter immediately following those bank-associated firms' IPOs. We construct two measures of institutional ownership: (1) the fraction of the SEO firm held by institutions that are associated with the bank leading the SEO and (2) the number of institutions holding shares in the SEO firms. We test for changes in these measures from the pre-offering period (−180 days, −90 days) to the post-offering period (0, +90 days) for firms that switched investment banks and for those that did not.[10]

The results are presented in Table 7. We find that both switchers and nonswitchers experience large changes in ownership by associated institutions. This result is not surprising because both types of firms are likely to sell a portion of their new shares to the institutions associated with their lead underwriter. However, Panel A shows that switchers experience a larger change in the fraction of the SEO firm held by associated institutions than nonswitchers (4.5% versus 3.5%). Furthermore, the evidence in Panel B indicates that switchers experience a larger increase in the number of associated institutions holding shares in the SEO firms than non-switchers (3.48 versus 2.38). In general, the results in Table 7 indicate that equity issuers experience significant changes in their investor clienteles when they switch investment banks.

For SEO firms switching banks, we also consider changes in holdings around the SEO by institutions associated with the new and old banks. Table 8 reports our results. Consistent with the evidence in Table 7, Panel A shows that the total percentage of the firm held by new bank institutions increases from 4.2% to 5.9% after the SEO.[11] Similarly, the average number of new bank institutions that hold stock in the firm increases significantly from 4.67 to 6.01. Both of these effects are larger for the first SEO. We also find that the total percentage of the firm held by old bank institutions (number of old bank institutions) increases only from 3.3% to 3.9% (3.93 to 4.42) after the SEO. These differences in the changes in institutional ownership between the new and the old bank are both economically and statistically significant (see the last column of Table 8).

The previous results demonstrate a significant change in the ownership around the SEO that could be related to investment banking networks. In Table 9, we present regression results that link changes in the holdings of lead bank institutions to the change in comovement. In these regressions, we consider the change in the lead bank coefficient estimates, $\Delta\beta$, and the change in adjusted R^2 from the univariate regressions in Table 4 as the dependent variable.

We regress the changes in comovement and the changes in adjusted R^2 on several offering-level characteristics, such as the relative size of the offering, the time since the last equity offering by the firm, and a dummy that is equal to one if the offering is the firm's first SEO. We also include a dummy that indicates if the lead bank was among the top ten banks in terms of underwriting volume

[10] Our pre-offering observation is from two quarters prior to the SEO, as Gibson, Safieddine, and Sonti (2004) show that institutions begin to increase their holdings prior to the SEO. Similar results hold if we consider the pre-offering observation to be the quarter immediately prior to the SEO.

[11] Here, we require the two sets to be mutually exclusive, as we are considering both new and old bank institutions.

Table 7
Changes in institutional holdings around the seasoned equity offering (SEO).

This table presents average measures of institutional holdings for institutions associated with the bank leading a firm's SEO. An institution is considered to be associated with a bank if it ranks above the 75th percentile in terms of the fraction of bank-associated firms that it holds a position in during the quarter immediately following those bank-associated firms' initial public offerings. Panel A presents the fraction of the firm held by institutions, and Panel B presents the total number of such institutions with a position in the stock. The pre-event observation comes from the period (−180 days, −90 days) relative to the offering, and the post-event observation comes from the period (0, +90 days) relative to the offering. "Diff" is the difference between the post-offering coefficient and the pre-offering coefficient. *T*-tests are performed to determine whether the cross-sectional mean of "Diff" is significantly different from zero. The standard errors for the *t*-statistics are clustered by offering month and the *t*-statistics are reported in parentheses. The columns labeled "Difference" present *t*-statistics for the tests of the null hypothesis that the means of the switching and nonswitching firms are equal.

