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 role of an investment bank as an information hub for segmented networks of investors, we find that stocks that share the same lead underwriter at their IPOs tend to move together. We also find that this comovement increases around a seasoned equity offering by the firm. Furthermore, firms that switch underwriters between their IPO and a subsequent SEO move less with the old-bank stocks and move more with the new-bank stocks after the switch even after controlling for potential endogeneity issues. The change in comovement is bigger for stocks completing their first SEO and for stocks with a larger change in ownership by institutions associated with the new bank.

1. Introduction

Investment banks are the central conduit of information flow from the firm to investors throughout the underwriting process. These institutions facilitate this flow by developing reputation and long-term relationships with both their corporate clients and investors through repeated securities offerings. These tight-knit, long-term relationships appear to generate unique networks of investors who tend to stay loyal to their main investment bank (e.g., Gondat-Larralde and James (2008), and Huang, Shangguan, and Zhang (2008)). This suggests that buy-side-firms may 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 through the creation of segmented capital markets.

Investment banking relationships are an ideal subject for studying the effect of information networks on assets prices. The prospectus, the road show, and general marketing efforts during initial public offerings (IPOs) and seasoned equity offerings (SEOs) all create an asymmetric information disclosure directed at targeted groups of investors. Underwriters also provide their clients with information-intensive activities such as market making, advice on mergers and acquisitions, analyst coverage, etc. (e.g., Ritter (2003), and Ljungqvist, Marston, and Wilhelm (2006)). Over time, all these information-sharing activities create suitable conditions for investors to form strong bonds with their main investment bank.

In this paper we argue that if different investment banks have access to different networks of investors, then the underwriting process could create segmented networks of investors who tend to hold similar stocks and who share similar correlated trading patterns. As a result, a firm's underwriting relationship could affect the firm's stock price behavior through market segmentation. While previous studies have documented the effect of underwriting relationships

on underpricing and long-run performance (e.g., Beatty and Ritter (1986), and Carter, Dark, and Singh (1998)), there is little evidence on whether the formation of investor coalitions segment markets enough to have a real effect on stock prices.

We find that stocks that share the same underwriter at their IPOs covary more than simple fundamentals would suggest. We find that this comovement increases when the firm issues equity in an SEO, and that the increase is magnified when the firm switches underwriters for the new offering. Further, these firms that switch underwriters begin to move less with the old bank stocks and move more with the new bank stocks after the switch. Our tests are consistent with the predictions of network theory (e.g., Colla and Mele, (2010), DeMarzo, Vayanos, and Zwiebel (2003)). If markets are complete, switching from one underwriter to another should not affect the covariance of asset prices. On the other hand, segmented markets or asymmetric information flow may cause some coalitions or networks of investors to concentrate their holdings and trading patterns in common securities. As a result, the "block booking" process in underwriting securities generates excess correlation across assets.

To test whether the network of investors affects comovement, we construct a time series of returns on an underwriter-affiliated portfolio for each investment bank. Our portfolios are formed using firms that had their most recent equity offering with a particular bank. In a simple test, we find that returns are more correlated within an underwriter-affiliated portfolio than they are with stocks associated with another bank (or with a random set of stocks). Of course, this could be true if some investment banks endogenously matched with firms along a dimension previously associated with comovement. For example, if Goldman Sachs tends to underwrite large-value, high-priced stocks headquartered in the Northeast, then we could simply be picking up those other forms of comovement.

To mitigate the endogeneity of cross-sectional underwriter matching, we examine the behavior of stock comovement around SEOs. By focusing on a relatively tight window around the SEO event, it is unlikely that other firm characteristics are driving the relative change in comovement. For both firms that change underwriters and firms that do not change underwriters, we estimate univariate regressions of each stock's return on the returns of the portfolio of all firms associated with the bank underwriting the SEO. Our results indicate that firms using a new underwriter experience a large increase in beta with respect to the new-underwriter-affiliated portfolio while firms that do not change underwriters experience a relatively small increase in beta with respect to the underwriter-affiliated portfolio. This change in comovement is especially large for firms completing their first seasoned equity offering. For the firms switching underwriters, we also find little change (or a decrease) in their betas with respect to the old-underwriter-affiliated portfolio. Overall, the economic magnitude of the effect we document is on the same scale as the comovement induced by nominal share price (Green and Hwang (2009)) or index additions (Barberis et al. (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 important issue, we follow the methodology in Asker and Ljungqvist (2010)and examine the changes in comovement of firms that are forced to switch underwriters because their old investment bank exits the sample through merger or bankruptcy. These tests are reassuring because we find similar changes in comovement around these forced switches.

Our findings also indicate that equity offerings alter the holdings by networks of investors that are associated with the lead bank. For firms that switch investment banks, this change in the holdings by associated institutions is especially large. To perform this analysis, we

form an index of underwriter-affiliated institutions by determining whether the institutional investor is above the 75th percentile of institutions in terms of the fraction of firms it holds which used the bank as lead underwriter for their IPO. Around the SEO, we find an increase in both the number of new-underwriter-affiliated institutions and the fraction of the firm held by those institutions, and a smaller increase (or no change) in the holdings of old-underwriter-affiliated institutions. Thus, it appears that firms who switch underwriters are able to access a new network of institutional investors that are (at least loosely) affiliated with the new underwriter. While Gibson, Safieddine, and Sonti (2004) document 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 find evidence directly linking the changes in comovement around the SEO to changes in institutional holdings. Specifically, we find that the change in comovement is stronger for firms experiencing larger changes in ownership by institutions associated with the lead investment bank. We also find that the trading behavior of firms switching underwriters becomes more correlated with the trading behavior of the stocks associated with the new bank. These results indicate that commonalities in trading behavior across investment banking networks drive comovement.

We also test whether changes in the investor network can be identified through market making activity. Using the Nasdaq stocks in our sample, we find significant changes in market making activity from pre- to post-SEO. In the 12 months before the SEO, the old underwriter clears an average 17% of all Nasdaq volume in the stock while the new underwriter has less than 7%. In the 12 months post-SEO, the roles are reversed with the old bank market share dropping to less than 9% and the new bank increasing to more than 16% on average. Clearly, there is a

large shift in trading from the old bank to the new bank which demonstrates a discrete change in the location and patterns of trade around the underwriter switch.

Our results are not driven by changes in analyst coverage. Previous work has documented a relation between analyst coverage and excess comovement (Anton and Polk (2010), Hameed, Morck, Shen and Yeung (2010), Muslu, Rebello, and Xu (2009)). However, we find that our main results hold in a sample of SEOs that have analyst coverage by the lead bank both before and after the offering. While changes in analyst coverage are certainly important information events, they do not appear to be the underlying source of the comovement we document here.

Finally, we show that our results are robust. In addition to the standard regression analysis employed in other studies of comovement, we also 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. Thus, our results are unlikely to be driven by any time-series change in the risk profile of firms that choose to switch underwriters. If there are unobserved characteristic changes in the propensity of firms to switch underwriters, our matched sample approach should purge our portfolios of any systematic differences, at least to the extent they are represented by our matching characteristics. Finally, we perform a battery of sensitivity tests with respect to our measure and statistics. All of our robustness tests are consistent with our basic findings.

