The Value of Investment Banking Relationships:
Evidence from the Collapse of Lehman Brothers[*]

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Current draft: March 17, 2010

Abstract

The sudden collapse of Lehman Brothers on September 14, 2008 offers a unique natural experiment to test whether existing investment banking relationships have value for the clients. We study the impact of the Lehman collapse on industrial firms that employed Lehman for (1) underwriting equity offerings; (2) underwriting debt offerings; (3) providing advice on mergers and acquisitions; (4) providing analyst research services; and (5) providing market-making services. Companies using Lehman as lead underwriter for equity offerings lost around 5% of their market value, on average, (amounting to approximately $23 billion in lost market capitalization) in the seven days surrounding Lehman's bankruptcy. We also examine how client losses were related to various client characteristics including the nature and strength of their relationship with Lehman. The losses were especially severe for companies that had undertaken a larger number of equity offerings in the past 10 years with Lehman as lead underwriter and those that were smaller, younger, and more financially constrained. No other client groups were adversely affected. Our findings offer new insights into how investment banking relationships create value for clients, including the variation across the different services offered by investment banks from the standpoint of a valuable long-term relationship.

Keywords: Firm-underwriter relationship; public security offerings; investment banking
JEL classification: C78, G24, G32, L14

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ABSTRACT

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September 14, 2008 witnessed an almost unprecedented event – the sudden, largely unanticipated, and nearly instantaneous collapse of the fifth largest investment bank in the world. Whereas large U.S. financial institutions in distress have almost invariably been prevented from declaring bankruptcy by being acquired by other large institutions (often with the intervention of the federal government under the "too big to fail" doctrine), Lehman Brothers was explicitly allowed to fail.[1] This unprecedented collapse was all the more shocking since Barclays Bank had been negotiating an acquisition with Lehman's managers right up to Saturday, September 13, 2008, the day before Lehman announced the largest bankruptcy filing in U.S. history in the Ninth U.S. Circuit Court in New York City. Thus, when stock market trading began on Monday, September 15, 2008, investors were very surprised by the news. Lehman Brothers' stock lost virtually all its remaining value that day, the U.S. stock market experienced one of its worst single-day losses, and the entire global financial system was pushed to the edge of collapse. Even though Barclays announced the purchase of most of Lehman Brothers' U.S. operations the following day for $1.5 billion, the Lehman Brothers name and franchise value were destroyed.[2] This unexpected bankruptcy offers a unique natural experiment with a clean, identifiable event period to test whether existing investment banking relationships have value *for the clients.*

In an environment of increased competition for investment banking services, the question of whether firms derive value from investment banking relationships has received considerable attention in the literature. The acquisition by a bank of valuable private information about a firm (James (1992), Schenone (2004), and Drucker and Puri (2005)), investment by banks in institutional investor book building networks (Benveniste and Spindt (1989), Cornelli and Goldreich (2001), Ritter and Welch (2002) and Ljungqvist, Jenkinson and Wilhelm (2003)), switching costs incurred by firms in moving to a new underwriter (Burch, Nanda, and Warther (2005) and Ellis, Michaely, and O'Hara (2006)) and the firm-underwriter relationship being the outcome of optimal matching (Fernando, Gatchev and Spindt (2005)) would all suggest that the relationship is jointly valuable to the firm and its underwriter. However, there is no clear evidence on the extent to which client firms receive a share of any value created from the relationship. Burch, Nanda, and Warther (2005) provide evidence that equity underwriting clients pay lower underwriting fees for subsequent SEOs but that loyalty to an existing debt

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[1] Examples of rescues during the 2008 financial crisis include the J.P. Morgan takeover of Bear Stearns, Bank of America takeover of Merrill Lynch and the U.S. Government's bailout of American International Group, Fannie Mae and Freddie Mac.

[2] Shortly after Barclays purchased Lehman's U.S. operations, Nomura purchased Lehman's international operations.

underwriter saddles the issuing firm with higher rather than lower underwriting fees on subsequent offerings. There is considerable evidence that client firms frequently switch underwriters, especially to those of higher reputation (Krigman, Shaw and Womack (2001) and Fernando, Gatchev and Spindt (2005)), which also raises questions about the extent to which client firms share any value created by the relationship. Additionally, while investment banks provide a variety of services in addition to underwriting equity and debt offerings, the extent to which these services create value to clients from a long-term investment banker relationship is also unknown.

We examine the impact of the Lehman Brothers collapse on different categories of Lehman's publicly traded non-financial, non-utility (henceforth *industrial*) client firms by studying how their stock prices reacted on Monday, September 15 and over various short-term windows around that day. We specifically address two research questions: First, did Lehman's collapse impact its investment banking (IB) clients over and above the impact the firm's collapse had on the equity market in general, and second, were all the bank's clients equally affected (or unaffected) or were there cross-sectional differences in impact across clients based on their individual characteristics and/or the specific IB services they received? These questions are central to understanding how intermediaries create value for their clients. While past studies have examined this question from the standpoint of individual transactions and by approaching it for the underwriter and client firm jointly, this is the first study, to our knowledge, that attempts to isolate the value of the underwriter relationship to client firms.

As described by Smith (2001), the largest investment banks derive their revenues from three principal activities – corporate finance, trading, and asset management. Corporate finance encompasses debt and equity securities underwriting and fee-based advisory work (principally mergers and acquisitions). During 2000, the year studied by Smith, the top eight investment banks derived an average of 22.5% of all their revenues from corporate finance, while Lehman (then ranked seventh in size overall) garnered 28.8% from underwriting and advising. Trading of fixed income and equity securities encompasses traditional brokerage services provided by banks for their individual and institutional clients, as well as principal investment trading on the bank's own account. Top banks derived an average of 25.1% of revenues from trading activities during 2000, and Lehman derived 27.0%. As the name implies, asset management involves banks providing the fiduciary service of managing personal and institutional wealth in exchange for fees or commissions. This activity accounted for the largest average fraction, 37.7%, of IB industry revenues during 2000, but only represented 23.0% of Lehman's revenues that year. Therefore, Lehman Brothers had relatively less of a buffer from stable fee-based asset management services than did other large investment banks during 2000, and this relative imbalance

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persisted for the next eight years.[3] In addition, Lehman moved aggressively into mortgage-backed securitization and CDS underwriting after 2004, which left the firm extremely vulnerable when the sub-prime mortgage market turned sour in June 2007.

Our first empirical objective is to identify publicly-traded industrial companies that were Lehman customers in September 2008 for any of the following five services: (1) underwriting equity security offerings (IPOs or SEOs); (2) underwriting debt security offerings; (3) providing advice on mergers and acquisitions; (4) providing security analysis or other research services; and (5) providing market-making services for firms with NYSE-listed shares. If the information acquired by an investment bank during the provision of underwriting or M&A advisory services is both costly and useful in possible future dealings, the said services will have economies of scale through repeat dealings with the bank (James (1992), Drucker and Puri (2005), Schenone (2004), Burch, Nanda, and Warther (2005) and Ellis, Michaely, and O'Hara (2006)). If the client captures a portion of the cost savings, it follows that the unexpected rupture of the relationship would have an adverse effect on client value. However, it is unclear whether the collapse of a major investment bank would impose real costs on firms receiving analyst coverage since an analyst can change banks, a transfer that may be costless to covered firms. That is, it is unclear whether any portion of the value derived from analyst coverage is bank specific rather than analyst specific. We also identify listed companies in which Lehman Brothers was a significant shareholder and perhaps provided monitoring or other valuable ownership services. Additionally, we identify firms that obtain equity underwriting services from other investment banks with market shares similar to Lehman's for comparison purposes.

We exclude all financial firms from our analyses to eliminate the possibility that our results may be influenced by their financial exposures to Lehman. The Lehman bankruptcy triggered a wave of creditor claims, with 57,057 claims exceeding $1000 being recorded against Lehman in the bankruptcy case docket as of the November 2, 2009 final filing deadline.[4] The majority of material creditor claims were from other financial firms and arose largely from debt and OTC derivatives counterparty claims. In addition to confining our analysis to industrial firms, we also screen all our initial samples for firms that reported pertinent exposure to Lehman in their 8-K, 10-Q and 10-K filings, and exclude all such firms.[5] Our final sample is comprised of over 800 public industrial companies that received one or more of the five services described above from Lehman Brothers during the 10 years leading up to and including

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[3] Lehman expanded its asset management business through acquisitions in the early 2000's, the most notable of which was that of Neuberger Berman in 2003. Despite this, asset management accounted for only 16% of Lehman's fiscal year 2007 revenues, while trading activities and corporate finance accounted for 64% and 20% respectively.

[4] In re Lehman Brothers Holdings Inc., 08-13555, U.S. Bankruptcy Court, Southern District of New York.

[5] As a robustness check, we also repeated our analysis by excluding all firms in our initial sample that filed material creditor claims against Lehman by searching the bankruptcy case docket. However, we found no substantive difference in our results.

2008, as well as a comparable number (944) of listed industrial firms that receive equity underwriting services from Lehman's competitors.

We then test whether Lehman's failure imposed significantly higher costs on its clients than on those of other firms, and also whether clients were impacted differentially based on their individual characteristics, the nature of the Lehman IB services they received and whether Lehman owned their shares. We find that companies which had used Lehman Brothers as lead underwriter for one or more equity offerings during the 10 years leading up to September 2008 suffered economically and statistically significant negative abnormal returns (between -1.5% and -4.8%, depending on the event window and market adjustment methodology) when Lehman Brothers declared bankruptcy. These losses were significantly larger than those for firms that were equity underwriting clients of other large investment banks, and were especially severe for companies that had undertaken a larger number of equity offerings in the past 10 years with Lehman as lead underwriter, were smaller, younger, and more financially constrained. No other client groups were significantly adversely affected by Lehman's collapse. These results show that the bank's collapse did, in fact, impose material losses on its customers, but for the most part these losses were confined to those companies that employed Lehman for equity underwriting. Based on Fama-French-Carhart four-factor model adjusted abnormal returns, the 183 equity underwriting clients that we studied lost 4.84% of their market value, on average, over a seven-day period spanning the five trading days prior to and the first and second trading days immediately following Lehman's bankruptcy filing (which occurred on a Sunday evening), amounting to approximately $23 billion in lost market capitalization. Intriguingly, this nearly equals Lehman's April 1, 2008 market value of $24 billion that was lost due to the collapse. We arrive at similar value loss estimates and conclusions using alternative return generating models widely accepted in the literature, such as the Fama-French three-factor model, the market model, and size/book-to-market matching. Furthermore, to the extent that investors partially anticipated Lehman's failure prior to the days surrounding Lehman's bankruptcy announcement, these estimates may actually understate the losses suffered by Lehman's equity underwriting clients. More broadly, these results tell us that equity underwriting is the principal portion of the overall investment banking relationship that is irreplaceable without significant cost and whose value will be forfeited if the relationship were to involuntarily collapse. Our unique findings offer considerable new insights into the firm-underwriter relationship.

After this paper was essentially completed, we became aware of a related paper by Kovner (2009). In addition to Lehman's failure, she examines the impact of the near failure of Bear Stearns, Merrill Lynch, and Wachovia on firms whose IPOs were recently underwritten by those banks. Our work is related in that our analysis also includes firms that conducted recent IPOs with Lehman. However, our equity underwriting client focus is broader in that we also examine the impact of Lehman's collapse on

firms that employed Lehman in recent SEOs. In addition, we ask whether Lehman's failure had a material adverse impact on Lehman's clientele that received services other than equity underwriting, including debt underwriting, M&A advisory services, market making services, and analyst coverage.

The rest of our paper is organized as follows. In Section I we briefly review the existing literature on firm-intermediary relationships in corporate finance and formulate our empirical hypotheses. Section II discusses the collapse of Lehman Brothers. Section III describes our data and methodology, respectively. Section IV presents the results and Section V concludes.

I. Literature Review and Empirical Implications

We organize our discussion of investment banking relationships below by the different services provided by investment banks, beginning with equity securities underwriting. The empirical implications pertaining to the value to clients of investment banking relationships are discussed at the section's end.

A. *Equity Underwriting*

The extant theoretical and empirical literature has examined ways in which a long-term equity underwriting relationship between an investment bank and a client firm can create value for both parties. As noted above, if the information acquired by an investment bank during the provision of underwriting or M&A advisory services is both costly and useful in possible future dealings, the said services will have economies of scale through repeat dealings with the bank. James (1992) predicts and shows that the existence of set-up costs in the IPO due diligence process creates capital that will lower underwriting spreads for firms that are expected to issue equity again. The IPO underwriter must invest in acquiring firm-specific information about the issuer in order to credibly certify the IPO to outside investors, and if this relationship capital is durable it should reduce the cost of subsequent offerings by these client firms.

Equity underwriters also create significant value for their clients by investing in the development and maintenance of institutional investor networks that serve as channels not only for collecting information but also for the distribution of shares through book building, thereby reducing the indirect costs of equity offerings.[6] Brau and Fawcett (2006) observe that the majority of CFOs in their survey carefully weigh the institutional client base of the underwriter. Since the value to an equity client is derived from the reputational capital of an investment bank with its institutional investor network, it is unlikely that this value can be quickly recreated with another investment bank, especially for smaller, less well known client firms.

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[6] See, for example, Eccles and Crane (1988) and Benveniste and Wilhelm (1990). Benveniste and Spindt (1989) model book building as a process in which investment banks provide preferential stock allocations to informed investors in exchange for their private information. Cornelli and Goldreich (2001), Ritter and Welch (2002) and Ljungqvist, Jenkinson and Wilhelm (2003) discuss the importance of book building in the equity issuance process.

Burch, Nanda, and Warther (2005) verify that the equity underwriting relationship is valuable for clients in that such relationships significantly reduce underwriting fees for subsequent equity offerings. They find significant support for the "benefits of loyalty hypothesis" using both a short-term and long-term measure of issuer loyalty to its relationship bank. However, looking only at how underwriting spreads change does not permit us to estimate how the value of client firms is affected by the underwriting relationship since it ignores the benefit side of the relationship.

The presence of switching costs also suggests that an underwriting relationship will be valuable since a rupture of the relationship will impose significant costs on client firms in establishing a new equity underwriting relationship. Consistent with this argument, both Burch, Nanda, and Warther (2005) and Ellis, Michaely, and O'Hara (2006) document that equity issuing firms that switch to higher reputation underwriters will be charged higher underwriting fees. However, as noted above, these studies do not take account of the added benefit that firms may receive by employing a higher quality underwriter. Indeed, Brau and Fawcett (2006) find that, for IPOs, underwriter reputation is among the most important factors to CFOs when selecting the underwriter, while Krigman, Shaw and Womack (2001) and Fernando, Gatchev and Spindt (2005) show that seasoned firms often voluntarily switch from lower to higher-quality underwriters, which suggests that the benefits of establishing a new underwriting relationship may sometimes outweigh the costs of doing so. Additionally, Gao and Ritter (2009) show that many firms find it cost effective to employ underwriters for fully-marketed seasoned equity offerings despite their higher cost relative to accelerated underwritings, because fully marketed deals temporarily increase the elasticity of demand for the issuing firm's stock.