	Used same bank for SEO				Used different bank for SEO				
	N	Pre	Post	Diff	*N*	Pre	Post	Diff	Difference
Panel A: Fraction of firm held by associated institutions									
First SEO	655	0.157	0.215	0.058	550	0.100	0.166	0.066	1.34
				(10.73)				(13.89)	
Later SEO	856	0.172	0.189	0.018	808	0.152	0.183	0.031	3.41
				(5.58)				(8.03)	
Full sample	1,511	0.165	0.200	0.035	1358	0.131	0.176	0.045	2.92
				(9.49)				(12.84)	
Panel B: Number of associated institutions with a stake in firm									
First SEO	655	13.702	17.056	3.354	550	9.022	13.502	4.480	3.27
				(9.14)				(15.31)	
Later SEO	856	17.731	19.362	1.631	808	16.978	19.780	2.802	3.91
				(6.33)				(8.35)	
Full sample	1,511	15.985	18.363	2.378	1,358	13.756	17.237	3.482	4.85
				(8.81)				(12.39)	

Table 8
Changes in institutional ownership around the seasoned equity offering (SEO) when firms switch banks.

This table presents the institutional ownership characteristics of firms around the SEO when firms switch banks. Panel A shows the total percentages of the firm held by old and new bank institutions. Panel B shows the number of institutions associated with the old and new banks that hold a stake in the firm. The pre-event observation comes from the period (−180 days, −90 days) relative to the offering, and the post-event observation comes from the period (0, +90 days) relative to the offering. An institution is considered to be associated with a bank if it ranks above the 75th percentile in terms of the fraction of bank-associated firms that it holds a position in during the quarter immediately following those bank-associated firms' initial public offering. We exclude institutions associated with both the old and new bank. "Diff" is the difference between the post-offering coefficient and the pre-offering coefficient. *T*-tests are performed to determine whether the cross-sectional mean of "Diff" is significantly different from zero. The standard errors for the *t*-statistics are clustered by offering month and the *t*-statistics are reported in parentheses.

		New bank institutions			Old bank institutions			
	N	Pre	Post	Diff	Pre	Post	Diff	Diff-in-Diff
Panel A: Total fraction held by associated institutions								
First SEO	393	0.035	0.064	0.030	0.027	0.034	0.006	0.023
				(8.00)			(3.58)	(5.38)
Later SEO	647	0.046	0.056	0.010	0.036	0.042	0.005	0.004
				(4.71)			(3.41)	(1.81)
Full sample	1,040	0.042	0.059	0.017	0.033	0.039	0.006	0.012
				(8.03)			(4.58)	(4.77)
Panel B: Total number of associated institutions								
First SEO	393	3.25	5.20	1.95	2.74	3.35	0.61	1.33
				(11.52)			(4.78)	(6.01)
Later SEO	647	5.54	6.50	0.96	4.65	5.07	0.42	0.54
				(5.72)			(3.27)	(3.40)
Full sample	1,040	4.67	6.01	1.34	3.93	4.42	0.49	0.84
				(9.52)			(4.66)	(5.93)

in the year of the offering (*Bank Top 10*), a dummy that indicates whether the firm switched banks during this offering (*Different Bank*), and a dummy that indicates whether the lead bank initiated research coverage either immediately prior to or after the offering (*New Coverage*). We then employ the changes in institutional holdings examined in Table 7 as additional explanatory variables. We include the change in the fraction of the firm held by institutions associated with the lead bank (*Diff. Sum Inst.*), the change in the percentage of the firm held by all institutions (*Diff. Sum All Inst.*), the change in the number of institutions associated with the lead bank (*Diff. Num. Inst.*), and the change in the total number of institutions (*Diff. Num. All Inst.*).

Table 9
Relation between change in comovement and change in institutional ownership.