Overall, our study is related to a number of different literatures. First, we show that banking networks play a role in the determination of asset prices and trading behavior. Our evidence is consistent with the predictions in DeMarzo, Vayanos, and Zwiebel (2003), who show that strong networks enable influential agents (e.g., investment banks) to effectively persuade other agents in the network (e.g., institutional investors). In this sense, 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. It is also related to the work of Das and Sisk (2005), who study stock market discussion forums and find stocks with more information centrality have greater covariance with other stocks, and the work of Feng and Seasholes (2004), who report direct evidence that interaction between investors in the same brokerage office leads to segmented groups of investors with correlated trading patterns across geographical regions in China.

Our paper also highlights the influence of investment banking relationships on institutional ownership. Although there is a large literature examining the determinants of institutional investors' demand for stocks (e.g., Gompers and Metrick (2001), Bennett, Sias, and Starks (2003)), these studies do not consider the effects of investors' coalitions on institutional trading behavior. Our paper makes a contribution to this literature by showing that network effects also play a role on the investment decisions of institutional investors.

Lastly, our paper is also related to a number of studies that find excess co-variation across assets. For example, Shiller (1989), and Pindyck and Rotemberg (1993) find evidence that comovement cannot be explained by simple fundamentals like dividends, size, or other firm characteristics. More recently, researchers have uncovered comovement based on factors like index affiliation (Barberis, et al. (2005), Greenwood (2008)), value/growth labels (Boyer (2010)), 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 (2010), Hameed, Morck, Shen and Yeung (2010), Muslu, Rebello, and Xu (2009)). Further, 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 adds to this literature by identifying a fundamental information-based source of comovement through the creation of segmented markets.

The remainder of the paper is 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 at the SEO. 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.

2. Sample Selection and Summary Statistics

We create two samples by collecting all equity offerings between 1980 and 2008 from the Securities Data Corporation's (SDC) Platinum database. The first sample consists of 2,540 IPOs in which the firm uses a single lead underwriter that was ranked in the top 25 banks in underwriting volume during the year of the offering.[1] We only consider IPOs raising at least $5 million and with at least one year until the first SEO. The second sample consists of 2,869 SEOs in which a single underwriter leads both the SEO and their previous equity offering, and for which the lead bank on the current offering is ranked in the top 25. This sample only includes SEOs that raise at least $5 million, and that occur at least 6 months after the most recent offering and at least 6 months before the next offering. Within this sample of SEOs, 1,511 used the same bank as in the previous offering and 1,358 switched investment banks.[2] For IPO's, we require

[1] In forming the rankings, we consider offerings led by multiple underwriters to have been equally split amongst the lead banks participating in the offering.

[2] In determining which firms switched banks, we hand check the observations and exclude any in which the firm appeared to switch banks but for which the switch may have been due to a merger of lead underwriters. For

CRSP stock return data for at least six months after the offering. For SEO's, we require CRSP data for at least six months prior to and after the offering, and holdings data from the Thomson 13F institutional holdings database. Finally, given the significant change in ownership at the first SEO, especially compared to later equity offerings, we might expect different changes in comovement at the first SEO relative to later ones. Thus, for most of our analysis, we split the sample into offerings which are the first SEO by the firm, and offerings which represent the 2nd or later SEO by their firm.

2.1 Defining Associated Firms and Institutions

In tracking comovement and institutional holdings around equity offerings, we must define (a) a set of firms which are associated with the bank leading the offering and (b) a set of institutions associated with the bank leading the offering. To define the set of firms associated with the lead bank, we include all firms which completed an equity offering (either IPO or SEO) within the last 2 years and which used the lead bank as the sole lead underwriter for their offering. For example, suppose we are examining changes in comovement around the SEO of Michael's Stores in July 1994, which was led by CS First Boston. Then for each month in the event window around the SEO, we find all firms which raised money through an IPO or SEO in the previous two years and used CS First Boston as the sole lead underwriter for their offering. These firms are considered to be associated with CS First Boston for the purposes of this offering by Michael's Stores.

To define the set of institutions associated with CS First Boston for the purposes of this offering, we consider all firms which completed an IPO with CS First Boston as the sole lead underwriter in the two years prior to the SEO by Michael's Stores. We then examine all

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example, a firm whose offering in 1999 was led by Citigroup but whose offering in 1997 was led by Salomon Brothers would not be considered in our analysis.

institutions which held a stake in at least one of these firms in the quarter immediately following the firm's IPO. Out of these institutions, we find the ones who are above the 75th percentile in terms of the fraction of these firms in which the institution has a stake. These institutions are considered to be associated with CS First Boston for the purposes of this offering by Michael's Stores.

2.2 Summary Statistics

Panel A of Table 1 shows statistics for the sample of IPOs. The average offering size of the IPOs in our sample is about $70 million, with a median size of about $41 million. The average number of firms in the portfolio associated with the investment bank leading the offering is about 49, and the average number of institutions holding a stake in the firm immediately after the IPO is approximately 19. Panel B shows statistics for the sample of SEOs. The average offering size for the firms that did not switch investment banks is about $92 million and for the firms that switched investment banks is about $90 million. The two subsamples of SEOs are fairly similar, with the only difference being that firms that switched investment banks wait longer to issue equity than firms that did not switch investment banks. The typical amount of time since the most recent offering is around 4 years for firms that switched investment banks and around 2 years for firms that did not switch investment banks. Not surprisingly, 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. Comovement with other firms associated with lead underwriter at the IPO

In this section we test whether stocks with the same underwriter at the IPO tend to move together. 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 which led the IPO.[3] Firm *i* is excluded from this portfolio. As described in the previous section, a bank is considered to be associated with a firm if it 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 responsiveness of the IPO firms' returns to the returns of stocks associated with the same underwriter.

Of course, our regression coefficients may simply pick up any systematic risk associated with both the portfolio return and the IPO firm. To assess whether the economic magnitude of the coefficient is significant, we estimate the same regressions for a similar bank which has no association with the firm. For this analysis, we construct unassociated portfolios that consist of all the firms associated with the banks ranked directly above and below the investment bank leading the IPO in terms of underwriting volume in the year of the IPO.[4] We examine how the returns of the IPO firms comove with the returns of these unassociated portfolios by estimating the following regression models:

$$\begin{aligned} R_{i,t} &= \alpha_i + \beta_{\text{Bank 1},i} R_{\text{Bank 1},t} + \varepsilon_{i,t}, \\ R_{i,t} &= \alpha_i + \beta_{\text{Bank 2},i} R_{\text{Bank 2},t} + \varepsilon_{i,t}, \\ R_{i,t} &= \alpha_i + \beta_{Lead,i} R_{Lead,t} + \beta_{\text{Bank 1},i} R_{\text{Bank 1},t} + \beta_{\text{Bank 2},i} R_{\text{Bank 2},t} + \varepsilon_{i,t}, \end{aligned} \quad (2)$$

[3] For an offering to be included in our sample, we require this portfolio to have an average of at least five firms per month.

[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.

where $R_{\text{Bank 1},t}$ ($R_{\text{Bank 2},t}$) 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.[5] The rest of the variables are as in Equation (1).

Our estimation of equations (1) and (2) yields a sample of associated and unassociated bank coefficients and adjusted R-squared estimates across all of 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, then the coefficients and adjusted R-squared estimates for the associated portfolio (IPO Bank) should be larger than the ones for the unassociated portfolio (Banks 1 and 2). In Panel A, we present results for daily returns, and Panel B shows results for weekly returns.