Taken together, the factors described above suggest that the rupture of an existing equity underwriting relationship could potentially be highly damaging for client firms, especially for those relatively small and lesser known companies that rely heavily on their current underwriters to access public stock markets and are unable to easily migrate to other underwriters. Additionally, even if some companies are able to swiftly enlist new underwriters, this will involve significant switching costs and any relationship-specific capital embodied in the prior relationship will be forfeited. However, in an environment where a free market exists for underwriter services and underwriter switching is common, the questions of what value client firms obtain by staying in an underwriting relationship and what the sources of this value are, if any, remain unresolved.

B.   *Debt Underwriting*

The investment banking literature suggests that a debt underwriting relationship may be less valuable than an equity underwriting relationship to both bank and client. Indeed, whether a debt underwriting relationship is valuable at all is an empirical issue. Interestingly, Burch, Nanda, and Warther

(2005) find that in contrast to repeat equity issuers, who benefit from significantly reduced underwriting fees for subsequent offerings, debt issuers are actually penalized (charged higher underwriting fees) for retaining the previous underwriter for subsequent bond offerings. Burch, Nanda and Warther (2005) use this evidence in support of their prediction that underwriter certification will be more valuable for stock than bond offers. While it is puzzling that firms would continue to employ the same underwriter for future debt offerings if they can obtain the same service from another underwriter at a lower cost, Burch, Nanda and Warther (2005) also show that issuers will face higher costs if they switch away from their current bond underwriter, so the net benefit of an existing relationship is ambiguous.

Several studies document that an existing *lending* relationship between a bank and borrowing firm can be mutually beneficial. Rajan (1992) and Boot and Thakor (2000) predict theoretically that a pre-existing relationship has both costs and benefits for the borrower, and Schenone (2004) and Bharath, Dahiya, Saunders, and Srinivasan (2007) document benefits accruing to both parties in a lending relationship. Schenone (2004) shows that an IPO issuing firm which has an existing relationship with a commercial bank that could underwrite its subsequent debt offerings is rewarded with significantly lower IPO underpricing. Yasuda (2005) shows that an existing commercial banking relationship significantly increases the likelihood that this bank will be selected to underwrite subsequent public debt offerings -- which is a benefit to the investment bank -- and will do so at a lower underwriting fee, which is a net benefit to the issuing firm. Bharath, et al. (2007) find that a strong prior lending relationship significantly increases the probability that the bank will secure the issuing firm's future lending and debt underwriting business, which mostly benefits the bank but could also benefit the borrower if these gains are shared.[7] Thus, an existing commercial banking relationship can be beneficial for both parties, but it is not clear whether and to what extent these findings for commercial banks carry over to investment banks like Lehman.

Additionally, in contrast to equity offerings, debt ratings by rating agencies make underwriter certification considerably less valuable to clients. Ratings also diminish the need for book building and the ability of investment banks to create value for their clients through their institutional investor networks. Therefore, on balance, the extant literature does not clearly predict whether the collapse of Lehman Brothers will impose significant net costs on existing bond underwriting clients.

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[7] More generally, Gande, Puri, and Saunders (1999), Song (2004), and Narayanan, Rangan, and Rangan (2004) all document that the entry of commercial banks into the securities underwriting business (mostly debt underwriting) has benefited issuing firms by reducing average fees charged by all underwriters. Conversely, Dahiya, Saunders, and Srinivasan (2003) show that the costs and benefits of a banking relationship can flow in both directions, by documenting that lead lending banks suffer significant negative abnormal returns when one of their client firms defaults on publicly issued bonds or files for Chapter 11 bankruptcy protection.

C.   *Merger and Acquisition Advisory Services*

Several academic studies examine the relationship between firms involved in mergers and acquisitions and the investment banks that advise them. These include McLaughlin (1990), Servaes and Zenner (1996), Rau (2000), Kale, Kini, and Ryan (2003), Allen, Jagtiani, Peristiani, and Saunders (2004), and Kisgen, Qian, and Song (2009). On balance, these studies show that banks do provide valuable advisory services to clients (particularly acquirers) involved in takeover contests, and that employing more prestigious banks is associated with superior outcomes for clients. However, most of these studies also find that the advice provided by banks in acquisitions is fundamentally colored by conflicts of interest between the desire of banks to burnish their reputation for sagacity and the (usually) stronger desire to consummate the deal in order to collect completion payments.

Additionally, from the standpoint of the value to client firms of a long term relationship in M&A advising, there is no evidence to suggest that client acquirer firms derive persistent value from such a relationship or that any relationship is not transferable to another investment bank without a significant cost to the client. Much of the private information collected during the M&A process pertains to the target firm and this information largely dissipates after a deal is consummated. While it is possible that serial acquirers may experience a decline in value after losing their M&A advisor, such firms are invariably large and would have a relatively easier time in transferring to another investment bank for M&A advisory services.

D.   *Security Analysis and Research*

The investment banking literature indicates that security analysts employed by prestigious banks can provide valuable services to client firms, though it is less clear whether that relationship is firm-specific (between client firm and bank) or person-specific (between client firm and analyst). In other words, we cannot a priori predict whether the collapse of a major investment bank will impose costs on client firms, or whether any value in an existing analyst relationship will simply be transferred costlessly to a new bank that employs the analyst after the original bank's failure.

Mikhail, Walther, and Willis (2004) document that individual security analysts do indeed demonstrate stock-picking ability and find that there is persistence in this ability. Ivković and Jegadeesh (2004) also show that some analysts have stock picking ability, but only during the period immediately before corporate earnings announcements. They interpret their findings as suggesting that top analysts are able to access information that other investors cannot access, and possess superior information processing skills in interpreting the data so obtained.

Ljungqvist, Marston, and Wilhelm (2006) ask whether security analysts are tempted to tailor their recommendations to assist their firms in acquiring underwriting mandates and, if so, whether this is a

successful strategy. They show that less prestigious analysts indeed often shade their recommendations in pursuit of new underwriting mandates but that this is almost never successful. The main determinant of lead-bank choice is the strength of the prior underwriting and lending relationship between an investment bank and an issuing firm, not whether the bank employs a top-rated analyst and definitely not whether the analyst is willing to make flattering recommendations. Finally, Clarke, Khorana, Patel, and Rau (2007) verify that analysts who change jobs do not change their recommendations upon assuming their new posts, though their new employer's client list does influence the companies selected for coverage. In contrast to Ljungqvist, et al. (2006), Clarke, et al. (2007) find that having a top industry analyst on staff does significantly influence the choice of equity security underwriting bank, but has no effect on debt underwriter choice.

On balance, the existing evidence suggests that the collapse of Lehman Brothers was unlikely to impose material switching costs on client firms that had been covered by the bank's top rated analysts. In particular, it is unclear whether any portion of the value derived from analyst coverage is bank specific rather than analyst specific. If the latter, whatever value is embedded in the analyst-client relationship will simply be transferred to the analyst's new employers without diminishing the client firm's market value. Therefore, while relationships with individual analysts may be valuable to client firms, we have no reason to expect that the Lehman collapse affected these relationships and thereby imposed losses on client firms that were covered by Lehman analysts.

E.   Market Making

Several academic studies examine the value of market making for NYSE listed firms, including Cao, Choe, and Hatheway (1997), Corwin (1999), Coughenour and Deli (2002), and Corwin, Harris and Lipson (2004). While investment banks provide valuable market making services, the existing literature suggests that the value of any market making provided by underwriters is short-lived, helping to stabilize an offering in the immediate aftermath of an IPO but progressively becoming less important over the ensuing months. Ellis, Michaely, and O'Hara (2000) show that the underwriter is almost always the dominant dealer in the three month period after a Nasdaq IPO and that the underwriter engages in price stabilization during this period. Schultz and Zaman (1994), Aggarwal (2000), and Corwin, Harris and Lipson (2004) also show that the underwriter engages in price stabilization just after the IPO. However, Ellis, Michaely, and O'Hara (2002), while confirming their previous finding that the underwriter is almost always the dominant market maker just after an IPO, show that after seven months other dealers take the dominant market making role more than half the time.

These findings suggest that the value to client firms of underwriter market making is short-lived at best, making it unlikely that they would derive value from a long term market making relationship. If a

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market maker can be replaced without cost to the firm receiving service, or if the loss of a market maker can be made up by other market makers increasing their market share, the exit of that market maker should have no impact on the firm.

F.   Empirical Implications

The above review of the literature suggests that the question of whether investment banking relationships create value for clients remains unresolved. Equity underwriting relationships (especially relationships with high reputation underwriters) appear to be potentially valuable to client firms due to equity clients (a) being able to share the benefit of an underwriter's investment in information generation via reduced fees for subsequent equity offerings; and (b) having the ability to benefit from the underwriter's investment in a network of institutional investors, who provide information and also subscribe to the underwriter's offerings. If so, we would expect Lehman equity underwriting clients to be significantly negatively impacted by the Lehman collapse.

Debt underwriting relationships appear to be less valuable to client firms than equity underwriting relationships. While debt offerings also entail information generation, there is no evidence in the literature to suggest that client firms are able to share in the benefit of an underwriter's investment in information when it comes to subsequent offerings. Additionally, since many debt securities have credit ratings, they are easier to price and place, making underwriter certification and the book building process considerably less valuable to client firms. Therefore, to the extent Lehman debt underwriting relationships are valuable to clients, we expect this value to be significantly less than for equity underwriting relationships.

While M&A advisory relationships involve intense information gathering prior to a deal, there is no evidence to suggest that client acquirer firms derive persistent value from such a relationship or that any relationship is not easily transferable to another investment bank. Much of the private information collected during the M&A process pertains to the target firm and this information largely dissipates after a deal is consummated. Additionally, serial acquirers are invariably larger and would have a relatively easier time in transferring to another investment bank for M&A advisory services.

The available evidence suggests that analyst coverage relationships are analyst specific rather than bank specific, which implies that whatever value is embedded in the analyst-client relationship will simply be transferred to the analyst's new employers without diminishing the client firm's market value.

The value of any market making provided by underwriters is short-lived, helping to stabilize an offering in the immediate aftermath of an IPO but progressively becoming less important over the ensuing months. Therefore, it is unlikely that client firms would derive value from a long term market making relationship.

Conditional on a relationship developed through the provision of investment banking services having value, we expect cross-sectional variation in client losses around Lehman's bankruptcy to be related to the strength of the relationship and client characteristics. For equity underwriting, we conjecture that a larger number of past equity deals with the same bank is indicative of a stronger relationship with that bank, and we therefore test whether firms that conducted more equity deals with Lehman were more adversely affected by Lehman's collapse. Additionally, we also hypothesize that a client's loyalty to Lehman, measured by Lehman's share of the client's past common stock offerings, would be a measure of the strength of the relationship. Finally, Ljungqvist and Wilhelm (2003) document a sizeable increase in the frequency of banks owning equity stakes in clients whose IPOs they underwrite, from 8% in 1996 to 44% in 2000. According to Ljungqvist and Wilhelm (2003), these stakes can be direct holdings, possibly as payment for services, or indirect holdings by the bank's private equity or venture capital funds. Ljungqvist, Marston, and Wilhelm (2006) conjecture that holding an equity stake in the client may serve as a means of "cementing" a relationship, and they find some evidence that banks that own stakes in an issuer are more likely to win equity underwriting mandates from that issuer. To the extent that Lehman's ownership of the client's shares is an indicator of a stronger relationship, a negative relation is implied between the client's abnormal returns and Lehman's ownership of the client's shares. Aside from this relationship based interpretation, Lehman's failure may have also disproportionately affected clients in which it owned shares due to a supply-side effect. If Lehman's bankruptcy triggered the sale of its clients' shares, either voluntarily or as a result of forced liquidation during the impending bankruptcy process, then a more negative reaction among such firms should be observed.

Regarding firm characteristics of Lehman's equity underwriting clients, we hypothesize that clients with greater immediate need for external capital will be more adversely affected by the loss of an underwriting relationship. Specifically, we expect firms with less financial slack and firms in greater financial distress to have greater need for external capital and therefore, we expect such firms to suffer greater losses in response to Lehman's bankruptcy. Finally, we reason that smaller and younger firms should have less established reputations in financial markets, so that the information production role of an intermediary is more important to them relative to larger, more established firms (Diamond (1991)). If so, smaller and younger firms would incur greater costs from switching underwriters, all else equal. Therefore, among Lehman's equity underwriting clients, we expect smaller firms and younger firms to be more adversely affected by Lehman's collapse.

We examine these questions in Section IV after discussing the Lehman collapse in the next section and our data and methodology in Section III.

II. The Collapse of Lehman Brothers

In Table I, we document the significant events surrounding the bankruptcy of Lehman Brothers and the associated abnormal returns to Lehman's common stock. Abnormal returns are estimated using the Fama-French-Carhart four-factor model (described below in Section III). Late in the evening on Sunday, September 14, 2008, Lehman announced that it would file for protection in the U.S. bankruptcy court in the southern district of New York. The following day, Lehman experienced a raw return of -94% and a risk-adjusted abnormal return of -76%. Lehman experienced significant losses during the week prior to the bankruptcy announcement (September 8 to September 12; Days -5 to -1) as well, as indicated by the negative cumulative abnormal return (CAR) of -115.6% in Panel B of Table I. During this week leading up to the bankruptcy, Lehman announced a $3.9 billion loss and a dividend cut, the major credit rating agencies put Lehman's credit rating on "watch," and a deal involving a potential investment in Lehman by Korea Development Bank reportedly fell through. After Lehman filed for bankruptcy, Barclays announced on September 16 that it had reached an agreement to purchase Lehman's North American investment banking and capital markets businesses, and the following day Lehman was delisted from the NYSE.

**** Insert Table I about here ****

We test whether equity and debt underwriting relationships have value for clients, on average, by examining the abnormal returns of Lehman's equity and debt underwriting clients around the time of Lehman's collapse. We also examine whether M&A advisory relationships are valuable to clients by doing the same for Lehman's M&A clients. We investigate whether security analysis by analysts at prestigious investment banks constitutes a valuable relationship for client firms by examining the stock price reaction of firms receiving analyst coverage from a Lehman analyst at the time of Lehman's collapse. Similarly, we test whether the provision of market-making services constitutes a valuable relationship by examining the abnormal returns of NYSE firms for which Lehman served as the specialist at the time of Lehman's bankruptcy. Finally, we perform cross-sectional regression analyses to examine the how client losses around Lehman's bankruptcy are related to the strength of the relationship and client characteristics.