This table presents regression results relating changes in beta and adjusted R^2 from the regressions in Table 4 to changes in institutional holdings by institutions associated with the lead bank, and other firm or offering characteristics. *Different Bank* is a dummy equal to one if the firm switched banks for this offering. *First SEO Dummy* is equal to one if the offering is the first seasoned offering (SEO) after its initial public offering (IPO). *Relative Size of SEO* is the ratio of the offering size to market capitalization prior to the offering. *Years Since Last Offering* is the number of years since the firm's prior equity offering. *Bank Top 10* is a dummy variable equal to one if the lead bank was in the top ten banks by underwriting volume the year of the offering. *New Coverage* is a dummy equal to one if the lead bank initiated research coverage around the offering. *Diff. Sum Inst.* is the change in the fraction of the firm held by institutions associated with the lead bank. *Diff. Sum All Inst.* is the change in the fraction of the firm held by all institutions. *Diff. Num. Inst.* is the change in the number of institutions associated with the lead bank. *Diff. Num. All Inst.* is the change in the total number of institutions. An institution is considered associated with a bank if it ranks above the 75th percentile by the fraction of bank-associated firms that it holds around the bank-associated firms' IPOs. Panel A presents the results for the coefficient estimates from the daily return regressions, and Panel B presents the results for the coefficient estimates from the weekly return regressions. *, **, and *** represent significance at the 10%, 5%, and 1% level, respectively.

	$\Delta\beta$			ΔR^2		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Daily returns						
Constant	3.492*	3.023	2.343	0.262	0.219	−0.714
	(1.713)	(1.467)	(1.103)	(0.589)	(0.489)	(−1.570)
Different bank	3.671**	3.324**	2.933*	0.861**	0.779**	0.647*
	(2.294)	(2.092)	(1.856)	(2.466)	(2.249)	(1.914)
First SEO dummy	4.072***	1.872	2.614*	1.227***	0.755**	0.761**
	(2.606)	(1.167)	(1.687)	(3.599)	(2.160)	(2.295)
Relative size of SEO	0.013**	0.005	0.008	0.001	−0.001	−0.000
	(2.343)	(0.856)	(1.489)	(0.702)	(−0.763)	(−0.167)
Years since last offering	0.391	0.410	0.333	0.167***	0.171***	0.130**
	(1.448)	(1.530)	(1.246)	(2.836)	(2.929)	(2.272)
Bank Top 10	−2.363	−2.787*	−3.438**	0.278	0.155	−0.140
	(−1.438)	(−1.702)	(−2.113)	(0.777)	(0.435)	(−0.402)
New coverage	−2.459	−3.451*	−3.875**	−0.250	−0.482	−0.715*
	(−1.280)	(−1.805)	(−2.038)	(−0.598)	(−1.156)	(−1.759)
Diff. Sum Inst.		40.774***			10.988***	
		(3.895)			(4.817)	
Diff. Sum All Inst.		14.761**			2.236	
		(2.015)			(1.401)	
Diff. Num. Inst.			0.989***			0.252***
			(7.511)			(8.933)
Diff. Num. All Inst.			0.069			0.067***
			(1.359)			(6.181)
N	2,759	2,759	2,759	2,759	2,759	2,759
R^2	0.011	0.027	0.039	0.012	0.030	0.077
Panel B: Weekly returns						
Constant	2.782	2.097	2.082	0.633	0.574	−0.561
	(0.858)	(0.637)	(0.610)	(0.868)	(0.775)	(−0.738)
Different bank	7.365***	7.038***	6.715***	1.901***	1.821***	1.679***
	(2.893)	(2.770)	(2.644)	(3.318)	(3.185)	(2.969)
First SEO dummy	1.039	−1.210	−0.225	0.898	0.424	0.403
	(0.418)	(−0.472)	(−0.090)	(1.606)	(0.735)	(0.726)
Relative size of SEO	0.011	0.003	0.006	0.002	−0.000	0.001
	(1.202)	(0.270)	(0.703)	(0.809)	(−0.089)	(0.312)
Years since last offering	−0.113	−0.093	−0.154	−0.019	−0.015	−0.064
	(−0.262)	(−0.217)	(−0.358)	(−0.199)	(−0.158)	(−0.666)
Bank Top 10	−2.553	−2.874	−3.449	−0.340	−0.455	−0.804
	(−0.977)	(−1.098)	(−1.320)	(−0.579)	(−0.773)	(−1.382)
New coverage	−1.175	−2.126	−2.397	0.267	0.039	−0.231
	(−0.385)	(−0.696)	(−0.785)	(0.387)	(0.057)	(−0.339)
Diff. Sum Inst.		33.780**			10.411***	
		(2.019)			(2.765)	
Diff. Sum All Inst.		18.370			2.507	
		(1.568)			(0.951)	
Diff. Num. Inst.			0.889***			0.251***
			(4.201)			(5.321)
Diff Num. All Inst.			0.038			0.083***
			(0.463)			(4.570)
N	2,759	2,759	2,759	2,759	2,759	2,759
R^2	0.005	0.011	0.013	0.007	0.013	0.036