Consistent with the notion that the stock prices of firms associated with same investment bank tend to move together, we obtain higher adjusted R-squared estimates and larger betas when we regress IPO firm returns on the returns of the associated bank portfolio than when we regress the same returns on the returns of the unassociated bank portfolios. Panel A shows that over the period 1980-2009, the average adjusted R-squared for regressions using the associated bank portfolio is 6.1%, while the one for regressions using unassociated bank portfolios is, on average, less than 5.4%. Further, the results from the multivariate regressions indicate that the average coefficient on the associated bank portfolio over the period 1980-2009 is approximately 40% larger than the average coefficient on the unassociated bank portfolio (0.32 vs. 0.23). The weekly return results in Panel B are similar to the ones in Panel A. The correlations are generally higher when weekly returns are considered, and across the board the correlation of the firm's returns are higher with the stocks associated with its current bank compared to firms

[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.

associated with another similar bank. It is important to note that the differences in adjusted R-squared estimates and betas between the associated-portfolio and unassociated-portfolio regressions are statistically significant at the one percent level in almost all cases. Overall, the evidence in Table 2 suggests that stocks that share a common investment bank exhibit greater comovement than stocks that are affiliated with a different underwriter.

To better understand the dynamics of stock price comovement, we also examine the time series behavior of betas and R-squared estimates after IPOs. We report the results from monthly regressions using daily returns in Figures 1 and 2. These figures depict the evolution of betas and R-squared estimates for associated and unassociated portfolios over the twelve months following the IPO. The differences in betas and R-squared estimates between associated and unassociated portfolios are largest during the first month after the IPO, but the differences persist up to 12 months following the offering.

Finally, to determine whether IPOs create coalitions of investors, we examine the holdings in the first quarter after the IPO for institutions that are associated with the bank leading the IPO and for institutions that are associated with the banks ranked directly above and below the investment bank leading the IPO in terms of underwriting volume. As mentioned previously, an institution is considered to be associated with a bank if it ranks above the 75^{th} percentile in terms of the fraction of bank-associated firms that it holds a position in during the quarter immediately following those bank-associated firm's IPO's. For this portion of the analysis, our three sets of bank-associated institutions are mutually exclusive. For example, an institution is only considered to be associated with the lead bank if it is not associated with either of the two control banks. Table 3 reports the results from this analysis. Panel A shows that the fraction of the IPO firm held by institutions that are associated with the bank leading the IPO is much larger

than the fraction held by unassociated banks (1.6% vs 1.0% for the bank 1 institutions). Similarly, Panel B shows that the average number of institutions holding shares of the IPO firms is much larger for the institutions that are associated with the bank leading the IPO than for unassociated banks (1.83 vs. 1.24 for bank 1 institutions).

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

4. Changes in comovement around equity offerings

It is possible that the results presented in section 3 may 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 operate in the same industry, etc., then this could induce comovement that is unrelated to the networks of investors. 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*) as well as a one year period following the SEO (*Post*), excluding one week on either side of the offering. The timing that we use is illustrated in Figure 5. Using the following set of univariate regressions, we estimate the

average change in the beta coefficient (as well as the change in adjusted R-squared) for firms that used the same bank as in their previous offering and for firms that switched investment banks:

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

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 which led the SEO. Our estimate of the change in comovement with the underwriter is simply $\Delta\beta_{Lead,i} = \beta^{Post}_{Lead,i} - \beta^{Pre}_{Lead,i}$.

Table 4 reports the results from the estimation of equation (3). Panel A presents results using daily returns, and Panel B presents results using weekly returns. This table shows that the changes in beta and adjusted R-squared are generally significant, both for firms keeping the same underwriter as well as those switching. But we also see that the changes in beta and adjusted R-squared are larger for firms that switch underwriters than for firms that keep their previous underwriter. Using daily returns, we find that the average change in beta (adjusted R-squared) for non-switchers is 0.06 (0.014) and for switchers is 0.10 (0.025). Using weekly returns, we find that the average change in beta (adjusted R-squared) for non-switchers is 0.03 (0.010) and for switchers is 0.10 (0.029). The last column of Table 4 shows that nearly all these differences in changes in betas and R-squared estimates are statistically significant.

Following previous studies that examine stock price comovement (e.g., Barberis, Shleifer, and Wurgler (2005), Green and Hwang (2009)), we also consider the changes in coefficient estimates from the following set of bivariate regressions for firms that use a different bank as lead manager for its SEO relative to its previous equity offering:

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

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. The main advantage of this approach is that it allows us to look at changes in comovement with the new bank portfolio while controlling for changes in comovement with the old bank portfolio.

Table 5 presents results from these regressions.[6] Panel A presents results for daily returns, and Panel B presents results for weekly returns. The results for the bivariate regressions in Panel A show that the coefficient estimate β_{New} goes up by an average of 0.07 after the SEO. When we split into the first/subsequent SEO subsamples, we see that the results are especially strong for the first SEO, with the coefficient estimate going up by an average of 0.11, more than twice as large as the increase for later offerings. This is consistent with the idea that the first offering has an especially large impact on the ownership structure of the firm, and hence 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. The last column of Table 5 shows that the differences between the changes in the old and new bank beta coefficients are statistically significant. Turning to the results for weekly returns in panel B, the results are quite similar to the daily results with one notable exception. For the subsequent SEO subsample, the average coefficient estimate for the old bank portfolio in the bivariate regressions actually goes down

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

significantly. This magnifies the difference in the correlation of the firm's returns with those of the old and new bank portfolios.

Overall, the economic magnitude of the effect we document in this section is significant. The univariate regressions in Table 4 show that across the entire sample of switching firms the average R-squared increases by roughly two to three percentage points. This means that association with the new investment bank accounts for two to three percent 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 documented in other studies. For example, Green and Hwang (2009) document a similar increase (2-3 percent change in R-squared) in price-based comovement around stock splits. Similarly, Barberis, et al (2005) find a similar increase in magnitude (0.10 – 0.15 coefficient change) for stocks added to the S&P 500. Overall, our basic results are at least as large in economic magnitude as the effects found in other studies of comovement.

Of course, the previous analysis is unable to fully control for missing factors which may by simultaneously related to (a) the decision to switch underwriters and (b) the change in comovement we document. We thus form a subsample of switching firms for which the decision to switch could be argued to be exogeneous. Here we follow Asker and Ljungqvist (2010), and consider only firms that switch banks following a merger involving the bank which led their last offering.[7] Furthermore, as in Asker and Ljungqvist (2010), we require that the investment bank merger would mean that the firm would share an underwriter with another firm in the same 4-digit SIC code and that is ranked in the top 10 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 are as a result much more likely to switch banks for their next offering. Given

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

that this approach yields only 26 offerings, we supplement this sample with a sample of firms that switched banks because their old investment bank shut down operations. Specifically, we include firms for which the bank leading their last offering was either Drexel Burnham Lambert or Robertson Stephens.[8]

Using this sample of firms which are exogenously "forced" to switch banks, we examine whether these firms start to comove more with the firms associated with the new investment bank after the SEO. Table 6 presents the results from these regressions. Using daily (weekly) returns, we find that the beta coefficient goes up by an average of 0.197 using daily returns and 0.176 using weekly returns. The adjusted R-squared goes up by 0.042 on average with daily returns and 0.049 with weekly returns. All of these numbers are similar to (or larger than) the corresponding figures reported for the full sample in table 4. Overall, these results provide evidence that the change in comovement is significant for a sample of firms where it can be argued that the decision to switch investment banks was forced by exogeneous factors.