III. Data and Methodology

A.   Equity Underwriting

We use the Securities Data Corporation (SDC) Global New Issues database to identify firms that employed Lehman Brothers as a lead underwriter on a public offering of common stock in the U.S. market during the ten years preceding Lehman's bankruptcy (September 14, 1998 to September 14,

2008).[8] We restrict the sample to U.S. firms in CRSP and Compustat with publicly traded common stock (CRSP share codes of 10 or 11) at the time of the bankruptcy announcement. We exclude utilities (two-digit SIC code 49) because their financing decisions are highly regulated.[9]

The Lehman bankruptcy triggered a wave of creditor claims, with 57,057 claims of more than $1,000 being recorded against Lehman in the bankruptcy case docket as of the November 2, 2009 final filing deadline.[10] The vast majority of material creditor claims were from other financial firms and arising largely from debt and OTC derivatives counterparty claims.[11] Therefore, we also exclude all financial (one digit SIC code 6) firms from all our analyses to eliminate the possibility that our results may be influenced by their financial exposures to Lehman.[12]

For our event study, we identify September 15, 2008 as Day 0 because it was the first day on which the market could react to the bankruptcy announcement. For the purpose of estimating abnormal stock returns during the event period, we use a 260-day estimation period (Day -289 to Day -30), and we require that firms have non-missing returns on at least 100 days during this estimation period and non-missing returns on all days during the period Day -5 to Day +5. Imposing these restrictions yielded an initial sample of 199 industrial (i.e., non-financial, non-utility) firms that employed Lehman as a lead underwriter on at least one common stock offering during the ten years preceding Lehman's bankruptcy.

In addition to excluding financial firms, we also screen the industrial firms in our initial sample for material financial exposure to Lehman. For example, some industrial firms use derivatives contracts in their risk management programs, and Lehman was a major dealer in OTC derivatives markets. Even counterparties whose positions were out of the money may have faced difficulties due to Lehman's failure, such as the costs of unwinding and replacing the contracts and reacquiring any collateral that may have been posted. In addition, non-financial firms may hold the securities of large financial institutions among their liquid assets, either directly or indirectly though money market funds, for example. We considered multiple means of identifying firms with material financial exposure to Lehman. The first step in our screening involved identifying firms in our sample that had claims against Lehman in its bankruptcy proceeding. These claims are posted on the court appointed claims administrator's website and thus are freely available to the public. Relevant information provided includes the dollar amount and nature of the claim, and whether the claim pertains to a derivatives contract. After filtering out trivial

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[8] Throughout, any references to underwriters or underwriting refer only to lead underwriters, not co-managers.

[9] Eckbo and Masulis (1995) provide a detailed discussion of how regulatory commissions influence the security issuance decisions of public utilities.

[10] In re Lehman Brothers Holdings Inc., 08-13555, U.S. Bankruptcy Court, Southern District of New York.

[11] For example, 95% of the largest 1000 claims were from financial firms.

[12] As discussed later in this section, we also explicitly take account of the possibility that some of the remaining (non-financial) firms in our sample could also be subject to counterparty exposure by individually identifying firms in any of our samples that filed material claims against Lehman in the bankruptcy proceeding.

claims of $1,000 or less, there was a total of 57,057 claims lodged against Lehman as of the November 2, 2009 final filing deadline. Among these we found that 17 of Lehman's 199 equity underwriting clients had claims against Lehman. Ten of these pertain to derivatives contracts. We also conducted this procedure for identifying firms with claims among Lehman's other client groups mentioned in Section IIIB below. We conducted all of our tests including and separately after excluding these firms that had claims in the bankruptcy case. We found that excluding firms with claims against Lehman did not affect our conclusions.

While identifying firms with claims in the bankruptcy case serves as a useful starting point, it has its disadvantages. One weakness is that it captures only firms whose exposures constitute creditor claims as defined by law. Derivatives counterparties whose positions were out of the money, for example, would likely not be captured unless the firm had a claim tied to a sufficiently large amount of collateral that had been posted as part of the contract. Additionally, firms with exposure to Lehman's equity securities or that held funds with exposure to Lehman's debt securities would not be captured. An additional weakness is that some of the sample firms with claims mentioned above appear to have claims that are trivial compared to the overall size of the firm. For example, among the 17 Lehman equity underwriting clients with claims mentioned above, more than half held claims that represented less than 0.095% of the firm's market capitalization. In light of these disadvantages, we consider an alternative procedure that better captures firms with material exposure, especially those with exposure stemming from derivatives contracts. We expect that firms that experienced or anticipated experiencing material losses due to financial exposure to Lehman would have disclosed such information in an 8-K report during or subsequent to the bankruptcy. The SEC requires a firm to file an 8-K report when an event triggers a material change in the firm's financial condition and maintains a list that explicitly outlines such events. While there are many such filings, those that are particularly relevant in the context of our study are "material impairments" to one or more of a firm's assets and the "termination of a material definitive agreement." Outside of the events explicitly required, firms are also allowed to use 8-Ks to disclose any "other events" that the firm determines as material and important to shareholders. Thus, we used the SEC's EDGAR system to search the 8-K reports filed by all our sample firms between September 1, 2008 and December 31, 2009.[13] Specifically, we used the word "Lehman" as the search term and flagged any

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[13] SEC rules state that an 8-K must be filed within four business days of the triggering event, but in our case Lehman's bankruptcy would not necessarily be deemed the triggering event. For example, if the firm eventually terminated a material contract in the months following the bankruptcy, it would be required to file the 8-K within four business days of the termination date, not the bankruptcy date. Similarly, if the firm's management determined that Lehman's bankruptcy caused the firm to experience a material impairment, it would be required to file within four days of when that determination was made. Thus, we conservatively search 8-K reports filed as late as December 2009 due to this timing issue.

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firm that filed an 8-K and disclosed therein that Lehman's bankruptcy impacted the firm in some way.[14] In our Lehman equity underwriting sample of 199 firms, we found eight such firms. Among these, only one pertained to derivatives contracts, wherein the firm disclosed that it was terminating its contracts with Lehman because they could no longer be regarded as effective hedging instruments. The remaining seven include two firms that reported material losses on Lehman securities held by the firm, two firms that lent shares of their equity to Lehman in conjunction with convertible notes offerings that were underwritten by Lehman, and three firms that disclosed that Lehman was a member of a syndicate of lenders under one or more of its credit facilities. After flagging these eight firms, out of an abundance of caution, we undertook an additional step to identify firms with material exposure stemming from derivatives contracts. Specifically, we also searched all sections of the quarterly (10-Q) and annual (10-K) reports filed by our sample firms during September 1, 2008 to December 31, 2009 and flagged any firm that disclosed therein that it was a counterparty in derivatives contracts with Lehman. In addition to the one firm mentioned above that filed an 8-K, we found 11 more firms in the Lehman equity underwriting sample that disclosed in either a 10-K or 10-Q that it had derivatives contracts with Lehman. We flagged these firms but, for most, we were unable to ascertain whether the firm's net position was in or out of the money, as some had multiple contracts and most did not disclose a sufficient amount of detail in the filing. However, we noted that, among the 12 firms that disclosed counterparty exposure in their SEC filings, six had derivatives related claims in the bankruptcy case and six did not, indicating that the six without claims likely had contracts which were all out of the money. To eliminate any suspicions of material contamination in our sample, we drop any firm that filed an 8-K and disclosed therein that Lehman's bankruptcy impacted the firm, regardless of whether the exposure pertains to derivatives or not. Additionally, to be conservative we also drop any firm that disclosed in its 10-K or 10-Q reports that it was a counterparty in a derivatives contract with Lehman. This procedure led us to drop 16 firms from our sample of Lehman equity underwriting clients and yielded a final sample of 183 equity underwriting clients. The results that we report pertain to this sample. Additionally, we use this same procedure to filter out firms with material exposure to Lehman in all samples discussed in subsequent portions of the paper. In Table II, we report summary statistics for the sample of Lehman clients that received equity underwriting services. The median number of offerings conducted over the sample period is two, while the median number of offerings for which Lehman served as a lead underwriter is one. 89 of the 183 sample firms (48% of the sample) went public during our sample period and used Lehman as a lead underwriter for their IPOs.

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[14]In cases where an 8-K triggering event occurs four business days prior to the scheduled filing of an annual (10-K) or quarterly (10-Q) report, SEC rules allow firms to forgo filing an 8-K as long as the firm discloses the information in "Part II: Item 5" of the 10-Q or "Part II: Item 9B" of the 10-K. Thus, to account for the possibility of such cases in our sample, we also searched these sections of the 10-K and 10-Q reports for all firms in all our samples. However, we found no instances of firms disclosing information relating to Lehman or its bankruptcy in these sections of the 10-Ks or 10-Qs.

However, only 33 firms (18% of the sample) employed Lehman exclusively over our sample period. That is, only 33 firms used Lehman as the sole lead underwriter on all of their stock offerings.

**** Insert Table II about here ****

Since Lehman's collapse had an adverse impact on the investment banking industry and may have signaled that it would be relatively more costly or difficult to issue equity in the near future, we conjecture that the broader population of equity issuers may also have been abnormally affected by Lehman's collapse. This raises the concern that any abnormal effects detected in our sample of Lehman clients are not necessarily specific to Lehman clients, *per se*, but to the broader population of firms that rely on equity issues to raise capital. We investigate this concern by documenting and comparing the abnormal returns earned by clients of similarly positioned investment banks around the time of Lehman's bankruptcy. We identify banks with industry status similar to that of Lehman using the two underwriter reputation metrics commonly employed in the literature[15] – underwriting market share (Megginson and Weiss (1991)) and reputation ranking (Carter and Manaster (1990)). We first identified all banks with an updated (2005-2007) Carter-Manaster (CM) ranking that is no more than one point lower or one point higher than that of Lehman.[16] We then picked the ten underwriters from this pool of banks that survived to September 14, 2008 and that were closest (according to difference in percentage points) to Lehman in 2007 U.S. common stock underwriting market share. These ten banks are Merrill Lynch, Goldman Sachs, Morgan Stanley, JP Morgan, Citi, UBS, Credit Suisse, Deutsche Bank, Bank of America, and Wachovia.[17] Table III reports the updated Carter-Manaster rankings and market share in U.S. public common stock, public straight debt, and public convertible debt of these ten banks. We use SDC to identify firms that employed at least one of these investment banks but did not employ Lehman as a lead underwriter in a public common stock offering during the ten years preceding Lehman's bankruptcy. This yielded an initial sample of 963 firms. After searching these firms' 8-K, 10-K, and 10-Q filings following the procedure outlined above, we eliminate 19 firms with material financial exposure to Lehman. This leads to a final sample that consists of 944 firms.

**** Insert Table III about here ****

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[15] The same restrictions regarding SIC codes and CRSP/Compustat data imposed on the Lehman clients are also imposed on these samples and on all samples examined in subsequent analyses.

[16] The updated CM rankings are generously provided by Jay Ritter on his webpage.

[17] Bear Stearns' market share in 2007 was closer to Lehman's than Wachovia's was to Lehman's, but we do not include Bear Stearns since the firm did not survive to September 14, 2008 (acquired by JP Morgan in May 2008).

B.   *Other Investment Banking Services: Debt Underwriting, M&A Advising, Market Making, and Analyst Coverage*

In addition to equity underwriting, we also examine the effect of Lehman's collapse on firms that received other services from Lehman, including debt underwriting, M&A advising, market making, and analyst coverage. We do so using samples that include all firms that received the particular service of interest from Lehman. These samples are constructed using the same restrictions regarding SIC codes and available CRSP/Compustat data as those used to construct the sample of equity underwriting clients described above, including the exclusion of utility and financial firms.

We use SDC to identify all industrial firms that employed Lehman as an underwriter in at least one public straight debt offering during the ten-year period prior to Lehman's bankruptcy. This initial sample consists of 61 firms. After searching these firms' 8-K, 10-K, and 10-Q filings following the procedure outlined in Section IIIA for identifying firms with material financial exposure to Lehman, we eliminate 11 firms from this sample. This yields a final sample of 50 firms. Of these, 12 were also equity underwriting clients. We also construct a sample of firms that used Lehman as an underwriter for at least one public convertible debt offering during the sample period. The initial sample of convertible debt clients consists of only 10 firms. After searching the 8-K, 10-K, and 10-Q reports filed by these firms and removing firms with material exposure following the procedure outlined above, the final sample of convertible debt underwriting clients consists of seven firms. Of these, five were also equity underwriting clients. As with equity underwriting, these samples are restricted to offerings made in the U.S. market.

We use the SDC Mergers and Acquisitions database to identify acquirers that employed Lehman as a financial advisor in at least one completed acquisition of a U.S. target that was announced during the ten years prior to Lehman's bankruptcy. This initial sample consists of 94 firms. After searching their 8-K 10-K, 10-Q reports and removing firms with material financial exposure to Lehman following the procedure outlined in Section IIIA, the final sample consists of 83 firms, 23 of which are also equity underwriting clients.

We use the NYSE's Post and Panel File to identify NYSE firms for which Lehman was the specialist at the time of the bankruptcy. This initial sample consists of 158 firms. After searching their 8-K 10-K, 10-Q reports and removing firms with material financial exposure to Lehman following the procedure outlined in Section IIIA, the final sample consists of 150 firms. Only 13 of these were equity underwriting clients of Lehman. In our sample of Lehman's equity underwriting clients, 103 are listed on the Nasdaq (CRSP exchange code of 3). For these firms, we collected information on Lehman's role as a market maker. We obtained a special file from Nasdaq that contains monthly data on Lehman's status as a registered dealer and the number of shares traded by Lehman as a market maker. In the three month period prior to Lehman's bankruptcy, Lehman was a registered dealer in all 103 stocks. To gauge the

extent of Lehman's market making activity in each stock, we compute Lehman's market making market share as the total number of shares traded by Lehman as a market maker during the three months prior to Lehman's bankruptcy (June, July, and August 2008) divided by the total number of shares traded (from CRSP) during the same period.[18]

We use the Thomson I/B/E/S Detail History database to identify firms that were covered by an analyst from Lehman Brothers just prior to Lehman's bankruptcy.[19] We define a firm as receiving coverage if an analyst from Lehman made at least one earnings forecast in either the firm's current fiscal quarter or last fiscal quarter.[20] This initial sample consists of 659 firms. After searching their 8-K 10-K, 10-Q reports and removing firms with material financial exposure to Lehman following the procedure outlined in Section IIIA, the final sample consists of 627 firms, 121 of which were also equity underwriting clients.