Changes in comovement are associated with changes in ownership. The coefficients on the *Different Bank* dummy (Table 9, Panel A) show that the change in beta, $\Delta\beta$, and the change in adjusted R^2 are significantly higher for firms that switch banks during the SEO. This result is consistent with the subsample results presented in Table 4. The change in the fraction of the firm held by institutions associated with the lead bank (*Diff. Sum Inst.*) is positively and significantly related to the change in beta and the change in adjusted R^2 (Columns 2 and 5). Although some evidence shows that the change in the fraction of the firm held by all institutions (*Diff. Sum All Inst.*) is positively correlated with the change in beta (Column 2), this measure of institutional ownership is uncorrelated with change in adjusted R^2 (Column 5). Panel A also shows that the change in the number of institutions associated with the lead bank (*Diff. Num Inst.*) is positively and significantly related to the change in beta and the change in adjusted R^2 (Columns 3 and 6).

In Panel B, we consider the changes in beta and the changes in adjusted R^2 from weekly return regressions as the dependent variables. Again, we find that the change in the fraction of the firm held by lead bank institutions and the change in the number of lead bank institutions holding a stake in the firm are both positively and significantly related to the change in beta and the change in adjusted R^2. However, no evidence exists that the change in the fraction of the firm held by all institutions is related to our two measures of comovement (Columns 2 and 5), and only some evidence shows that the change in the total number of institutions is positively related to the change in adjusted R^2 (Column 6). Because there is less microstructure noise in weekly returns, we might expect that the relation between institutional holdings and return comovement would be stronger and more consistent, and the evidence bears that expectation out. Overall, our findings indicate that the changes in the ownership of the institutions associated with the lead investment bank are correlated with the changes in comovement around equity offerings.

6. Market-making and trading activity

If the results in Sections 4 and 5 are due to changes in the network of investors that own and trade the stock, these patterns should also appear in the trading activity of affiliated institutions. In this section, we examine the trading activity around the SEO date for our sample of firms that switch underwriters in greater detail. Because banks also tend to be market makers in the Nasdaq-listed securities they underwrite, we expect that changes in investment bank affiliation drive changes in market-making activity, as in Ellis, Michaely, and O'Hara (2011).

To test this hypothesis, we construct a time series of market making activity for both the old and new underwriter around the SEO for a subsample of firms. Our sample is initially drawn from the SEO firms that switched banks as outlined in Section 2. We restrict our sample to 622 offerings that occur after 1996 (when we have data on market making) and before 2002 (after this date, much of that share volume shifts to electronic communication networks; see Fink, Fink, and Weston, 2006). From this sample, we retain only the 198 Nasdaq offerings in which the SEO occurs at least 12 months after the IPO. We then require that the old underwriter be an active market maker in the stock for 12 months before the offering and the new underwriter be an active market maker for 12 months after the offering. This restricted sample results in