5. Changes in institutional holdings and changes in comovement

In this section we link the changes in comovement found in the previous section with the change in holdings by institutions that tend to hold shares of firms associated with a certain bank. As before, an institution is considered 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 holds a position in during the quarter immediately following those bank-associated firm's IPO's. We consider 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 of the SEO firms. We examine changes in these measures from the pre-offering period (-

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

180 days, -90 days) to the post-offering period (0, +90 days) for firms that used the same bank for SEO as in their previous offering and for firms that switched investment banks.[9]

The results from this analysis are presented in Table 7. This table shows that both switchers and non-switchers experience large changes in the fraction of the firm held by associated institutions as well as in the number of associated institutions holding shares of the firm. This 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 non-switchers (4.5% vs. 3.5%). Furthermore, the evidence in Panel B indicates that switchers tend to experience a larger increase in the number of associated institutions holding shares of the SEO firms than non-switchers (3.48 vs. 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 the result from this analysis. Consistent with the evidence in Table 7, Panel A shows that the total fraction of the firm held by new bank institutions increases from 4.2% to 5.9% after the SEO.[10] Similarly, Panel B shows that the average number of new bank institutions that hold stock in the firm significantly increases from 4.67 to 6.01. Both of these effects are larger for the first SEO. Shifting our attention to the behavior of old bank institutions, we find that the total fraction of the firm held by old bank institutions (number of old bank institutions) only increases from 3.3% to 3.9%

[9] Note that our pre-offering observation is from two quarters prior to the SEO, since 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.

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

(3.93 to 4.42) after the SEO. These differences in the changes in institutional ownership between the new and the old bank are not only economically significant but also statistically significant (see last column of Table 8).

The previous results suggest that there is a significant change in the ownership of the firm around the SEO that may be related to networks of institutional investors associated with certain investment banks. In Table 9, we present regression results suggesting that there is indeed a link between the changes in holdings of lead bank institutions and the change in comovement with lead bank stocks. In these regressions we consider as the dependent variables the change in the lead bank coefficient estimates, $\Delta\beta$, and the change in adjusted R-squared from the univariate regressions in Table 4.

We regress the comovement changes as well as the changes in adjusted R-squared 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 which is equal to one if the offering is the first SEO by the firm. We also include a dummy that indicates if the lead bank was in the top 10 banks in terms of underwriting volume in the year of the offering (*Bank Top 10*), a dummy that indicates if the firm switched banks during this offering (*Different Bank*), and a dummy that indicates if the lead bank initiated research coverage either immediately prior to or after the offering (*New Coverage*). We then use as additional explanatory variables the changes in institutional holdings examined in Table 7. 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 fraction 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.*). As in Table 7, 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 firm's IPOs.

In Panel A of Table 9 the dependent variables are the changes in the betas and the changes in adjusted R-squared from daily return regressions. Looking at the *Different Bank* dummy, we see that the change in beta, $\Delta\beta$, and the change in adjusted R-squared are significantly higher for firms that switch banks during the SEO. This is consistent with the subsample results presented in Table 4. Turning our attention to the explanatory variables measuring changes in institutional holdings, we see that 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-squared (columns 2 and 5). Although there is some evidence 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-squared (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-squared (columns 3 and 6).

In Panel B, we consider the changes in beta and the changes in adjusted R-squared from weekly return regressions as the dependent variables. Once 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-squared. However, there is no evidence 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 that the change in the total number of institutions is

positively related to the change in adjusted R-squared (column 6). Given that 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 out. Overall, our findings indicate that the changes in the ownership of the institutions associated with the lead investment bank are important determinants of the changes in comovement around equity offerings.

6. Market Making and Trading Activity

In this section, we dig deeper into the trading activity around the SEO date for our sample of firms that switch underwriters. Because banks also tend to be market makers in the Nasdaq listed securities they underwrite, we expect that changes in investment bank affiliation will drive changes in market making activity. If the results in sections 4 and 5 are the results of changes in the network of investors that own and trade the stock, then these patterns should also appear in the trading activity of affiliated institutions.

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 our sample of SEO firms which switched banks as outlined in section 2. We restrict our sample to 622 offerings that occur after 1996 (where we have data on market making) and before 2002 (after this date, much of that share volume shifts to electronic communication networks, see Fink, et al (2006)). From this sample, we keep only 198 Nasdaq offerings where the SEO occurs at least 12 months after the IPO. We then require that the old underwriter is an active market maker in the stock for 12 months before the offering and where the new underwriter is an active market maker for 12 months after the offering. This restricted sample results in 88 offerings where 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 the 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.

Figure 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, about 15-20 percent of the total trading volume while the (soon to be) new underwriter clears less than half that amount. In the month immediately after the SEO, the roles reverse with the new bank rising to a market share greater than 20 percent and the old bank dropping to less than 10 percent. 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 are indicative 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 view these results as supportive of the hypothesis that there is a discrete change in the location and pattern of trading around the underwriter switch.

In addition to examining market making activity, we also consider whether the change in comovement in returns is mirrored in share volume as well. 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 which 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:

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

where $\Delta TO_{i,t}$ is the percentage change in turnover for stock *i* in period t, and $\Delta TO_{\text{Lead},t}$ is the percentage change in turnover on a value-weighted portfolio of all firms associated with the bank which led the SEO. Firm *i* is eliminated from this portfolio. For 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. Further, the results are much stronger when we use weekly turnover instead of daily turnover. Overall, the patterns in returns are mirrored by the pattern in trading activity. Firms that switch underwriters begin to trade more like the new bank stocks.

7. Robustness

Our results on the changes in comovement around SEO's are strong evidence of a change in the networks of investors holding the firm's stock. However, there remains the possibility 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 comovement of our sample firms around their SEO relative to the changes in comovement of similar firms. For each firm which uses a different bank as lead manager for its SEO relative to the IPO, we find a matching firm which completed an SEO within 60 days of the firm's SEO but which did not switch banks. We match 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 do 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 does seem 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 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 find similar results.

In addition to the analysis above, we also repeat our tests of changes in comovement while controlling for the market, SMB, and HML factors from the Fama-French 3-factor model. In untabulated results, we find that while the magnitude of the changes in the beta coefficients decreases once we control for the other three factors, there is still a significant increase in comovement with other stocks associated with the same bank following a seasoned equity offering. Thus it does not appear that our results are driven by changes in sensitivity to other standard risk factors.

We also perform a number of other robustness checks for our sample. We consider restricting our sample to only offerings of greater than $10 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 also find similar results concerning the change in comovement. We also consider 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 3 years up to the last 10 years. All of our general results hold under these various specifications.