C.   Measures of Investment Bank-Client Relationship Strength and Client Characteristics

In addition to documenting the average price reaction for each of Lehman's client groups in our event study analyses, we also perform cross-sectional regressions for each client group to examine how client losses around Lehman's bankruptcy are related to measures of the strength of the client's relationship to Lehman and to various client characteristics. In particular, if clients with stronger relationships with Lehman Brothers maintained those relationships because they had greater value, then we expect to observe more adverse price reactions among those clients. In this subsection, we briefly describe our measures of relationship strength and the client characteristics we use as independent variables in our regressions.[21]

C.1. Equity Underwriting

We employ several measures of the strength of the investment banking relationships that Lehman had with client firms. For Lehman's equity underwriting clients, our first proxy for relationship strength is the total number of common stock offerings with Lehman during our sample period. The intuitive interpretation is that more offerings with Lehman indicate a stronger relationship. This variable is simply a count of the number of stock offerings for which Lehman served as a lead underwriter and, for a given offering, does not make a distinction between offerings in which Lehman was the only lead underwriter

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[18] Ellis, Michaely, and O'Hara (2002) use this specification to measure the market share of Nasdaq market makers.

[19] Thomson has removed all earnings forecasts made by a Lehman analyst from the August 2009 I/B/E/S data that is available through WRDS. We obtained our I/B/E/S data directly from Thomson, and Thomson generously provided us the data that still contains those observations.

[20] By "current," we mean the fiscal quarter that contains September 15, 2008. By "last," we mean the fiscal quarter just prior to the current fiscal quarter.

[21] For detailed descriptions of all variables in the paper, please see Appendix A.1.

and offerings for which Lehman was one of multiple lead underwriters. It also does not account for the offerings done with other banks (where Lehman was not a lead underwriter). Therefore, it does not capture the extent to which the firm had equity underwriting relationships with other banks. Hence, we also employ a measure that accounts for the client's loyalty to Lehman in common stock deals relative to other banks, which we call Lehman's share of the client's common stock offerings. This variable is defined as the number of a client's offerings underwritten by Lehman divided by the total number of the client's offerings over the prior ten years. Because our aim is to capture the client's degree of exclusivity or loyalty to Lehman relative to other banks, this variable is constructed such that, for offerings with n lead underwriters, Lehman is credited with 1/n share of that offering. This variable ranges between zero and one, where a value of one would indicate that the firm dealt exclusively with Lehman and no other banks in its equity offerings.

As noted previously, Ljungqvist and Wilhelm (2003) and Ljungqvist, Marston, and Wilhelm (2006) conjecture that an investment bank holding an equity stake in the client may serve as a means of "cementing" a relationship. Following Ljungqvist, Marston, and Wilhelm (2006), we use the CDA/Spectrum database on institutional 13f holdings to identify clients in which Lehman held common shares at the time of the bankruptcy. Since Lehman was a large financial institution with multiple subsidiaries that could potentially own shares, we use Lehman's 10-K filing for fiscal year 2007 to identify subsidiaries of Lehman Brothers Holdings Inc. (the ultimate parent company of all Lehman Brothers entities). We then searched the SEC's EDGAR database for 13f filings by Lehman Brothers Holdings Inc (LBHI) and its subsidiaries. We found 13f filings by two Lehman Brothers entities. These include LBHI and Neuberger Berman LLC, part of Lehman's asset management arm.[22] We then collect the holdings data for LBHI and Neuberger Berman from CDA/Spectrum. We construct two variables that measure the proportions of the client firm's outstanding shares owned by LBHI and Neuberger Berman. We regress abnormal returns on these two variables to determine whether clients with larger proportions of shares owned by Lehman Brothers entities were more adversely affected by Lehman's collapse.[23]

We expect firms with greater immediate need for external capital to be more adversely affected by the failure of their equity underwriter. We reason that firms with greater amounts of financial slack should have smaller immediate needs for external financing, and hence, we use measures of financial slack to test this hypothesis. These measures include net market leverage and cash-to-assets. We also reason that financially distressed firms would have a greater need for external equity capital and, hence,

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[22] SEC Rule 13f is set up so that there is no overlap in the holdings reported by subsidiaries and parents or different subsidiaries of the same parent. Parents may file on behalf of subsidiaries, but in the case that a subsidiary files on its own behalf, the holdings reported by the subsidiary are not reported on the 13f filing of the parent and *vice versa*.

[23] The data in CDA/Spectrum are based on quarterly SEC filings. We measure these variables over the prior calendar quarter, which ended June 30, 2008.

we use Altman's Z-score. As additional determinants, we include firm size and age. We expect larger and older firms to have more established reputations in financial markets so that the information production role of an underwriter is less important to them.

Finally, we also include a dummy variable that takes the value of one if the client shelf registered (Rule 415) an equity offering during the two years preceding Lehman's bankruptcy and did not take any of the registered equity off the shelf before September 14, 2008, and zero otherwise. Our intent in using this variable is to capture firms that were likely to be issuing equity in the near future.

C.2. Debt Underwriting, M&A Advisory, NYSE Market Making, and Analyst Coverage

For the remaining transaction-based services (i.e. debt underwriting and M&A advisory) we use relationship strength measures analogous to those used for the equity underwriting clients. For example, for debt underwriting (M&A advisory) clients, we use the number of debt offerings (M&A deals) with Lehman and Lehman's share of the client's debt offerings (M&A deals) during our sample period.

For Lehman's NYSE market making clients, we conjecture that firms with less liquid stock may have been more adversely affected by the collapse of their specialist, so we include two independent variables meant to proxy for liquidity: (1) share turnover, measured over the previous calendar month (August 2008), and (2) the proportion of shares owned by non-Lehman institutions.[24]

For firms receiving analyst coverage from Lehman, we hypothesize that firms with less analyst coverage from other brokers should be more adversely affected by Lehman's collapse. Hence, we use the natural log of the number of non-Lehman analysts[25] as a determinant of the client's stock price reaction. Kelly and Ljungqvist (2007) find that, in the calendar quarter subsequent to a firm losing analyst coverage from a broker, 13f institutions are abnormally large net buyers of the firm's stock, implying that individual investors and smaller institutions are the net sellers. They interpret this result as indicating that individual investors and smaller institutions are more dependent on sell-side analyst research and that a loss of coverage may reduce their valuation and demand for the stock. Hence, among firms receiving analyst coverage from Lehman, we hypothesize that firms with less institutional ownership should be more adversely affected by Lehman's collapse. We test this hypothesis by including the proportion of shares owned by non-Lehman institutions as an independent variable. Finally, we conjecture that smaller and younger firms may tend to have lower quality information environments than larger and older firms.

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[24] The proportion of shares owned by non-Lehman institutions is constructed using data from CDA/Spectrum and is defined as the number of shares owned by institutions required to report holdings under SEC Rule 13f, excluding Lehman Brothers Holdings Inc. and Neuberger Berman LLC, divided by the total number of shares outstanding as of June 2008.

[25] The number of non-Lehman analysts is defined as number of equity analysts in I/B/E/S that were not employed by Lehman during the firm's current fiscal quarter or last fiscal quarter that made at least one earnings forecast during the same period, where the current fiscal quarter contains Sep. 14, 2008.

Therefore, among firms receiving analyst coverage from Lehman, we hypothesize that smaller and younger firms will react more negatively and include firm size and age as determinants of the client's abnormal returns around Lehman's collapse.

D. Estimating Abnormal Returns

We estimate daily abnormal stock returns using the Fama-French-Carhart four-factor model which includes the three factors from Fama and French (1993) and the momentum factor from Carhart (1997):

$$R_{i,t} = \alpha_i + \beta_i R_{M,t} + s_i SMB_t + h_i HML_t + u_i UMD_t + \varepsilon_{i,t} \tag{1}$$

where on Day t, $R_{i,t}$ is the return to firm i, $R_{M,t}$ is the return to the value-weighted CRSP market index, and SMB_t, HML_t, and UMD_t are the returns to the Small-Minus-Big, High-Minus-Low, and Up-Minus-Down portfolios meant to capture size, book-to-market, and return momentum effects, respectively.[26] For each firm in the sample, we estimate the parameters in the four-factor model over a 260-day pre-event period (Day -289 to Day -30). Daily abnormal returns during the event period are calculated in the usual manner by subtracting the expected return implied by the four-factor model from the firm's realized return. While most short-term event studies typically employ a simpler return generating model, such as the market model, we chose the four-factor model as our primary method due to the unusual nature of the event in our study. Lehman's collapse had a system-wide impact, as evidenced by the fact that the market experienced a one-day return of nearly -5% on September 15. In addition, the SMB portfolio gained 1.4%, indicating that larger firms were more adversely affected than smaller firms, the HML portfolio lost over 2%, indicating that value stocks suffered greater losses than growth stocks, and the UMD portfolio gained nearly 3%, indicating that past losers were more adversely affected than past winners. The aim of our study is to isolate the effect of Lehman's collapse on Lehman clients after filtering out systematic effects. Since many of our samples could be considered non-random, especially with respect to size or book-to-market,[27] we consider the four-factor model more robust than the market model because it attempts to control for systematic size, value, and momentum effects, which were significant during our event period. Therefore, using the four-factor model reduces the likelihood that our results may be

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[26] The daily factor returns for the SMB, HML, and UMD portfolios are generously provided on Ken French's website.

[27] For example, our sample of Lehman equity underwriting clients is typical of recent stock issuer samples in that the average market capitalization is lower than the CRSP average and the average and median book-to-market ratios are lower than the CRSP average and median.

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influenced by systematic effects (e.g. a small firm effect).[28] Nonetheless, in some of our analyses we also report abnormal returns estimated with the three-factor model of Fama and French (1993), the market model, and a procedure that matches sample firms under study to reference portfolios of firms with similar market capitalization and book-to-market ratios. See Appendix A.2 for a detailed discussion of this procedure.

Because all firms in our analysis have the same event period in calendar time, some degree of cross-sectional correlation in abnormal returns across firms is expected and conventional test-statistics will be biased if they ignore covariation in returns across stocks in the sample. To account for the event date clustering, we compute t-stats using the "crude dependence adjustment" (CDA) of Brown and Warner (1980, 1985). The standard error[29] used to compute this statistic is based on the time-series standard deviation of daily average abnormal returns from the estimation period, which implicitly accounts for contemporaneous covariation across stocks. A disadvantage of the CDA approach is that it is not robust to variance increases induced by the event under study. This is a concern because Lehman's collapse almost certainly induced volatility. Hence, in most of our event-study analyses we also report t-statistics based on the cross-sectional (CS) standard error of abnormal returns during the event period, which is robust to event induced shifts in volatility in large samples.[30]

IV. Results

A.   The Stock Price Reaction of Lehman's Equity Underwriting Clients to Lehman's Bankruptcy

In Panel A of Table I, we reported abnormal returns of Lehman equity underwriting clients by event day using the Fama-French-Carhart four-factor model. These firms experienced a statistically significant mean four-factor adjusted abnormal return of -1.49% on Day 0.[31] Both the CDA and CS t-statistics for this estimate are significant at the 1% level. In addition, Lehman's equity underwriting clients earned sizable negative abnormal returns on Days -4 and -2, the same days on which Lehman Brothers experienced raw, unadjusted returns of -45% and -42%, respectively. In Panel A of Table IV, we report mean CARs over various event windows for Lehman's equity underwriting clients and clients of banks with industry status similar to that of Lehman, using the four-factor model. Over the longer seven-

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[28] Brav, Geczy, and Gompers (2000) find that equally-weighted portfolios comprised of recent stock issuers (IPOs and SEOs) do not exhibit long-run abnormal underperformance when the Carhart (1997) four-factor model is used to estimate abnormal returns. They conclude that the model sufficiently captures the joint covariation of issuer returns.

[29] We adjust the standard errors to account for the fact that the event-day abnormal returns are prediction errors. See Greene (2003), page 111, for a detailed discussion of this adjustment.

[30] See Brown and Warner (1985) and Boehmer, Musumeci, and Poulsen (1991).

[31] Unless otherwise specified, all statements of statistical significance refer to the 5% level or better in two-tailed tests.

day period (-5,+1) that includes the week just prior to the bankruptcy announcement, Lehman's equity underwriting clients experienced a sharp -4.84% cumulative abnormal return that is highly significant.[32] The mean (0,+1) CAR for this sample is also negative and statistically significant. We find some evidence of a contagion effect, as clients of Lehman's industry peers experienced a smaller (in magnitude) but statistically significant mean four-factor adjusted abnormal return of -0.65% on Day 0. The -0.84% difference in mean abnormal returns on Day 0 between Lehman clients and clients of similar banks is statistically significant, indicating that Lehman's bankruptcy had a relatively more adverse effect on Lehman clients. The same conclusion is drawn when the mean (-5,+1) CARs are compared across the two groups.

**** Insert Table IV about here ****

In Panels B, C, and D, of Table IV we report CARs estimated with the Fama and French (1993) three-factor model, the market model, and a matching procedure in which firms are matched to reference portfolios on the basis of size and book-to-market, respectively. The results based on the Fama-French three-factor model (Panel B) are in complete agreement with those from the Fama-French-Carhart four-factor model. Regarding the reaction of Lehman clients, results based on the market model (Panel C) are weaker than those from the four-factor and three-factor models. The mean market model adjusted abnormal return on Day 0 for Lehman clients is -0.20%, which is statistically indistinguishable from zero based on both the CDA t-statistic and CS t-statistic. However, the (-5,+1) mean CAR for Lehman clients is a sizeable -4.27%, and it is highly significant. In addition, as with the four-factor and three-factor adjusted returns, the differences in mean CARs over the (0,0), (0,+1), and (-5,+1) windows between Lehman clients and clients of similar banks are significantly negative, indicating that Lehman clients suffered significantly greater losses. In Panel D of Table IV, the mean size/book-to-market adjusted abnormal return earned by Lehman clients on Day 0 is a statistically significant -0.97%, indicating that Lehman clients significantly underperformed other firms with similar market capitalization and book-to-market ratios on Day 0. Clients of Lehman's industry peers experienced an insignificant mean size/book-to-market adjusted abnormal return of -0.01% on the same day. In addition, the difference between these two estimates is statistically significant. The same conclusion is drawn when the size/book-to-market adjusted abnormal returns are compared across the two groups using the longer (0,+1) and (-5,+1) windows. In summary, the evidence in Table IV indicates strongly that Lehman's equity underwriting clients responded more negatively to the announcement of Lehman's bankruptcy than did clients of Lehman's industry peers.