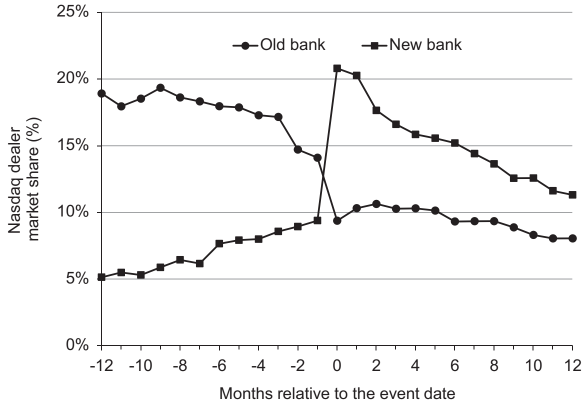

Fig. 6. Time series of market-making activity. This figure presents the time series of Nasdaq dealer market shares in event time around the month of the seasoned equity offering (SEO) for a sample of firms that switched underwriters from their initial public offering (IPO) to their SEO. The old bank series represents the average market share of the lead underwriter in the IPO, and the new bank series is for the lead underwriter in the SEO. Nasdaq dealer market shares are based on the Nasdaq monthly volume share report. The sample consists of 88 firms that switched underwriters between 1996 and 2002, in which both the IPO and SEO were Nasdaq listed and for which there were 24 months of Nasdaq dealer market-making data for both the new and old bank surrounding the SEO.

88 offerings in which we have 24 months of continuous monthly Nasdaq market maker share volume reports for both the old and new underwriters. Market-making activity is collected from the Nasdaq monthly volume share reports. These data record the total amount of volume cleared by each registered market maker in each stock at a monthly frequency. For each stock, we compute the market share (percent of total volume each month) for the old and new dealer for the 12 months before and after the SEO month.

Fig. 6 presents the time series of the average market share in event time for both the new and old underwriter. In the 12 months prior to the SEO, the old underwriter clears, on average, approximately 15–20% of the total trading volume, and the (soon-to-be) new underwriter clears less than half that amount. In the month immediately following the SEO, the roles reverse, with the new bank rising to a market share greater than 20% and the old bank dropping to less than 10%. These large changes in market making activity are both economically and statistically significant. While these tests do not identify a specific change in comovement, they indicate that the decision to switch underwriters has a real and large effect on the pattern of trading in the stock for this sample of Nasdaq firms. The trading in these stocks moves from the old network of institutions to the new network of institutions affiliated with the new bank. We regard these results as supportive of the hypothesis that a discrete change occurs in the location and pattern of trading around the underwriter switch.

In addition to examining market making activity, we consider whether the change in comovement in returns is mirrored in trading activity. Our approach is similar to our analysis of returns in that we compute the average change in share turnover for all firms associated with the bank

Table 10
Turnover comovement with other stocks associated with same bank around the seasoned equity offering (SEO).
This table reports the estimated coefficients of the following regression model:

$$\Delta TO_{i,t} = \alpha_i + \beta_{Lead,i} \Delta TO_{Lead,t} + \varepsilon_{i,t},$$

where $\Delta TO_{i,t}$ is the percentage change in turnover on stock i in period t, $\Delta TO_{Lead,t}$ is the percentage change in turnover on a value weighted portfolio of all firms associated with the bank that led the SEO. A bank is considered to be associated with a firm if it was the sole lead underwriter for the firm's IPO/SEO within the last two years. The sample is all SEOs led by a single underwriter ranked in the top 25 by underwriting volume and that had a single underwriter lead their most recent equity offering. Offerings are divided into those in which the firm used the same underwriter as in its previous offering and those that used a new underwriter. Regressions are estimated for a pre-SEO and post-SEO window of one year excluding the week before and after the offering. “Diff” is the difference between the post-offering coefficient and the pre-offering coefficient. The standard errors for the t-statistics are clustered by offering month and the t-statistics are reported in parentheses. The columns labeled “Difference” present t-statistics for the tests of the null hypothesis that the means for the switching and non-switching firms are equal.