We also replicate our main tests controlling for the potential effects of analyst coverage on stock prices. Since analyst coverage is likely to change when firms switch underwriters, it is possible we could be picking up the potential effect of analyst coverage on market making activity (Madureira and Underwood (2008)), or the general effect of analyst coverage on comovement found in recent work (Anton and Polk (2010), 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 where the lead bank has analyst coverage of the firm at least six months prior to the offering as well as after the offering.[11] Table 12 reports the results from this analysis. This table shows that that the findings in Table 4 are generally unaffected when we control for changes in analyst coverage.

8. Conclusion

This paper documents that underwriting relationships appear to create segmented networks of investors that share correlated trading patterns by showing 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. Since we focus on firms that switch underwriters and because we focus on a relatively narrow window, it is unlikely that our results are 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 is has long been noted that investment banking relationships can create such information channels, we present new evidence that this has an effect on asset prices though comovement. In general, the results in this paper

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

highlight the importance of investor networks on asset prices. Further, it underscores the effect of networks on the institutional investors' demand for stocks.

This study opens up several promising opportunities for future research. For example, since 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 main investment bank. Furthermore, since there is evidence that the presence of institutional investors reduces potential conflicts of interest between investment banks and investors (e.g, Ljungqvist et al. (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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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 IPOs over the period 1980-2008. We require that the firm uses a single lead underwriter for the offering that was ranked in the top 25 banks in underwriting volume during the year of the offering. Only IPO's with at least one year until the first SEO are included. The second sample consists of 2,869 SEOs which 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 6 months after the most recent offering and with at least 6 months until the next offering are included in the sample. All IPO's and SEO's 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 IPO's, *# 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. control bank 1 (2). *Total # Institutions* is the number of institutions holding a stake in the firm immediately following the IPO or SEO. For SEO's, *Years since last offering* is the number of years since the firm's last equity offering, and *Relative Offering Size* is the Offering Size divided by the market capitalization of the firm in the month prior to the SEO.

Panel A: IPO Sample (2,540 offerings)

	Mean	25th percentile	Median	75th percentile
Offering Size ($ millions)	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)

	Mean	25th percentile	Median	75th percentile
Offering Size ($ millions)	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)

	Mean	25th percentile	Median	75th percentile
Offering Size ($ millions)	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

Table 2
Comovement with Other Stocks Associated with Same Bank following IPO

This table reports the average adjusted R-squared of the following regression models:

$$(1)\, R_{i,t} = \alpha_i + \beta_{Lead,i} R_{Lead,t} + \varepsilon_{i,t},$$
$$(2)\, R_{i,t} = \alpha_i + \beta_{\text{Bank 1},i} R_{\text{Bank 1},t} + \varepsilon_{i,t},$$
$$(3)\, R_{i,t} = \alpha_i + \beta_{\text{Bank 2},i} R_{\text{Bank 2},t} + \varepsilon_{i,t},$$

and the average beta coefficients from the following regression model:

$$(4)\, R_{i,t} = \alpha_i + \beta_{Lead,i} R_{Lead,t} + \beta_{\text{Bank 1},i} R_{\text{Bank 1},t} + \beta_{\text{Bank 2},i} R_{\text{Bank 2},t} + \varepsilon_{i,t},$$

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 which led the IPO, and $R_{\text{Bank 1},t}$ ($R_{\text{Bank 2},t}$) 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 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 only consider 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-squared 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-squared			Multivariate Regression Average Betas		
	N	Lead Bank	Bank 1	Bank 2	Lead Bank	Bank1	Bank2
1980-1989	546	0.068	0.061***	0.060***	0.289	0.215***	0.191***
1990-1999	1647	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	2540	0.061	0.054***	0.051***	0.320	0.231***	0.204***

Panel B: Weekly Returns

		Univariate Regressions Average R-squared			Multivariate Regression Average Betas		
	N	Lead Bank	Bank 1	Bank 2	Lead Bank	Bank1	Bank2
1980-1989	546	0.127	0.112***	0.115***	0.369	0.235***	0.267**
1990-1999	1647	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	2540	0.113	0.102***	0.097***	0.399	0.273***	0.242***

Table 3
Institutional Holdings in First Quarter after IPO

This table shows average measures of institutional holdings for institutions which 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 which 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.

Panel A: Fraction of firm held by associated institutions

	N	IPO Bank	Control 1	Control 2
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

	N	IPO Bank	Control 1	Control 2
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***

Table 4
Comovement with Other Stocks Associated with Bank Leading SEO

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

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

where $R_{i,t}$ is the return on stock i in period t and $R_{Lead,t}$ is the return on a value weighted portfolio of all other firms associated with the bank which 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 or SEO within the last two years. The sample consists of all SEO'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, and which had a single underwriter lead their most recent equity offering. The offerings are split into two categories: those in which the firm used the same underwriter as their most recent offering, and those in which the firm used a new underwriter. 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. T-statistics are in parentheses. Standard errors are clustered by offering month. The columns labeled "Difference" present t-statistics for the tests of the null hypothesis that the means are equal between the switching and non-switching firms.

Panel A. Daily Returns

	Used Same Bank for SEO as previous offering							Used Different Bank for SEO							Difference	
		Average Beta			Average R2				Average Beta			Average R2				
	N	Pre	Post	Diff	Pre	Post	Diff	N	Pre	Post	Diff	Pre	Post	Diff	Beta	R2
1st 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	1511	0.63	0.69	0.06	0.081	0.095	0.014	1358	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

	Used Same Bank for SEO as previous offering							Used Different Bank for SEO							Difference	
		Average Beta			Average R2				Average Beta			Average R2				
	N	Pre	Post	Diff	Pre	Post	Diff	N	Pre	Post	Diff	Pre	Post	Diff	Beta	R2
1st 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	1511	0.74	0.76	0.03	0.131	0.141	0.010	1358	0.63	0.73	0.10	0.103	0.132	0.029	3.08	3.81
				(1.39)			(1.71)				(4.77)			(5.77)		

Table 5
Comovement around 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. Standard errors are clustered by month. t-statistics are reported in parentheses. Panel A shows results for daily returns, and Panel B shows results for weekly returns.

Panel A: Daily Returns

		New Bank – Average Beta			Old Bank – Average Beta			
	N	Pre	Post	Diff	Pre	Post	Diff	Diff (New)-Diff (Old)
1st 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	1040	0.39	0.46	0.07	0.34	0.34	0.01	0.06
				(5.66)			(0.46)	(3.85)

Panel B: Weekly Returns

		New Bank – Average Beta			Old Bank – Average Beta			
	N	Pre	Post	Diff	Pre	Post	Diff	Diff (New)-Diff (Old)
1st 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	1040	0.43	0.51	0.08	0.38	0.34	-0.03	0.11
				(3.38)			(-1.57)	(2.98)

Table 6
Comovement with Other Stocks Associated with Bank Leading SEO – Bank mergers/closures

This table reports the estimated coefficients and adjusted R-squared of the following regression model:

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

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 which 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 or SEO within the last two years. The sample consists of all SEO'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, and which had a single underwriter lead their most recent equity offering. This table reports results for a sample of firms which 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. T-statistics are in parentheses. Standard errors are clustered by offering month.

Panel A: Daily Returns

		Average Beta			Average R2		
		Pre	Post	Diff	Pre	Post	Diff
1st 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

		Average Beta			Average R2		
		Pre	Post	Diff	Pre	Post	Diff
1st 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)

Table 7
Changes in institutional holdings around SEO

This table shows average measures of institutional holdings for institutions which are 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 firm's IPO's. 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. The columns labeled "Difference" present t-statistics for the tests of the null hypothesis that the means are equal between the switching and non-switching firms .