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[32] To the extent that there was any anticipation of Lehman's collapse prior to the event windows we study, the abnormal return estimates we document should understate the effect of Lehman's collapse on its clients.

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To investigate the possibility that the abnormal returns discussed above reflect temporary overreactions, in Table IV we report mean CARs over the (+2,+30) window. If the CARs documented above reflect overreaction, we should observe positive return reversals over this post-event period. In Table IV, we find no evidence of a positive return reversal for any of the methodologies, as all the post-event mean CARs remain negative.

To the extent that Lehman's collapse was partially anticipated by the market during the weeks preceding Day -5, the abnormal returns we document should underestimate the value loss experienced by sample firms. To explore the possibility that better estimates of the value loss might be obtained by extending the event windows back further in event time, we examine abnormal returns over the (-30,-6) period.[33] In calendar time, this window begins on August 1, 2008, exactly one and one-half months prior to Lehman's bankruptcy announcement. As reported in Table IV, we find no evidence of significantly negative abnormal returns over this pre-event period. Thus, there is little to be gained by including abnormal returns over the (-30,-6) period in our estimates of the market reaction.

One potential concern with the above analysis is the inclusion of Merrill Lynch and Bank of America clients in our sample of Lehman clients and in the samples of clients of similar banks.[34] On September 14, the day that Lehman announced its bankruptcy filing, Bank of America announced that it intended to acquire Merrill Lynch, and the deal was later approved by shareholders of both banks in December 2008. Since the acquisition announcement could have conveyed value relevant information for the clients of either Merrill Lynch or Bank of America, we repeated all the above analyses after excluding any firms that used either bank as a lead underwriter during our sampling period. Although unreported for brevity, the inferences and conclusions from those analyses are the same as for those reported for the full sample.

B.   *Other Investment Banking Services: Debt Underwriting, M&A Advising, Market Making, and Analyst coverage*

In Table II, we reported descriptive statistics on the incidence of equity underwriting clients receiving other IB services from Lehman. 6.6% (12) of Lehman's equity underwriting clients also employed Lehman as a lead underwriter in a public straight debt offering in the prior ten years, while 2.7% (five) employed Lehman in a convertible debt offering. 12.6% (23) of Lehman's equity underwriting clients received M&A advising services during the prior ten years, while 66.1% (121) were receiving analyst coverage from Lehman just prior to the bankruptcy. Regarding market making, Lehman

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[33] To avoid overlap between the estimation period and the (-30,-6) period, we use a different estimation period that spans Day -319 to Day -60 to compute abnormal returns over the (-30,-6) period.

[34] In our sample of 183 Lehman equity underwriting clients, 50 also used either Merrill Lynch or Bank of America as a lead underwriter on a common stock offering during the ten years prior to Lehman's bankruptcy.

served as the NYSE specialist for only 13 equity underwriting clients. 103 of Lehman's equity underwriting clients were listed on the Nasdaq (CRSP exchange code of 3) at the time of the bankruptcy. Among these firms, Lehman played a modest role as a market maker on average. Lehman's average and median market share as a market maker among these firms are 6.0 and 6.1%, respectively.[35]

In Table V, we report correlations between the extent to which Lehman's equity underwriting clients used Lehman for common stock deals and their use of other services from Lehman. The number of common stock offerings that the equity client conducted with Lehman is positively associated with the incidence of receiving debt underwriting services, indicating that firms that conducted a larger number of common stock deals with Lehman also tended to use Lehman for straight debt deals. Similarly, the number of common stock offerings with Lehman is also positively correlated with the incidence of receiving analyst coverage from Lehman.[36]

**** Insert Table V about here ****

In Table VI, we explore the market reaction of Lehman's other client groups. We report four-factor model adjusted abnormal returns of firms that received debt underwriting services, M&A advising services, NYSE specialist services, and analyst coverage from Lehman. Additionally, we divide each of these groups into two subsamples: (a) firms that also received common stock underwriting services from Lehman (i.e., firms that also appear in the sample of equity underwriting clients) and (b) firms that did not receive common stock underwriting services from Lehman. We report CARs for both subsamples. We conducted these analyses using the different methodologies for estimating abnormal returns employed in Section IVA and arrived at the same basic conclusions. Hence, we only report results from the Fama-French-Carhart four-factor model for brevity. In Panel A of Table VI, we report mean CARs for all 50 firms that employed Lehman as a lead underwriter for a public straight debt offering. We find very weak evidence of a negative reaction among these firms. The (0,+1) mean CAR of -1.14% is statistically significant. However, the Day 0 mean abnormal return of 0.10% is actually positive but insignificant, while the mean (-5,+1) abnormal return of -0.78% is also insignificant. Furthermore, there is no evidence of significantly negative abnormal returns over the (-30,-6) window. Among straight debt clients, 12 were also equity underwriting customers. Consistent with our previous results for equity underwriting, we find evidence of a significant negative reaction among this subsample of debt clients, as the mean CARs over the (0,0), (0,+1), and (-5,+1) windows are -2.08%, -4.07%, and -7.30%, and all three are significant based on the CDA t-stat, although only the (0,+1) and (-5,+1) mean CARs are significant based on the CS t-stat.

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[35] Among Lehman's Nasdaq equity underwriting clients, the minimum value for Lehman's market making share is 0%, and the maximum is 17%.

[36] In Table V, a coefficient is not reported for the correlation between the incidence of using Lehman for straight debt offerings and Lehman's market share as a Nasdaq market maker because none of the 103 firms listed on the Nasdaq used Lehman to underwrite a straight debt offering.

In contrast, the 38 straight debt clients that did not also receive equity underwriting services from Lehman show no evidence of a significant negative reaction to Lehman's collapse. The (-5,+1) and (0,0) mean CARs for this group are actually positive, while the mean (0,+1) CAR of -0.21% is small in magnitude and insignificant. This conflicting finding for the "pure" straight debt client sample suggests that the significantly negative reaction among the 12 debt clients that also received equity underwriting services is likely to be driven by the equity underwriting relationship rather than the debt underwriting relationship. Overall, our event study analysis provides no conclusive evidence that the rupture of straight debt underwriting relationships precipitated by Lehman's collapse adversely affected straight debt underwriting clients.

**** Insert Table VI about here ****

In Panel B of Table VI, we find no evidence of a significantly negative reaction among convertible debt underwriting clients. While the event period abnormal returns for these seven firms tend to be large in magnitude, none are significantly negative. Furthermore, due to the very small number of firms in this sample, it would be difficult to draw any strong conclusions even in the presence of statistically significant returns.

Panel C of Table VI reports the stock price reaction of Lehman's M&A clients. For all 83 firms, there is no evidence of a negative mean stock price reaction, as the mean CARs over the (0,0), (0,+1), and (-5,+1) windows are all positive and insignificant. In addition, splitting this sample according to whether the firm also received equity underwriting services does not yield significantly negative abnormal returns for either subsample. Overall, we find no evidence that the M&A advisory relationship has enduring value for Lehman's M&A clients.

In Panel D of Table VI, we document the stock price reaction of firms for which Lehman was the NYSE specialist. For all 150 firms, there is no evidence of significantly negative abnormal returns over the (0,0), (0,+1), and (-5,+1) windows. Only 13 of these firms were also equity underwriting clients, and there is no evidence of a significant negative reaction among these firms. However, the subsample of 137 firms that were not equity underwriting clients displays a (0,+1) mean CAR of -0.94% which is significant at the 10% level according to the CDA t-statistic and the 5% level based on the CS t-statistic. However, the mean (0,0) and (-5,+1) CARs of -0.28% and 0.13% for this subsample are close to zero and insignificant. We interpret this mixed evidence as too weak to conclude that Lehman's collapse had a significant adverse impact on Lehman's NYSE market making clients.

In Panel E of Table VI, we report CARs for firms that received analyst coverage from Lehman just prior to Lehman's bankruptcy. For all 627 firms, we find no evidence of a negative mean stock price reaction. For the 212 firms that received analyst coverage and equity underwriting services, the mean (0,0) abnormal return of -1.01% is significant at the 10% level according to the CDA t-statistic and the

1% level according to the CS t-statistic. In addition, the mean (-5,+1) CAR of -4.19% is significant for this subsample of firms. However, this finding appears to be driven by the equity underwriting relationship since we find no significant abnormal short-term returns for the 506 firms that did not receive equity underwriting services from Lehman.

C.   *Cross-Sectional Analysis of the Stock Price Reaction of Lehman's Equity Underwriting Clients to Lehman's Bankruptcy*

We have reported strong evidence that, on average, Lehman's equity underwriting clients reacted negatively to Lehman's collapse. In this section, we investigate the cross-sectional determinants of this market reaction using multivariate regressions by regressing the two-day CARs on measures of the strength of the client's relationship with Lehman and on various client characteristics that we discussed previously.

In Table VII, we report the results of our cross-sectional analysis. Since all the firms in the sample have the same event day, we use the portfolio weighted least squares (PWLS) approach of Chandra and Balachandran (1992), which produces unbiased estimates of the regression coefficient standard errors when abnormal returns over the event window are heteroskedastic and correlated across firms.[37] We estimate the PWLS regressions over the period Day -289 to Day +10 using the Fama-French-Carhart four-factor model and a two-day event window (Days 0 and +1).[38]

**** Insert Table VII about here ****

We find consistent evidence that the stock price reaction to Lehman's collapse is significantly and negatively related to the number of stock offerings that the client conducted with Lehman. The coefficient estimates indicate that each additional stock offering conducted with Lehman reduces the client's two-day CAR by roughly 0.86 percentage points. To the extent that multiple offerings with Lehman indicate a stronger relationship, this finding supports the hypothesis that an issuer with a stronger relationship to its underwriter should lose more value when its underwriter fails. In addition, we find that the client's stock price reaction is also negatively related to Lehman's share of the client's common stock offering, although not significantly. Regarding ownership stakes in clients, we find that client abnormal returns are not significantly related to the proportion of the client's shares owned by Lehman Brothers Holdings Inc

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[37] PWLS is the weighted version of the portfolio time-series ordinary least squares (POLS) approach of Sefcik and Thompson (1986). As with weighted least squares (WLS), each observation receives a weight that is inversely proportional to its variance in PWLS, where the variance is estimated using a time-series of residuals from the chosen asset return generating model. We use the time-series of residuals from the four-factor model estimated over the pre-event estimation period (Day -289 to -30) to estimate the variance of each observation.

[38] We also estimated these regressions using the Fama-French three-factor model and the market model. Our conclusions based on those results (unreported for brevity) are qualitatively similar.

(LBHI) or the proportion of shares owned by Neuberger Berman LLC, although the coefficient estimates are negative as expected.

We find evidence that firms with less financial slack responded more negatively to Lehman's collapse. The client's two-day CAR is negatively related to net market leverage at the 10% level in specification (1) and the 5% level in (2). In addition, two-day CARs are positively related to the cash/assets ratio at the 5% level in specification (3). We also find that client abnormal returns are positively related to the client's Z-score at the 1% level in specification (4), indicating that clients that were financially more distressed responded more negatively than clients that were financially more secure. This evidence is consistent with the hypothesis that firms with greater immediate need for external capital should respond more negatively to the failure of their underwriter.

Finally, we find some evidence that the client's stock price reaction is positively related to client size and age. In specifications (1), (3) and (5), the client's two-day CAR is positively related to the natural log of the client's market capitalization of equity at either the 10% or 5% levels. In specifications (4) and (5), the two-day CAR is positively related to the natural log of the client's age at the 10% level. This evidence is consistent with the hypothesis that larger and older equity underwriting clients should be less adversely affected by the failure of their underwriter.

D.   *Cross-Sectional Analysis of the Stock Price Reaction of Lehman's Debt Underwriting, M&A, NYSE Market Making, and Analyst Coverage Clients*

In Table VIII, we investigate the cross-section of abnormal returns earned by Lehman's debt underwriting clients. Because there are only seven convertible debt clients, we pool these firms together with the straight debt underwriting clients and include a dummy to differentiate these firms. We also include a dummy variable to indicate equity underwriting clients in the debt underwriting sample. We do not find that a debt underwriting client's reaction is significantly and negatively related to the number of debt offerings conducted with Lehman. However, in specification (5), we find that the client's reaction is significantly and negatively related to Lehman's share of the client's debt offerings at the 10% level, although this variable's coefficient is not significant at the 10% level in specifications (2) and (6). The convertible debt dummy is negative in all specifications and significant at the 10% level or better in four of out of six specifications. However, as previously discussed, five of Lehman's seven convertible debt underwriting clients were also equity underwriting clients. After controlling for whether the firm was an equity underwriting client, we observe in specification (6) that the convertible debt dummy is not significant, while the equity underwriting dummy is negative and significant. We find that a debt underwriting client's two-day CAR is significantly and negatively related to the proportion of the client's shares owned by Neuberger Berman LLC. Additionally, we find that a debt underwriting client's reaction

is more negative if the firm is financially constrained, as net market leverage is negative and significant in specifications (1) and (2) and cash/assets is positive and significant in specifications (3), (5), and (6). A debt client's reaction is also significantly and positively related to the client's Z-score at the 10% level or better in specifications (4), (5), and (6), which is consistent with financially constrained firms responding more negatively to the failure of their debt underwriter.

**** **Insert Table VIII about here** ****

In Table IX, we perform a cross-sectional analysis of Lehman's M&A clients. We find no evidence that an M&A client's stock price reaction is significantly and negatively related to the number of deals advised by Lehman or Lehman's share of the client's M&A deals. We also do not find an M&A client's reaction to be significantly related to the proportion of shares owned by Lehman entities. The only significant determinant of an M&A client's reaction to Lehman's collapse in Table IX is the client's Z-score. We conjecture that this may not be an effect specific to Lehman's M&A clients, *per se*, but one specific to financially distressed firms in general, since Lehman's collapse occurred at the onset of the 2008-2009 financial crisis and may have signaled generally that it would more difficult for firms to raise external capital in the near future. Furthermore, the equity underwriting dummy is insignificant in this case.

**** **Insert Table IX about here** ****

In Table X, we examine the cross-section of abnormal returns earned by firms for which Lehman served as the specialist on the NYSE. The attrition of the sample size from 150 to 149 is due to one firm with some missing data fields in Compustat needed to construct the independent variables. We find weak evidence that stock market liquidity is a significant determinant of these firms' responses to the collapse of their specialist. The proportion of shares owned by non-Lehman institutions is significantly and positively related to abnormal returns in specifications (3) and (4). If one considers institutional ownership as a proxy for liquidity, then the interpretation is that firms with less liquid stock responded more negatively. Share turnover, however, is not significantly related to abnormal returns. As with equity underwriting clients and M&A clients, the abnormal returns earned by these firms are also significantly and positively related to the firm's Z-score.