	Used same bank for SEO as previous offering							Used different bank for SEO								
		Average beta			Average R^2				Average beta			Average R^2			Difference	
	N	Pre	Post	Diff	Pre	Post	Diff	N	Pre	Post	Diff	Pre	Post	Diff	Beta	R^2
Panel A: Daily turnover																
First SEO	655	0.43	0.47	0.04	0.028	0.028	−0.001	550	0.40	0.41	0.02	0.024	0.024	0.000	−0.80	0.22
				(1.76)			(−0.19)				(0.92)			(0.01)		
Later SEO	856	0.47	0.45	−0.02	0.038	0.033	−0.004	808	0.40	0.42	0.02	0.029	0.033	0.003	2.29	2.43
				(−1.47)			(−0.98)				(1.21)			(1.50)		
Full sample	1,511	0.45	0.46	0.00	0.033	0.031	−0.003	1,358	0.40	0.42	0.02	0.027	0.029	0.002	0.88	1.94
				(0.34)			(−0.72)				(1.36)			(0.92)		
Panel B: Weekly turnover																
First SEO	655	0.78	0.79	0.02	0.116	0.132	0.016	550	0.63	0.77	0.14	0.086	0.129	0.043	3.23	3.37
				(0.52)			(2.31)				(4.44)			(6.54)		
Later SEO	856	0.73	0.77	0.04	0.147	0.160	0.012	808	0.65	0.73	0.08	0.118	0.145	0.027	1.35	2.01
				(1.94)			(1.52)				(3.62)			(4.09)		
Full sample	1,511	0.75	0.78	0.03	0.134	0.148	0.014	1,358	0.64	0.75	0.11	0.105	0.138	0.033	3.22	3.60
				(1.64)			(2.18)				(5.15)			(6.07)		

that led the SEO. We then test whether changes in turnover are linked to the trading activity of affiliated stocks in a similar context for the one-year period before and after SEOs as follows:

$$\Delta TO_{i,t} = \alpha_i + \beta_{Lead,i} \Delta TO_{Lead,t} + \varepsilon_{i,t} \tag{5}$$

where $\Delta TO_{i,t}$ is the percentage change in turnover for stock i in period t and $\Delta TO_{Lead,t}$ is the percentage change in turnover on a value-weighted portfolio of all firms associated with the bank that led the SEO. Firm i is eliminated from this portfolio. For the daily regressions, the change in turnover is measured relative to a moving average of the last five days' turnover.

Table 10 presents the results of our analysis. We find a significantly large increase in the comovement of turnover for affiliated stocks, especially among firms that switch underwriters. Furthermore, the results are much stronger when we use weekly turnover instead of daily turnover. Overall, the patterns in the returns are mirrored by the pattern in trading activity. Firms that switch underwriters begin to trade more similarly to the stocks associated with the new investment bank.

7. Robustness

In this section, we test the sensitivity of our results to a variety of estimation techniques and explore alternative explanations.

7.1. Matched sample results

Our results on the changes in comovement around SEOs are strong evidence of a change in the networks of investors holding the firm's stock. However, the possibility remains that some underlying characteristic of the firm is changing in such a way as to change the stock's comovement with other firms associated with its old and new lead underwriters. To control for this potential confounding effect, we form a matched sample and examine the changes in the comovement of our sample firms around their SEOs relative to the changes in the comovement of similar firms. For each firm that uses a different bank as lead manager for its SEO than in its IPO, we find a matching firm that completed an SEO within 60 days of the firm's SEO but did not switch banks. We match the firms based on the relative size of the offering and the time since the last equity offering. We then run the same regressions as in Table 5 and compare the difference between the change in the coefficient estimates for the sample firm and the matched firm.