Panel A: Fraction of firm held by associated institutions

	Used Same Bank for SEO				Used Different Bank for SEO				
	N	Pre	Post	Diff	N	Pre	Post	Diff	Difference
1st SEO	655	0.157	0.215	0.058 (10.73)	550	0.100	0.166	0.066 (13.89)	1.34
Later SEO	856	0.172	0.189	0.018 (5.58)	808	0.152	0.183	0.031 (8.03)	3.41
Full Sample	1511	0.165	0.200	0.035 (9.49)	1358	0.131	0.176	0.045 (12.84)	2.92

Panel B: Number of associated institutions with a stake in firm

	Used Same Bank for SEO				Used Different Bank for SEO				
	N	Pre	Post	Diff	N	Pre	Post	Diff	Difference
1st SEO	655	13.702	17.056	3.354 (9.14)	550	9.022	13.502	4.480 (15.31)	3.27
Later SEO	856	17.731	19.362	1.631 (6.33)	808	16.978	19.780	2.802 (8.35)	3.91
Full Sample	1511	15.985	18.363	2.378 (8.81)	1358	13.756	17.237	3.482 (12.39)	4.85

Table 8
Changes in Institutional Ownership around SEO

This table presents characteristics of institutional ownership of firms around the SEO when firms switch banks. Panel A shows the total percent of the firm held by old and new bank institutions. Panel B shows the number of the 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 firm's IPOs. We exclude institutions which are associated with both the old and new bank. T-statistics are in parentheses. Standard errors are clustered by offering month.

Panel A: Total fraction held by associated institutions

		New Bank Institutions			Old Bank Institutions			
	N	Pre	Post	Diff	Pre	Post	Diff	Diff(New)-Diff(Old)
1st 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	1040	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

		New Bank Institutions			Old Bank Institutions			
	N	Pre	Post	Diff	Pre	Post	Diff	Diff(New)-Diff(Old)
1st 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	1040	4.67	6.01	1.34	3.93	4.42	0.49	0.84
				(9.52)			(4.66)	(5.93)

Table 9
Relation between Change in Comovement and Change in Institutional Ownership

This table presents regression results relating the change in beta and change in adjusted R^2 from the univariate regressions in Table 4 with the change in institutional holdings by institutions associated with the bank leading the offering, as well as other firm/offering characteristics. *Different Bank* is a dummy equal to one if the firm switched banks for this offering. *First SEO dummy* is a dummy equal to one if the offering is the firm's first SEO after its IPO. *Relative Size of SEO* is the ratio of the size of the offering to the market capitalization prior to the offering. *Years since last offering* is the number of years since the firm's previous equity offering. *Bank Top 10* is a dummy variable equal to one if the lead bank was in the top 10 banks in terms of underwriting volume in the year of the offering. *New Coverage* is a dummy equal to one if the lead bank initiated research coverage either immediately prior to or after 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 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 firm's IPOs. Panel A presents results for the coefficient estimates from the daily return regressions, and Panel B presents results for the coefficient estimates from the weekly return regressions. *, **, and *** represent significance at the 10%, 5%, and 1% levels.

Panel A: Daily Returns						
VARIABLES	Δβ	Δβ	Δβ	Δ R^2	Δ R^2	Δ R^2
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)
Observations	2,759	2,759	2,759	2,759	2,759	2,759
R-squared	0.011	0.027	0.039	0.012	0.030	0.077

Table 9
(Continued)

Panel B: Weekly Returns						
VARIABLES	Δβ	Δβ	Δβ	Δ R^2	Δ R^2	Δ R^2
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)
Observations	2,759	2,759	2,759	2,759	2,759	2,759
R-squared	0.005	0.011	0.013	0.007	0.013	0.036

Table 10
Turnover Comovement with Other Stocks Associated with Same Bank around SEO

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

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

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 which 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 or SEO within the last two years. The sample consists of all SEO'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 SEO, and which had a single underwriter lead their most recent equity offering. The offerings are split into two categories: those in which the firm used the same underwriter as their most recent offering, and those in which the firm used a new underwriter. 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. T-statistics are in parentheses. Standard errors are clustered by offering month. The columns labeled "Difference" present t-statistics for the tests of the null hypothesis that the means are equal between the switching and non-switching firms.

Panel A. Daily Turnover

	Used Same Bank for SEO as previous offering							Used Different Bank for SEO								
		Average Beta			Average R-squared				Average Beta			Average R-squared			Difference	
	N	Pre	Post	Diff	Pre	Post	Diff	N	Pre	Post	Diff	Pre	Post	Diff	Beta	R2
1st 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	1511	0.45	0.46	0.00	0.033	0.031	-0.003	1358	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

	Used Same Bank for SEO as previous offering							Used Different Bank for SEO								
		Average Beta			Average R-squared				Average Beta			Average R-squared			Difference	
	N	Pre	Post	Diff	Pre	Post	Diff	N	Pre	Post	Diff	Pre	Post	Diff	Beta	R2
1st 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	1511	0.75	0.78	0.03	0.134	0.148	0.014	1358	0.64	0.75	0.11	0.105	0.138	0.033	3.22	3.60
				(1.64)			(2.18)				(5.15)			(6.07)		

Table 11
Matched Sample Analysis

This table reports changes in the coefficient estimates from regressions of returns for a firm which switches banks for its SEO relative to a firm which does not switch banks. For each firm which uses a different bank as lead manager for its SEO relative to the previous offering, we find a matching firm which completed an SEO within 60 days of the firm's SEO but which did not switch banks. We match 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 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 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 results for daily returns, and Panel B shows results for weekly returns.

Panel A: Daily Returns

	$\overline{\Delta\beta_{New} - \Delta\beta_{New,Match}}$	$\overline{\Delta\beta_{Old} - \Delta\beta_{Old,Match}}$	$\overline{\left(\Delta\beta_{New} - \Delta\beta_{New,Match}\right) - \left(\Delta\beta_{Old} - \Delta\beta_{Old,Match}\right)}$
1st 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

	$\overline{\Delta\beta_{New} - \Delta\beta_{New,Match}}$	$\overline{\Delta\beta_{Old} - \Delta\beta_{Old,Match}}$	$\overline{\left(\Delta\beta_{New} - \Delta\beta_{New,Match}\right) - \left(\Delta\beta_{Old} - \Delta\beta_{Old,Match}\right)}$
1st 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)

Table 12
Comovement with Other Stocks Associated with Bank Leading SEO – Research Coverage by Lead Bank before and after SEO

This table reports the estimated coefficients and adjusted R-squared of the following regression model:

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

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 which 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 or SEO within the last two years. The sample consists of all SEO'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 SEO, and which had a single underwriter lead their most recent equity offering. In addition, we only include offerings in which the lead underwriter also provided research coverage of the firm before and after the offering. The offerings are split into two categories: those in which the firm used the same underwriter as their most recent offering, and those in which the firm used a new underwriter. 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. T-statistics are in parentheses. Standard errors are clustered by offering month. The columns labeled "Difference" present t-statistics for the tests of the null hypothesis that the means are equal between the switching and non-switching firms.