**** **Insert Table X about here** ****

In Table XI, we examine the market reaction of firms that received analyst coverage from Lehman just prior to the bankruptcy in a multivariate context. The attrition of the sample size from 627 to 625 in specifications (2) through (5) is due to missing data in some of the data fields in Compustat for two firms. We find no evidence that firms followed by fewer non-Lehman analysts reacted more negatively to Lehman's collapse, as the natural log of the number of non-Lehman analysts is not significant in any of our specifications. However, consistent with Kelly and Ljungqvist (2007), we find that in all

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specifications in which it is included, the proportion of shares owned by non-Lehman institutions is significantly and positively related to the two-day CAR, indicating that firms with high institutional ownership were less adversely affected by Lehman's bankruptcy. In addition, we find some evidence that younger firms were more adversely affected, as the natural log of firm age is positive and significant at the 10% level in specifications (2) through (5). Finally, as with all other client groups, we find in Table XI that the share price reaction of firms that received analyst coverage from Lehman is positively and significantly related to the firm's Z-score.

<center>****** Insert Table XI about here ******</center>

In unreported work we have repeated the analysis in Tables VIII through XI for the corresponding subsamples of firms that did not also receive equity underwriting services from Lehman. Our above findings are substantively unaltered by this subsample analysis.

E. *Pooled Cross-Sectional Analysis of the Stock Price Reaction of Lehman's Equity Underwriting, Debt Underwriting, M&A, NYSE Market Making, and Analyst Coverage Clients*

Finally, in Table XII, we pool the different client groups into one sample that includes all firms that received equity underwriting, debt underwriting, M&A advising, NYSE market making, or analyst coverage services from Lehman. For each client group, we include a dummy variable that takes the value of one if the client received that specific service from Lehman and zero otherwise. We also include as independent variables firm-specific characteristics (size, age, and Z-score) and ownership of the firm's shares by Lehman Brothers Holdings Inc and Neuberger Berman LLC. Our event study analysis suggests that equity underwriting is the principal source of value for clients in investment banking relationships. Our aim is to re-examine that conclusion in a multivariate analysis that disentangles the effects of each type of client-IB relationship. If our conclusion is robust, we would expect to observe a negative and significant coefficient for equity underwriting. In Table XII, this is exactly what we find. The coefficient on the dummy variable that equals one if the firm received equity underwriting services from Lehman and zero otherwise is negative and significant at the 1% level in both specifications (1) and (2). In specification 1, the coefficient on the dummy variable for straight debt underwriting is negative and significant at the 10% level, although it is not in specification (2), which controls for firm characteristics. The coefficients on the convertible debt dummy and the NYSE market making dummy are small in magnitude and insignificant. The coefficients on the M&A dummy and analyst coverage dummy are both positive and significant at the 10% level or better, indicating that those client groups were least affected by the Lehman's collapse. These results buttress our previously discussed event study results and the conclusion that equity underwriting is the principal source of value for clients in investment banking relationships.

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**** Insert Table XII about here ****

V. Conclusions

The unexpected catastrophic collapse of Lehman Brothers provides a unique natural experiment to find answers to two key questions in the corporate finance and banking literatures: (1) Are investment banking relationships valuable for client firms and, if so, (2) what are the value drivers of these relationships? We examine the impact that the Lehman Brothers collapse had on different categories of Lehman's publicly traded clients by studying how their stock prices reacted to the collapse. We find that companies that used Lehman as lead underwriter for one or more equity offerings during the 10 years leading up to September 2008 suffered economically and statistically significant negative abnormal returns when Lehman Brothers declared bankruptcy. These losses were significantly larger than those for firms that were equity underwriting clients of other large investment banks, and were especially severe for companies that were smaller, younger, more financially constrained, and had undertaken a larger number of equity offerings in the past 10 years with Lehman as lead underwriter. No other client groups were significantly adversely affected by Lehman's collapse. These results show that Lehman's collapse did, in fact, impose material losses on its customers, but for the most part these losses were confined to those companies which employed Lehman for equity underwriting. Based on Fama-French-Carhart four-factor model adjusted abnormal returns, the 183 equity underwriting clients that we studied lost 4.84% of their market value, on average, over a seven-day period spanning the five trading days prior to and the first and second trading days immediately following Lehman's bankruptcy, amounting to approximately \$23 billion in lost market capitalization. Intriguingly, this nearly equals Lehman's April 1, 2008 market value of \$24 billion that was lost due to the collapse.

Our findings offer considerable new insights on whether and how long-term intermediary-client relationships create value for clients. While past studies have examined some aspects of these questions, this is the first study, to our knowledge, that attempts to isolate the value of the underwriter relationship to client firms. Notwithstanding the view that the market for investment banking services has become less relationship-based [39] and the findings in recent studies that client firms routinely switch underwriters,[40] our findings show conclusively that the value of long-term firm-underwriter relationships continues to persist.

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[39] See, for example, Hayes, Spence, and Marks (1983), and Eccles and Crane (1988).

[40] See, for example, Krigman, Shaw and Womack (2001) and Fernando, Gatchev and Spindt (2005).

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Table I. Events Surrounding Lehman's Bankruptcy and Abnormal Returns

The sample of "Lehman Equity Underwriting Clients" consists of 183 industrial (non-financial, non-utility) firms that used Lehman Brothers as a lead underwriter for at least one public common stock offering during the September 14, 1998 to September 14, 2008 period. Daily abnormal returns (ARs) and cumulative abnormal returns (CARs) are calculated using the Fama-French-Carhart four-factor model and a 260-day estimation period (Day -289 to Day -30). The "CDA t-stat" is based on the "crude dependence adjustment" of Brown and Warner (1980, 1985) in which the time series of daily average abnormal returns over the estimation period is used to compute the standard error. The "CS t-stat" is computed using the cross-sectional standard error of abnormal returns over the event period. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels respectively in a two-tailed t-test.

Panel A: News and Abnormal Returns by Day

| Date | Event Day | Lehman Brothers | | | Lehman Equity Underwriting Clients (N=183) | | | News |
		Closing Stock Price	Daily Raw Return	Daily AR	Mean Daily AR	CDA t-stat	CS t-stat	
Aug. 29	-10	$16.09	1.4%	3.5%	0.13%	0.33	0.71	
Sep.2	-9	$16.13	0.3%	-2.5%	-0.43%	-1.05	-1.18	Korea Development Bank (KDB) CEO, Min Euoo-Sung, confirmed rumors that KDB was considering a potential investment in Lehman.
Sep 3	-8	$16.94	5.0%	2.9%	0.02%	0.05	0.08	
Sep. 4	-7	$15.17	-10.5%	-0.6%	-0.36%	-0.87	-1.51	
Sep. 5	-6	$16.2	6.8%	3.5%	0.03%	0.08	0.13	
Sep. 8	-5	$14.15	-12.7%	-21.0%	-0.62%	-1.49	-1.48	
Sep. 9	-4	$7.79	-45.0%	-34.0%	-1.33%	-3.18***	-4.09***	Dow Jones Newswire reported that KDB put talks with Lehman on hold. (2) S&P put Lehman's credit rating on negative "watch."
Sep. 10	-3	$7.25	-6.9%	-4.2%	-0.19%	-0.45	-0.73	(1) Lehman announced an expected $3.9 billion loss and plans to sell a majority stake in its investment management division, spin off real estate assets, and cut its dividend. (2) Moody's put Lehman's credit rating on "watch", saying it would be downgraded unless Lehman could negotiate "a strategic transaction with a stronger financial partner"
Sep. 11	-2	$4.22	-41.8%	-43.8%	-0.68%	-1.66*	-2.69***	The Wall Street Journal reported that Lehman spent the day shopping itself to potential buyers, including Bank of America.
Sep. 12	-1	$3.65	-13.5%	-12.6%	0.03%	0.08	0.12	

Table I (continued)

Table I (continued)

Panel A (continued): News and Abnormal Returns by Day

| Date | Event Day | Lehman Brothers | | | Lehman Equity Underwriting Clients (N=183) | | | News |
		Closing Stock Price	Daily Raw Return	Daily AR	Mean Daily AR	CDA t-stat	CS t-stat	
Sep. 13	--	--	--	--	--	--	--	(1) Timothy Geithner, president of the New York Fed at the time, called a special meeting to discuss Lehman's future and a possible emergency asset liquidation. (2) Lehman reported that it had been talking with Bank of America and Barclays for the company's possible sale.
Sep. 14	--	--	--	--	--	--	--	Lehman announced that the company would file for Chapter 11 bankruptcy protection.
Sep. 15	0	$0.21	-94.3%	-75.9%	-1.49%	-3.44***	-3.90***	First day of trading after Lehman bankruptcy announcement.
Sep. 16	+1	$0.3	42.9%	39.7%	-0.56%	-1.34	-1.25	Barclays announced that it had agreed to purchase, subject to regulatory approval, Lehman's New York headquarters and North American investment banking and capital markets businesses.
Sep. 17	+2	$0.13	-56.7%	-41.6%	-1.09%	-2.57**	-2.08**	Lehman's stock delisted from the NYSE at market close.
Sep. 18	+3	--	--	--	0.42%	0.93	0.74	
Sep. 19	+4	--	--	--	2.58%	5.70***	3.95***	

Panel B: Cumulative Abnormal Returns (CAR)

| Event Window | Lehman Brothers | | Lehman Equity Underwriting Clients (N=183) | | |
	CAR	CDA t-stat	CAR	CDA t-stat	CS t-stat
(-5,-1)	-115.6%	-13.86***	-2.78%	-3.02***	-4.02***
(0,0)	-75.9%	-20.34***	-1.49%	-3.44***	-3.90***
(0,+1)	-36.2%	-6.85***	-2.05%	-3.41***	-3.51***
(-5,+1)	-151.77%	-15.38***	-4.84%	-4.39***	-5.00***

Table II. Summary Statistics for Lehman's Equity Underwriting Clients

The sample consists of 183 industrial (non-financial, non-utility) firms that used Lehman Brothers as a lead underwriter for at least one public common stock offering during the period September 14, 1998 to September 14, 2008. Variable definitions are in Appendix A.1.

Variable	Mean	Std. Dev	25th Percentile	Median	75th Percentile	N
# of common stock offerings with Lehman	1.486	0.857	1.000	1.000	2.000	183
Total common stock offerings	2.164	1.514	1.000	2.000	3.000	183
Common stock proceeds raised with Lehman	186	249	56	104	205	183
Total common stock proceeds	479	665	130	265	567	183
Lehman's share of client's common stock offerings	0.506	0.274	0.313	0.500	0.600	183
Lehman's share of client's common stock proceeds	0.498	0.281	0.272	0.500	0.524	183
Exclusive Lehman equity underwriting client	0.180	0.386	0.000	0.000	0.000	183
Lehman straight debt underwriting client	0.066	0.248	0.000	0.000	0.000	183
Lehman convertible debt underwriting client	0.027	0.163	0.000	0.000	0.000	183
Lehman M&A client	0.126	0.332	0.000	0.000	0.000	183
Lehman analyst coverage	0.661	0.475	0.000	1.000	1.000	183
Lehman NYSE specialist	0.071	0.258	0.000	0.000	0.000	183
Lehman's market share as a Nasdaq market maker	0.060	0.027	0.043	0.061	0.075	103
Recent IPO underwritten by Lehman	0.481	0.501	0.000	0.000	1.000	183
Proportion of outstanding shares owned by Lehman Brothers Holdings, Inc.	0.004	0.020	0.000	0.001	0.002	183
Proportion of outstanding shares owned by Neuberger Berman, LLC	0.006	0.020	0.000	0.000	0.000	183
Equity shelf registration dummy	0.087	0.283	0.000	0.000	0.000	183
Age	12.230	12.825	4.000	9.000	15.000	183
Z-score	4.843	9.754	1.107	2.342	4.671	183
Market cap	2597	6419	362	1064	2159	183
Book-to-market	0.429	0.280	0.218	0.384	0.560	167
Net Market Leverage	0.064	0.255	-0.117	0.076	0.254	183
Cash / Assets	0.271	0.291	0.035	0.134	0.470	183

Table III. 2007 Underwriting Market Share of Lehman Brothers and IBs with Similar Industry Status

The table reports the updated (2005-2007) Carter-Manaster rankings and the total proceeds underwritten in public common stock, public straight debt, and public convertible debt offered in the U.S. during January 1, 2007 to December 31, 2007 by Lehman Brothers and by banks with similar industry status. The "IBs with Industry Status Similar to that of Lehman" are the ten banks that were closest (based on difference in percentage points) to Lehman in 2007 U.S. common stock underwriting market share, subject to the constraint that the bank survived to September 14, 2008 and has an updated Carter-Manaster ranking that is no more than one point higher or one point lower than that of Lehman. "Public Common Stock," "Public Straight Debt," and "Public Convertible Debt" figures include offerings in SDC for which the lead underwriter(s) can be identified. Private placements and Rule 144A offerings are not included. Public Common Stock excludes offerings by closed-end funds and real estate investment trusts. Offering proceeds are credited to lead underwriter(s). Joint lead underwriters are credited with a $1/n$ share of the proceeds, where n is the number of lead underwriters in the offering. Rank is based on the bank's 2007 proceeds relative to all other underwriters in SDC. Market share is the bank's proceeds divided by total 2007 proceeds underwritten by all underwriters in SDC.