The results are presented in Table 11. Using daily returns (Panel A), we find that the firms switching banks exhibit much larger changes in comovement than the matched firms when we consider the sample of first SEOs. However, the difference is not significant when we consider the sample of subsequent SEOs. Thus, there seems to be a general increase in comovement with the new bank portfolio, even for the matching firms. Using weekly returns (Panel B), we find that the change in comovement

Table 11
Matched sample analysis.
This table reports changes in the coefficient estimates from regressions of returns for a firm that switches banks for its seasoned equity offering (SEO) relative to a firm that does not. For each firm that uses a different bank as lead manager of its SEO relative to the previous offering, we find a matching firm that completed an SEO within 60 days of the firm's SEO but did not switch banks. The match is made based on the relative size of the offering and the time since the last equity offering. We regress stock returns on the returns of a value-weighted portfolio of firms associated with the old investment bank and the new investment bank. Firms are considered to be associated with a bank if that bank led their initial public offering (IPO) or SEO in the last two years. For each offering, we estimate bivariate regressions separately for the one-year period before and after SEOs as follows:

$$R_{i,t}=\alpha_i+\beta_{New,i}R_{New,i,t}+\beta_{Old,i}R_{Old,i,t}+\varepsilon_{i,t},$$

where $R_{i,t}$ is the return on stock i in period t, $R_{New,i,t}$ is the return on a value-weighted portfolio of all firms associated with the new investment bank, and $R_{Old,i,t}$ is the return on a value-weighted portfolio of all firms associated with the old investment bank. Firm i is eliminated from these portfolios, and we exclude the week before and after the SEO. We also run these regressions for the matching firms and report averages of the difference between the change in coefficients for the firm of interest and the matching firm. Standard errors are clustered by month. *T*-statistics are reported in parentheses. Panel A shows the results for daily returns, and Panel B shows the results for weekly returns.

	$\Delta\beta_{New}-\Delta\beta_{New,Match}$	$\Delta\beta_{Old}-\Delta\beta_{Old,Match}$	Diff-in-diff.
Panel A: Daily returns			
First SEO	0.092	−0.012	0.103
	(4.05)	−(0.60)	(3.29)
Later SEO	0.035	0.008	0.027
	(2.20)	(0.48)	(1.12)
Full sample	0.057	0.001	0.056
	(4.21)	(0.04)	(3.05)
Panel B: Weekly returns			
First SEO	0.084	−0.036	0.120
	(1.57)	−(0.86)	(1.60)
Later SEO	0.087	−0.062	0.149
	(2.38)	−(1.95)	(3.09)
Full sample	0.086	−0.052	0.138
	(2.84)	−(1.98)	(3.39)

with the new bank portfolio is larger than the change for the matched firm and that the change in comovement with the old bank portfolio is less than the change for the matched firms for the full sample. We perform a similar robustness check for the changes in institutional ownership around SEOs and obtain similar results.

7.2. Comovement and risk factors

If firms switch underwriters when their risk changes, then we could simply be measuring a change in the comovement among portfolios of stocks with similar loadings on various risk factors. In addition to the analysis above, we repeat all our tests of changes in comovement while controlling for the standard market, size, value, and momentum factors. The results from our analysis (not reported in a table) indicate that our main results are not driven by changes in the sensitivity to other standard risk factors.

7.3. Sample size and event window duration

We also perform a number of other robustness checks for our sample. We consider restricting our sample to offerings greater than \$10 million or \$20 million and find similar results. Thus, our findings are not driven by a number of small offerings. We consider a number of alternative pre- and post-event windows around the SEO and find similar results concerning the change in comovement. We also examine different windows in which we consider a firm to be associated with an investment bank, ranging from having completed an offering with the bank in the last three years up to the last ten years. All our results hold under these specifications.

While our primary analysis focuses on a two-year window, this may be enough time for a firm to change its investment planning in a manner that changes its risk profile and leaves open the possibility that the firm chooses to switch based on endogenous matching. As a result, we replicate all our analyses using tighter windows of 90 and 180 days around the switch. Our results are qualitatively similar and do not appear to be sensitive to our choice of a one-year sample period to measure pre- and post-event comovement.