Panel A. Daily Returns

	Used Same Bank for SEO as previous offering							Used Different Bank for SEO								
		Average Beta			Average R-squared				Average Beta			Average R-squared			Difference	
	N	Pre	Post	Diff	Pre	Post	Diff	N	Pre	Post	Diff	Pre	Post	Diff	Beta	R2
1st SEO	414	0.65	0.72	0.06	0.066	0.086	0.020	182	0.55	0.68	0.13	0.059	0.082	0.023	1.84	0.40
				(2.76)			(4.00)				(3.79)			(3.48)		
Later SEO	411	0.63	0.68	0.05	0.090	0.100	0.010	336	0.58	0.63	0.06	0.083	0.105	0.022	0.37	1.83
				(2.05)			(1.85)				(2.46)			(3.38)		
Full Sample	825	0.64	0.70	0.05	0.078	0.093	0.015	518	0.57	0.65	0.08	0.075	0.097	0.022	1.27	1.51
				(3.09)			(3.55)				(4.03)			(4.39)		

Panel B. Weekly Returns

	Used Same Bank for SEO as previous offering							Used Different Bank for SEO								
		Average Beta			Average R-squared				Average Beta			Average R-squared			Difference	
	N	Pre	Post	Diff	Pre	Post	Diff	N	Pre	Post	Diff	Pre	Post	Diff	Beta	R2
1st SEO	414	0.79	0.77	-0.02	0.112	0.123	0.011	182	0.63	0.76	0.13	0.094	0.128	0.034	2.39	1.91
				-(0.47)			(1.27)				(2.37)			(3.59)		
Later SEO	411	0.70	0.75	0.05	0.126	0.142	0.015	336	0.62	0.67	0.05	0.112	0.137	0.025	0.07	0.97
				(1.60)			(1.74)				(1.67)			(2.72)		
Full Sample	825	0.74	0.76	0.02	0.119	0.132	0.013	518	0.62	0.70	0.08	0.106	0.134	0.029	1.84	1.96
				(0.62)			(1.84)				(2.64)			(3.86)		

Figure 1
Average Coefficients from Multivariate Regressions

This figure depicts the evolution over time of the estimated coefficients of the following regression model:

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

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 IPO, $R_{\text{Bank 1},t}$ ($R_{\text{Bank 2},t}$) 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 only consider 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.

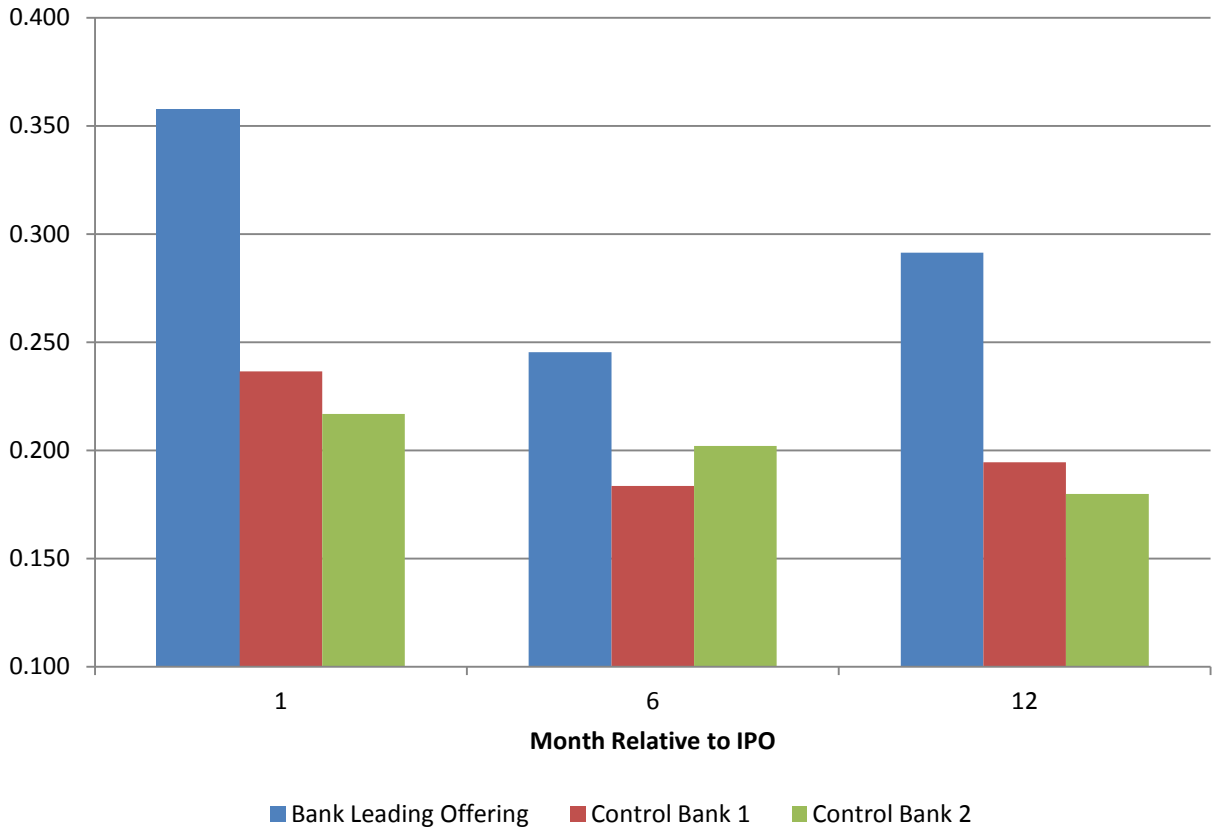

Figure 2
Average Adjusted-R^2 from Univariate Regressions

This figure depicts the evolution over time of the adjusted-R^2 of the following regression models:

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

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

$$(3)\, R_{i,t} = \alpha_i + \beta_{\text{Bank 2},i} R_{\text{Bank 2},t} + \varepsilon_{i,t},$$

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 IPO, $R_{\text{Bank 1},t}$ ($R_{\text{Bank 2},t}$) 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 only consider 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.