Lead Manager	Carter-Manaster Ranking	Public Common Stock			Public Straight Debt			Public Convertible Debt		
		Proceeds ($Mil)	Rank	Market Share	Proceeds ($Mil)	Rank	Market Share	Proceeds ($Mil)	Rank	Market Share
Lehman Brothers	8	11,481	5	9.1	84,363	7	6.8	2,907	4	11.1
IBs with Industry Status Similar to that of Lehman										
Merrill Lynch	9	15,262	1	12.1	97,142	4	7.8	1,233	9	4.7
Morgan Stanley	9	14,983	2	11.9	88,299	5	7.1	750	12	2.9
Goldman Sachs	9	13,500	3	10.7	114,238	3	9.2	3,237	3	12.4
JP Morgan	9	12,965	4	10.3	145,274	2	11.7	3,472	2	13.3
Citi	9	10,163	6	8.1	146,414	1	11.8	6,701	1	25.6
UBS	8	9,819	7	7.8	48,779	11	3.9	1,247	8	4.8
Credit Suisse	9	9,714	8	7.7	37,059	12	3.0	1,703	7	6.5
Deutsche Bank	9	5,369	9	4.3	83,572	8	6.8	2,494	5	9.5
Bank of America	8	3,865	10	3.1	84,839	6	6.9	1,138	10	4.3
Wachovia	7	2,277	12	1.8	49,419	10	4.0	817	11	3.1

Table IV. The Stock Price Reaction of Lehman's Equity Underwriting Clients to Lehman's Bankruptcy

The "Clients of Lehman Brothers" sample consist of 183 industrial (non-financial, non-utility) firms that employed Lehman as a lead underwriter for at least one public common stock offering during September 14, 1998 to September 14, 2008. "IBs with Industry Status Similar to that of Lehman" are listed in Table III. The "Clients of IBs with Industry Status Similar to that of Lehman" consists of 944 industrial firms that did not employ Lehman but employed at least one of these ten banks for at least one public common stock offering during September 14, 1998 to September 14, 2008. Model parameters for the (-30,-6) window are estimated over the (-319,-60) period. Model parameters for all other windows are estimated over the (-289,-30) period. For mean CARs, the "CDA t-stat" is based on the "crude dependence adjustment" of Brown and Warner (1980, 1985) in which the time series of daily average abnormal returns over the estimation period is used to compute the standard error. The "CS t-stat" is computed using the cross-sectional standard error of abnormal returns over the event period. For differences in means, the "CDA t-stat" is computed using the time series of daily differences in average abnormal returns over the estimation period, and the "CS t-stat" uses the cross-sectional standard errors and assumes unequal variances and independence within and across the two samples. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels respectively in two-tailed t-tests.

Event Window	Clients of Lehman Brothers (N=183) (1) Mean CAR	CDA t-stat	CS t-stat	Clients of IBs with Industry Status Similar to that of Lehman (N=944) (2) Mean CAR	CDA t-stat	CS t-stat	Difference in Means (1) - (2)	CDA t-stat	CS t-stat
Panel A: Fama-French-Carhart Four-Factor Model Adjusted Abnormal Returns									
(-30,-6)	0.55%	0.28	0.33	-0.14%	-0.11	0.64	0.69%	0.46	0.08
(-5,+1)	-4.84%	-4.39***	-5.00***	-1.89%	-2.64***	-5.02***	-2.95%	-3.53***	-2.84***
(0,0)	-1.49%	-3.44***	-3.90***	-0.65%	-2.30**	-3.91***	-0.84%	-2.57**	-2.03**
(0,+1)	-2.05%	-3.41***	-3.51***	-0.91%	-2.33**	-4.30***	-1.14%	-2.49**	-1.83*
(+2,+30)	-7.24%	-3.09***	-3.27***	-4.37%	-2.87***	-4.40***	-2.87%	-1.61	-1.16
Panel B: Fama-French Three-Factor Model Adjusted Abnormal Returns									
(-30,-6)	0.67%	0.34	0.39	-0.05%	-0.04	0.93	0.72%	0.48	0.04
(-5,+1)	-5.08%	-4.61***	-5.52***	-2.19%	-3.01***	-6.22***	-2.89%	-3.48***	-2.93***
(0,0)	-1.47%	-3.40***	-3.79***	-0.62%	-2.16**	-3.71***	-0.85%	-2.60**	-2.02**
(0,+1)	-2.16%	-3.58***	-3.82***	-1.04%	-2.62**	-5.07***	-1.12%	-2.46**	-1.86*
(+2,+30)	-6.89%	-2.93***	-2.96***	-3.85%	-2.48**	-3.79***	-3.03%	-1.71*	-1.18
Panel C: Market Model Adjusted Abnormal Returns									
(-30,-6)	2.24%	0.91	1.32	2.89%	1.34	4.81***	-0.65%	-0.44	-0.49
(-5,+1)	-4.27%	-3.01***	-4.59***	-1.23%	-0.97	-3.43***	-3.04%	-3.63***	-3.05***
(0,0)	-0.20%	-0.36	-0.51	0.69%	1.41	4.35***	-0.89%	-2.76***	-2.13**
(0,+1)	-0.83%	-1.08	-1.42	0.46%	0.67	2.18**	-1.29%	-2.87***	-2.08**
(+2,+30)	-11.72%	-3.98***	-5.21***	-9.50%	-3.60**	-9.75***	-2.22%	-1.28	-0.86
Panel D: Size/Book-to-Market Adjusted Abnormal Returns									
(-30,-6)	-0.93%	-0.50	-0.57	-0.63%	-0.59	-1.05	-0.30%	-0.19	-0.17
(-5,+1)	-4.16%	-4.12***	-4.43***	-0.93%	-1.57	-2.65***	-3.23%	-3.66***	-3.22***
(0,0)	-0.97%	-2.53**	-2.51**	-0.01%	-0.05	-0.07	-0.95%	-2.87***	-2.28**
(0,+1)	-1.50%	-2.78***	-2.50**	-0.06%	-0.18	-0.27	-1.44%	-3.07***	-2.27**
(+2,+30)	-5.13%	-2.50**	-2.23**	-3.91%	-3.22***	-3.92***	-1.23%	-0.68	-0.47

Table V. Correlations Conditional on being a Lehman Equity Underwriting Client

The sample consists of 183 industrial (non-financial, non-utility) firms that used Lehman Brothers as a lead underwriter for at least one public common stock offering during September 14, 1998 to September 14, 2008. All variable definitions are in Appendix A.1. P-values are reported in parentheses below Pearson correlation coefficients. *, **, and *** indicates statistical significance at the 10%, 5%, and 1% levels respectively in two-tailed tests.

	# of common stock offerings with Lehman	Lehman's share of client's common stock offerings	Lehman straight debt under-writing client	Lehman convert-ible debt under-writing client	Lehman M&A client	Lehman analyst coverage	Lehman NYSE specialist
Lehman's share of client's common stock offerings	0.04 (0.602)	--					
Lehman straight debt underwriting client	0.24*** (0.001)	0.04 (0.603)	--				
Lehman convertible debt underwriting client	-0.02 (0.820)	-0.04 (0.584)	0.09 (0.220)	--			
Lehman M&A client	0.07 (0.322)	0.13* (0.074)	0.17** (0.025)	0.04 (0.614)	--		
Lehman analyst coverage	0.19*** (0.010)	0.04 (0.627)	0.05 (0.504)	-0.09 (0.213)	0.06 (0.401)	--	
Lehman NYSE specialist	-0.08 (0.266)	-0.04 (0.571)	0.01 (0.865)	-0.05 (0.533)	0.22*** (0.003)	0.06 (0.396)	--
Lehman's market share as a Nasdaq market maker	0.05 (0.630)	-0.20** (0.040)	--	0.09 (0.340)	0.17* (0.093)	0.18* (0.069)	--

Table VI. The Stock Price Reaction of Lehman's Debt Underwriting Clients, M&A Clients, Firms for which Lehman served as the NYSE Specialist, and Firms that Received Analyst Coverage from Lehman

In Panel A, the sample consists of 50 industrial (non-financial, non-utility) firms that used Lehman as a lead underwriter for at least one public straight debt offering during September 14, 1998 to September 14, 2008. In Panel B, the sample consists of 10 industrial firms that used Lehman as a lead underwriter for at least one public convertible debt offering during the same period. In Panel C, the sample consists of 94 industrial firms that used Lehman as a financial advisor on a completed acquisition announced during the same time period. In Panel D, the sample consists of 158 industrial firms listed on the NYSE for which Lehman was the NYSE specialist at the time of Lehman's bankruptcy. In Panel E, the sample consists of 659 industrial firms for which an analyst from Lehman made at least one earnings forecast during the firm's current fiscal quarter or last fiscal quarter. The "Equity Underwriting" samples consist of firms that also received equity underwriting services from Lehman. Day 0 is September 15, 2008. Abnormal returns are estimated using the Fama-French-Carhart four-factor model. Model parameters for the (-30,-6) window are estimated over the (-319,-60) period. Model parameters for all other windows are estimated over the (-289,-30) period.. The "CDA t-stat" is based on the "crude dependence adjustment" of Brown and Warner (1980, 1985). The "CS t-stat" is computed using the cross-sectional standard error of abnormal returns over the event period.*, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels respectively in two-tailed tests.

Event Window	Mean CAR	CDA t-stat	CS t-stat	Mean CAR	CDA t-stat	CS t-stat	Mean CAR	CDA t-stat	CS t-stat
Panel A: Lehman Public Straight Debt Underwriting Clients									
	All (N=50)			Equity Underwriting (N=12)			No Equity Underwriting (N=38)		
(-30,-6)	2.64%	0.34	1.14	-3.97%	-1.10	-1.27	3.49%	2.04**	2.18**
(-5,+1)	-0.78%	-0.80	-0.68	-7.30%	-3.05***	-2.54**	1.28%	1.29	1.27
(0,0)	0.10%	0.27	0.22	-2.08%	-2.21**	-1.71	0.79%	2.04**	1.84*
(0,+1)	-1.14%	-2.12**	-1.99*	-4.07%	-3.11***	-2.66**	-0.21%	-0.39	-0.42
(+2,+30)	-7.95%	-3.80***	-2.50**	-20.73%	-4.07***	-2.31	-3.91%	-1.86*	-1.36
Panel B: Lehman Public Convertible Debt Underwriting Clients									
	All (N=7)			Equity Underwriting (N=5)			No Equity Underwriting (N=2)		
(-30,-6)	1.70%	1.05	0.55	-3.97%	-1.10	0.38	2.97%	0.17	0.41
(-5,+1)	-5.24%	-1.11	-1.31	-7.19%	-1.36	-1.37	-0.37%	-0.04	-0.07
(0,0)	-2.95%	-1.59	-1.64	-2.26%	-1.09	-0.92	-4.70%	-1.30	-2.30
(0,+1)	-1.13%	-0.44	-0.64	-0.65%	-0.22	-0.27	-2.34%	-0.47	-1.20
(+2,+30)	-12.46%	-1.24	-1.54	-9.66%	-0.86	-0.84	-19.46%	-0.99	-10.31*
Panel C: Lehman M&A Clients									
	All (N=83)			Equity Underwriting (N=23)			No Equity Underwriting (N=60)		
(-30,-6)	3.22%	1.94*	2.10**	5.26%	2.02**	1.82*	2.50%	0.32	0.41
(-5,+1)	1.45%	1.55	0.98	0.80%	0.57	0.38	1.70%	1.56	-0.07
(0,0)	0.49%	1.33	0.42	-0.92%	-1.65	-1.12	1.03%	2.40**	-2.30
(0,+1)	0.57%	1.11	0.48	-0.22%	-0.28	-0.20	0.87%	1.46	-1.20
(+2,+30)	-8.38%	-4.19***	-3.03***	-9.23%	-3.08***	-1.93*	-8.05%	-3.46***	-10.31*
Panel D: Lehman is the NYSE Specialist									
	All (N=150)			Equity Underwriting (N=13)			No Equity Underwriting (N=137)		
(-30,-6)	-0.89%	-0.57	-0.60	3.23%	0.72	0.57	-1.28%	-0.81	-0.84
(-5,+1)	-0.01%	-0.01	-0.01	-1.42%	-0.55	-0.33	0.13%	0.14	0.16
(0,0)	-0.09%	-0.25	-0.28	1.94%	1.89*	1.78*	-0.28%	-0.77	-0.84
(0,+1)	-0.69%	-1.37	-1.64	1.94%	1.36	2.45**	-0.94%	-1.84*	-2.10**
(+2,+30)	-7.65%	-3.93***	-3.39***	-17.88%	-3.23	-2.26**	-6.76%	-3.41	-2.88***

Table VI (continued)

Panel E: Firms Receiving Analyst Coverage from Lehman								
	All (N=627)			Equity Underwriting (N=121)			No Equity Underwriting (N=506)		
(-30,-6)	1.97%	1.59	3.46***	2.33%	0.99	1.26	1.88%	1.55	3.43***
(-5,+1)	-0.41%	-0.60	-1.06	-4.19%	-3.20**	-3.64***	0.49%	0.73	1.28
(0,0)	-0.12%	-0.46	-0.76	-1.01%	-1.97*	-2.75***	0.09%	0.33	0.47
(0,+1)	-0.16%	-0.43	-0.74	-0.53%	-0.74	-0.95	-0.07%	-0.20	-0.31
(+2,+30)	-5.22%	-3.61***	-4.94***	-6.03%	-2.17**	-2.27**	-5.04%	-3.49***	-4.39***

Table VII. Cross- Sectional Analysis of Lehman Equity Underwriting Clients' Stock Price Reaction to Lehman's Bankruptcy

The sample consists of 183 industrial (non-financial, non-utility) firms that used Lehman Brothers as a lead underwriter for at least one public common stock offering during September 14, 1998 to September 14, 2008. All regressions are estimated using the portfolio weighted least squares (PWLS) approach of Chandra and Balachandran (1992) over Day-289 to Day +10 using a two-day event period (Day 0 and Day +1) and the Fama-French-Carhart four-factor model. Day 0 is September 15, 2008. The reported coefficients represent the marginal effect of the independent variable on the client's two-day percentage CAR. All variable definitions are in Appendix A.1. All t-stats are reported in parentheses below estimated coefficients. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels respectively in two-tailed tests.

	(1)	(2)	(3)	(4)	(5)
# of common stock offerings with Lehman	-0.860*** (-3.22)		-0.863*** (-3.21)	-0.859*** (-3.20)	-0.824*** (-3.03)
Lehman's share of client's common stock offerings		-0.897 (-0.88)			-0.796 (-0.76)
Proportion of outstanding shares owned by Lehman Brothers Holdings Inc	-24.442 (-1.54)	-25.817 (-1.63)	-24.873 (-1.57)	-24.077 (-1.52)	-25.278 (-1.59)
Proportion of outstanding shares owned by Neuberger Berman LLC	-8.516 (-0.54)	-9.117 (-0.56)	-1.596 (-0.10)	-6.133 (-0.39)	0.331 (0.02)
Equity shelf registration dummy	1.268 (0.99)	1.384 (1.10)	1.407 (1.10)	1.318 (1.03)	1.382 (1.09)
Ln(age)	0.420 (1.15)	0.548 (1.50)	0.553 (1.53)	0.651* (1.79)	0.715* (1.92)
Ln(market cap)	0.504* (1.95)	0.383 (1.48)	0.591** (2.27)	0.275 (1.12)	0.442* (1.65)
Net Market Leverage	-3.056* (-1.92)	-3.771** (-2.29)			0.590 (0.25)
Cash / Assets			4.309** (2.44)		3.789 (1.40)
Z-score				0.097** (2.53)	0.065 (1.54)
Intercept	-4.732** (-2.59)	-4.969** (-2.45)	-6.889*** (-3.40)	-4.370** (-2.37)	-6.099*** (-2.72)
# Firms	183	183	183	183	183

Table VIII. Cross-Sectional Analysis of Lehman Debt Underwriting Clients' Stock Price Reaction to Lehman's Bankruptcy

The sample consists of 56 industrial (non-financial, non-utility) firms that used Lehman Brothers as a lead underwriter for at least one public debt (straight or convertible) offering during September 14, 1998 to September 14, 2008. All regressions are estimated using the portfolio weighted least squares (PWLS) approach of Chandra and Balachandran (1992) over Day-289 to Day +10 using a two-day event period (Day 0 and Day +1) and the Fama-French-Carhart four-factor model. Day 0 is September 15, 2008. The reported coefficients represent the marginal effect of the independent variable on the client's two-day percentage CAR. All variable definitions are in Appendix A.1. All t-stats are reported in parentheses below estimated coefficients. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels respectively in two-tailed tests.