7.4. The role of stock analysts

Because analyst coverage is likely to change when firms switch underwriters, our results could reflect commonality in market making activity (Madureira and Underwood, 2008) or the general effect of analyst coverage on comovement found in recent work (Anton and Polk, forthcoming; Hameed, Morck, Shen and Yeung, 2010; Muslu, Rebello, and Xu, 2009). To address this concern, we replicate the analysis in Table 4 using a sample of SEOs in which the lead bank has analyst coverage of the firm at least six months prior to and following the offering.[12] Our results (not reported in a table) demonstrate that the findings in Table 4 are generally unaffected when we control for changes in analyst coverage. Because the magnitude and significance of our results appear to be equally strong among firms with no change in analyst coverage, it is unlikely that our main results are driven by commonality in analyst coverage.

7.5. Comovement in bond returns

Our analysis above focuses on equity underwriting and the subsequent comovement of equity prices. Similar patterns could also exist in other asset classes. To explore whether investment banking networks exist in bond underwriting, we repeat our analysis using corporate bonds.[13]

We begin by collecting all bond issues from the SDC database since 2002 for offerings that used a single lead underwriter. We begin the sample in 2002 because this is when the TRACE (Trade Reporting and Compliance Engine) system began reporting corporate bond trades. Merging

[12] We thank Leonardo Madureira for providing the coverage data.

[13] We thank the referee for suggesting this analysis.

these 25,252 unique offerings with the TRACE data set and excluding agency issues (e.g., Federal National Mortgage Association, or Fannie Mae) yields 9,710 offerings by 294 firms. We measure the monthly returns on these bonds in the three years immediately following the issuance. (We use three years in an attempt to create a larger sample because the data are too sparse to consider higher frequency returns.) For each bond issue, we form portfolios of other bonds that were underwritten in the past two years by the investment bank leading this particular offering, the investment bank ranked just above the lead bank in the underwriting rankings for the year, and the investment bank ranked just below the lead bank in the underwriting rankings for the year. Because there are a large number of bond issues per firm, we consider only bonds issued by other firms when forming these portfolios (i.e., if we are examining a bond issued by IBM, we would not allow other bonds issued by IBM to be part of any of our associated or unassociated bank portfolios). We also limit our sample to bonds with monthly returns in at least 18 of the 36 months in the three-year window. We then require that there be an average of at least five bonds in each of the bank portfolios described above. We have a final sample of 448 bonds. For these bonds, we run our comovement regressions in the same fashion as in Sections 3 and 4.

Our results (not reported in a table) suggest that bonds comove to a greater extent with other bonds in their network than they do with bonds in different networks. Overall, these results are consistent with our primary results for equity returns. However, the statistical evidence is somewhat weaker and depends on how frequently bonds are traded (less liquid issues exhibit less comovement). Moreover, nonsynchronous trading issues add considerable noise to our return calculations and portfolio returns. As a result, we interpret these findings as suggestive that bond returns show comovement patterns similar to equity returns.

8. Conclusion

Consistent with the idea that underwriting relations appear to create segmented networks of investors that share correlated trading patterns, this paper shows that stocks affiliated with a particular underwriter tend to comove more than expected by chance. The magnitude of the effect is similar to the comovement linked to share price, index inclusion, or geography. Because we focus on firms that switch underwriters and in a relatively narrow window, our results are unlikely to be driven by endogenous bank-firm matching in the cross-section. Instead, our results are likely driven by the existence of distinct clienteles or networks of segmented investors created by asymmetric information flow. While it has long been noted that investment banking relations can create such information channels, we present new evidence that this has an effect on asset prices and trading behavior through comovement. In general, the results in this paper highlight the importance of investor networks on asset prices, and they underscore the effect of networks on the institutional investors' demand for stocks.

This study presents several promising opportunities for future research. For example, because investment banks can provide valuable information about their corporate clients to their network of investors, it would be interesting to examine whether institutional investors earn abnormal profits on the stocks associated with their primary investment bank. Furthermore, because evidence exists that the presence of institutional investors reduces potential conflicts of interest between investment banks and investors (e.g., Ljungqvist, Marston, Starks, Wei, and Yan, 2007), an interesting line of inquiry would be to examine whether the presence of investment banking networks further reduces these potential conflicts of interest.

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