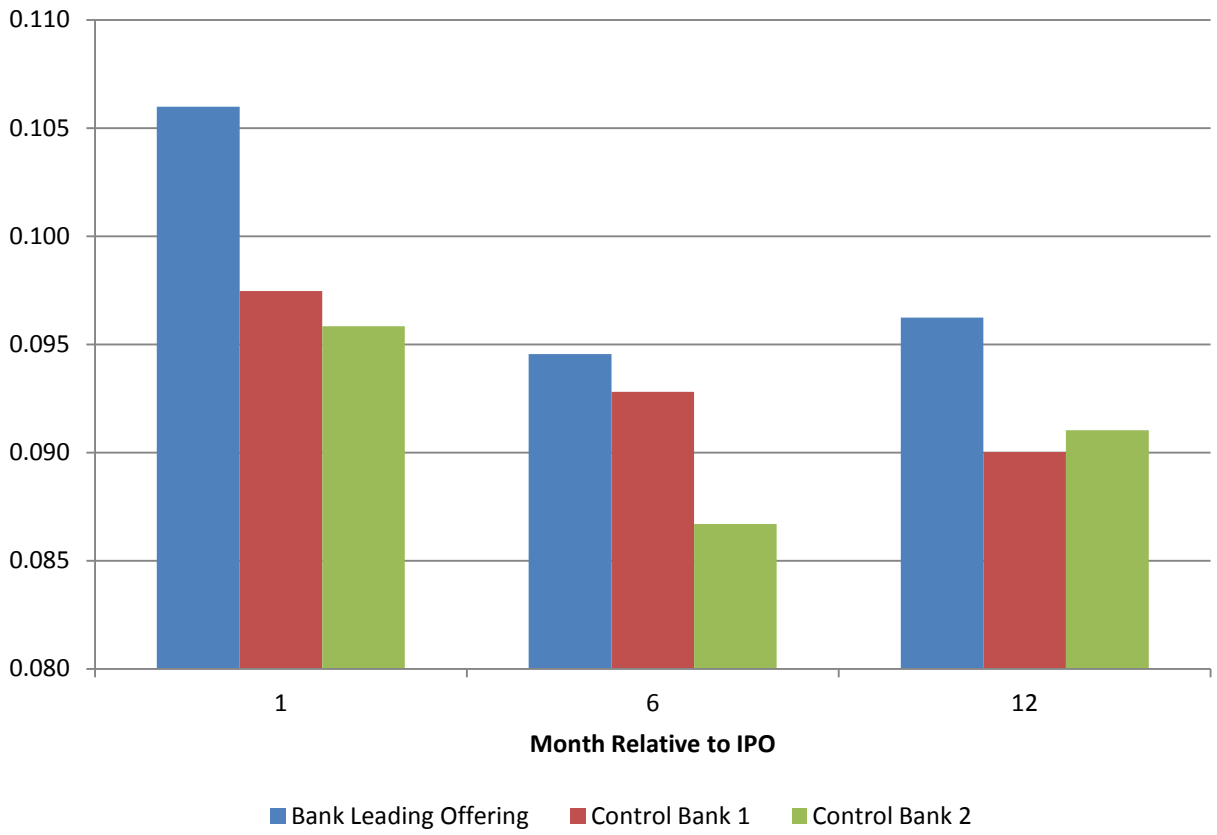

Figure 3
Fraction of Firm Held by Associated Institutions

This figure depicts the evolution over time of the fraction of the 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 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 only consider offerings in which the firm did not have another equity offering in the 12 months following the IPO.

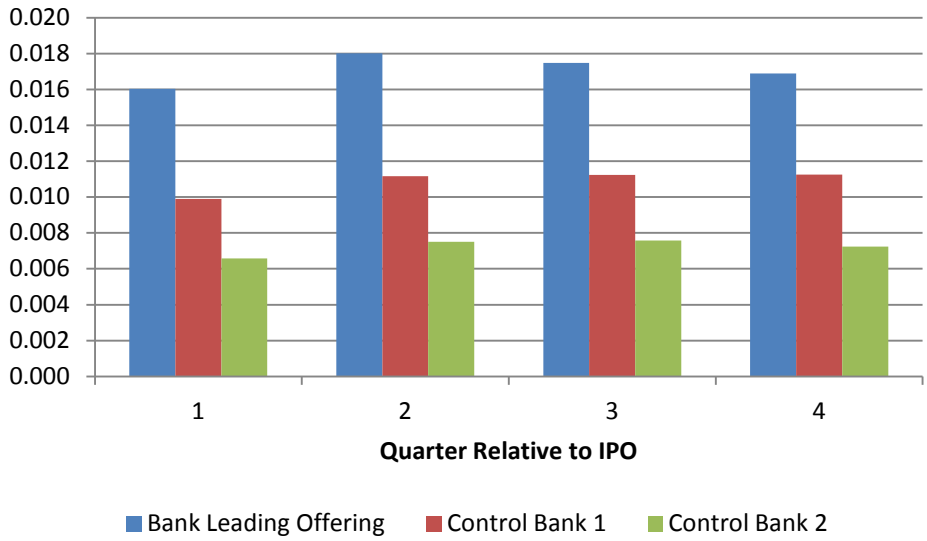

Figure 4
Number of Associated Institutions

This figure depicts the evolution over time of the number of the institutions holding shares of the 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 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 only consider offerings in which the firm did not have another equity offering in the 12 months following the IPO.

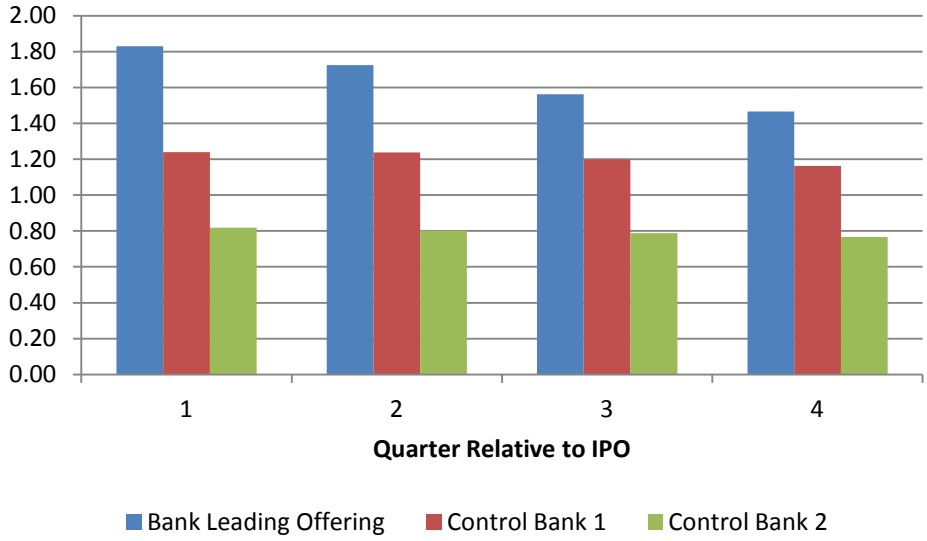

Figure 5
Timeline used for Pre and Post SEO regressions

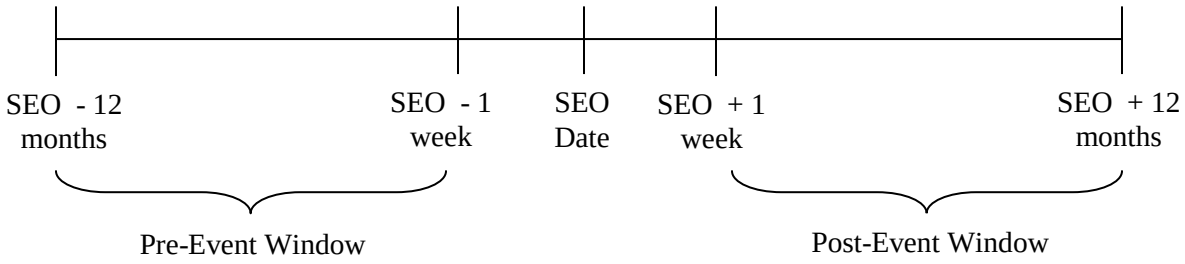

Figure 6
Time Series of Market Making Activity

This figure presents the time series of Nasdaq dealer market shares in event time around the month of the SEO for a sample of firms that switched underwriters from their 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 for 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 where 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.