	(1)	(2)	(3)	(4)	(5)	(6)
# of debt offerings with Lehman	0.107		0.114	0.086	0.082	0.149
	(1.03)		(1.10)	(0.83)	(0.79)	(1.40)
Lehman's share of client's debt offerings		-2.840			-5.050*	-4.034
		(-1.08)			(-1.84)	(-1.48)
Lehman convertible debt underwriting client	-6.959**	-6.368**	-10.623***	-3.320	-6.597*	-5.154
	(-2.31)	(-2.14)	(-3.01)	(-1.04)	(-1.89)	(-1.51)
Proportion of outstanding shares owned by Lehman Brothers Holdings Inc	-25.856	-14.584	-35.089	-15.281	-4.422	4.555
	(-0.97)	(-0.52)	(-1.33)	(-0.57)	(-0.16)	(0.16)
Proportion of outstanding shares owned by Neuberger Berman LLC	-68.535**	-71.790**	-72.854**	-63.234**	-60.281**	-60.794**
	(-2.40)	(-2.53)	(-2.55)	(-2.24)	(-2.17)	(-2.18)
Debt shelf registration dummy	-1.754	-1.782	-1.052	-1.269	-1.448	1.019
	(-0.84)	(-0.82)	(-0.50)	(-0.61)	(-0.65)	(0.48)
Ln(age)	0.776	0.766	0.864	0.471	-0.053	0.121
	(1.29)	(1.29)	(1.47)	(0.77)	(-0.09)	(0.20)
Ln(market cap)	0.228	0.224	0.324	0.368	0.307	-0.472
	(0.62)	(0.58)	(0.86)	(1.03)	(0.74)	(-1.16)
Net Market Leverage	-9.648**	-10.783***			3.166	6.103
	(-2.52)	(-2.80)			(0.52)	(0.95)
Cash / Assets			15.470**		23.539***	20.303**
			(2.49)		(2.62)	(2.37)
Z-score				0.836**	1.357**	0.898*
				(2.14)	(2.42)	(1.70)
Lehman equity underwriting client						-7.585***
						(-3.77)
Intercept	-3.044	-1.760	-6.646*	-7.424**	-6.967	1.855
	(-0.79)	(-0.40)	(-1.80)	(-2.07)	(-1.33)	(0.38)
# Firms	56	56	56	56	56	56

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Table IX. Cross-Sectional Analysis of Lehman M&A Clients' Stock Price Reaction to Lehman's Bankruptcy

The sample consists of 83 industrial (non-financial, non-utility) firms that employed Lehman as a financial advisor in a completed acquisition of a U.S. target announced during September 14, 1998 to September 14, 2008..All regressions are estimated using the portfolio weighted least squares (PWLS) approach of Chandra and Balachandran (1992) over Day-289 to Day +10 using a two-day event period (Day 0 and Day +1) and the Fama-French-Carhart four-factor model. Day 0 is September 15, 2008. The reported coefficients represent the marginal effect of the independent variable on the client's two-day percentage CAR. All variable definitions are in Appendix A.1. All t-stats are reported in parentheses below estimated coefficients. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels respectively in two-tailed tests.

	(1)	(2)	(3)	(4)
# of M&A deals with Lehman	-0.182		-0.188	-0.205
	(-1.11)		(-1.01)	(-1.02)
Lehman's share of client's M&A deals		-0.312	0.102	0.152
		(-0.30)	(0.09)	(0.13)
Proportion of outstanding shares owned by Lehman Brothers Holdings Inc	83.535	60.755	83.418	81.453
	(0.65)	(0.48)	(0.65)	(0.64)
Proportion of outstanding shares owned by Neuberger Berman LLC	-63.394	-77.420	-61.920	-66.157
	(-1.14)	(-1.35)	(-1.00)	(-1.07)
Pending M&A deal with Lehman	0.559	0.534	0.576	0.587
	(0.30)	(0.28)	(0.30)	(0.31)
Ln(age)	0.346	0.401	0.350	0.372
	(0.74)	(0.86)	(0.74)	(0.77)
Ln(market cap)	-0.226	-0.283	-0.221	-0.208
	(-1.00)	(-1.25)	(-0.94)	(-0.86)
Z-score	0.204*	0.226**	0.202*	0.200*
	(1.88)	(2.00)	(1.72)	(1.70)
Lehman equity underwriting client				0.258
				(0.31)
Intercept	1.035	1.248	0.935	0.720
	(0.62)	(0.60)	(0.44)	(0.31)
# Firms	83	83	83	83

Table X. Cross-Sectional Analysis of Lehman NYSE Market Making Clients' Stock Price Reaction to Lehman's Bankruptcy

The sample consists of 149 industrial (non-financial, non-utility) firms listed on the NYSE for which Lehman was the NYSE specialist at the time of Lehman's bankruptcy announcement. All regressions are estimated using the portfolio weighted least squares (PWLS) approach of Chandra and Balachandran (1992) over Day-289 to Day +10 using a two-day event period (Day 0 and Day +1) and the Fama-French-Carhart four-factor model. Day 0 is September 15, 2008. The reported coefficients represent the marginal effect of the independent variable on the client's two-day percentage CAR. All variable definitions are in Appendix A.1. All t-stats are reported in parentheses below estimated coefficients. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels respectively in two-tailed tests.

	(1)	(2)	(3)	(4)
Share turnover	-1.527		-3.156	-2.900
	(-0.59)		(-1.14)	(-1.04)
Proportion of outstanding shares owned by non-Lehman institutions		1.805	3.119**	2.995**
		(1.16)	(2.07)	(1.99)
Proportion of outstanding shares owned by Lehman Brothers Holdings Inc	-3.867	-14.954	-18.283	-8.182
	(-0.06)	(-0.21)	(-0.26)	(-0.12)
Proportion of outstanding shares owned by Neuberger Berman LLC	16.970	16.132	15.722	12.764
	(1.55)	(1.47)	(1.44)	(1.17)
Ln(age)	0.065	0.098	0.073	0.166
	(0.20)	(0.30)	(0.22)	(0.50)
Ln(market cap)	0.265	0.278	0.252	0.224
	(1.31)	(1.35)	(1.25)	(1.10)
Z-score	0.217*	0.232**	0.271**	0.286**
	(1.91)	(1.97)	(2.25)	(2.36)
Lehman equity underwriting client				1.687*
				(1.78)
Intercept	-3.446**	-5.431***	-5.556***	-5.754***
	(-1.98)	(-2.60)	(-2.66)	(-2.76)
# Firms	149	149	149	149

Table XI. Cross-Sectional Analysis of Firms' Receiving Analysts Coverage Stock Price Reaction to Lehman's Bankruptcy

The sample consists of 627 industrial (non-financial, non-utility) firms for which an analyst from Lehman made at least one earnings forecast during the firm's current fiscal quarter or last fiscal quarter. All regressions are estimated using the portfolio weighted least squares (PWLS) approach of Chandra and Balachandran (1992) over Day-289 to Day +10 using a two-day event period (Day 0 and Day +1) and the Fama-French-Carhart four-factor model. Day 0 is September 15, 2008. The reported coefficients represent the marginal effect of the independent variable on the client's two-day percentage CAR. All variable definitions are in Appendix A.1. All t-stats are reported in parentheses below estimated coefficients. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels respectively in two-tailed tests.

	(1)	(2)	(3)	(4)	(5)
Ln(# of non-Lehman analysts)	0.176	-0.062		-0.074	-0.082
	(0.65)	(-0.22)		(-0.20)	(-0.23)
Proportion of outstanding shares owned by non-Lehman institutions		1.720**	1.708**	1.739**	1.585**
		(2.19)	(2.19)	(2.33)	(2.15)
Proportion of outstanding shares owned by Lehman Brothers Holdings Inc		53.610	53.682	53.848	56.425
		(1.50)	(1.49)	(1.50)	(1.56)
Proportion of outstanding shares owned by Neuberger Berman LLC		-26.337**	-26.357**	-26.311**	-24.492**
		(-2.42)	(-2.43)	(-2.44)	(-2.42)
Ln(age)		0.422*	0.421*	0.415*	0.380*
		(1.85)	(1.90)	(1.91)	(1.80)
Ln(market cap)			-0.007	0.009	-0.020
			(-0.06)	(0.06)	(-0.13)
Z-score		0.121***	0.120***	0.121***	0.121***
		(3.99)	(3.92)	(4.00)	(3.99)
Lehman equity underwriting client					-0.635
					(-1.25)
Intercept	-0.601	-3.072**	-3.157**	-3.118**	-2.533*
	(-0.74)	(-2.50)	(-2.18)	(-2.14)	(-1.75)
# Firms	627	625	625	625	625

Table XII. Pooled Cross-Sectional Analysis of Lehman Clients' Stock Price Reaction to Lehman's Bankruptcy
The sample consists of 800 industrial (non-financial, non-utility) firms that received at least one of the following services from Lehman Brothers: underwriting of a public common stock, public straight debt, or public convertible debt offering during September 14, 1998 to September 14, 2008; financial advisory service in a completed acquisition of a U.S. target announced during September 14, 1998 to September 14, 2008; market making service as the NYSE specialist at the time of Lehman's bankruptcy; coverage (at least one earnings forecast) by an equity analyst from Lehman during the firm's current fiscal quarter or last fiscal quarter, where the current fiscal quarter contains September 15, 2008. All regressions are estimated using the portfolio weighted least squares (PWLS) approach of Chandra and Balachandran (1992) over Day-289 to Day +10 using a two-day event period (Day 0 and Day +1) and the Fama-French-Carhart four-factor model. Day 0 is September 15, 2008. The reported coefficients represent the marginal effect of the independent variable on the client's two-day percentage CAR. All variable definitions are in Appendix A.1. All t-stats are reported in parentheses below estimated coefficients. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels respectively in two-tailed tests.

	(1)	(2)
Lehman equity underwriting client	-1.666*** (-3.16)	-1.421*** (-3.12)
Lehman straight debt underwriting client	-0.618* (-1.80)	-0.451 (-1.28)
Lehman convertible debt underwriting client	-0.280 (-0.14)	-0.088 (-0.04)
Lehman M&A client	1.038*** (2.98)	1.038*** (2.99)
Lehman NYSE specialist	-0.032 (-0.09)	0.039 (0.12)
Lehman analyst coverage	0.826** (2.01)	0.774* (1.76)
Proportion of outstanding shares owned by Lehman Brothers Holdings Inc		-16.458 (-1.08)
Proportion of outstanding shares owned by Neuberger Berman LLC		-7.734 (-0.88)
Ln(age)		0.468** (2.35)
Ln(market cap)		-0.118 (-1.00)
Z-score		0.121*** (4.16)
Intercept	-0.783 (-1.48)	-1.644 (-1.49)
# Firms	800	797

Appendix A.1: Variable Definitions	
# of non-Lehman analysts	Number of equity analysts in I/B/E/S that were not employed by Lehman during the firm's current fiscal quarter or last fiscal quarter that made at least one earnings forecast during the same period, where the current fiscal quarter contains Sep. 14, 2008.
# of common stock offerings with Lehman	Number of public common stock offerings by the client for which Lehman served as a lead underwriter during Sep. 14, 1998 to Sep. 14, 2008.
# of debt offerings with Lehman	Number of public debt (straight and convertible) offerings by the client for which Lehman served as a lead underwriter during Sep. 14, 1998 to Sep. 14, 2008.
# of M&A deals with Lehman	Number of acquisitions by the firm of U.S. targets announced during Sep. 14, 1998 to Sep. 14, 2008 for which the firm employed Lehman as a financial advisor.
Age	The number of years elapsed between the time that the client first appears in CRSP and Sep. 14, 2008.
Book-to-market	For firms with positive book value of common equity only: equals the book value of common equity (Compustat Item #60) divided by market value of common equity (#6*#199) for the latest fiscal year.
Cash / Assets	Cash and short-term investments (#1) scaled by the book value of assets (#6) for the latest fiscal year.
Common stock proceeds raised with Lehman	Client's public common stock proceeds (in December 2007 $ millions) underwritten by Lehman during the period Sep 14, 1998 to Sep. 14, 2008. For offerings in which Lehman was one of n lead underwriters, Lehman is credited with 1/n of the proceeds. Proceeds are converted to Dec. 2007 $ using the Producer Price Index.
Debt shelf registration dummy	Dummy variable: = 1 if the firm shelf registered (SEC Rule 415) a public debt (straight or convertible) offering during Sep. 14, 2006 to Sep. 14, 2008 without taking any of the registered debt off the shelf before Sep. 14, 2008 and zero otherwise.
Equity shelf registration dummy	Dummy variable: = 1 if the firm shelf registered (SEC Rule 415) a common stock offering during Sep. 14, 2006 to Sep. 14, 2008 without taking any of the registered equity off the shelf before Sep. 14, 2008 and zero otherwise.
Lehman convertible debt underwriting client	Dummy variable: = 1 if the firm employed Lehman as a lead underwriter in a public convertible debt offering during Sep. 14 1998 to Sep. 2008 and zero otherwise.
Lehman equity underwriting client	Dummy variable: = 1 if the firm employed Lehman as a lead underwriter in at least one public common stock offering during Sep. 14 1998 to Sep. 2008.
Lehman M&A client	Dummy variable: = 1 if the firm was an acquirer in a completed acquisition of a U.S. target for which Lehman served as an advisor during Sep. 14, 1998 to Sep. 14, 2008 and zero otherwise.

A.1: Variable Definitions (continued)	
Lehman's market share as a Nasdaq market maker	For Nasdaq firms only (CRSP exchange code of 3): Equals the total number of shares traded by Lehman as a Nasdaq market maker during the previous three calendar months (Jun., Jul., and Aug. 2008) divided by the total number of shares traded over the same time period.
Lehman NYSE specialist	Dummy variable: = 1 if the firm is listed on the NYSE and Lehman was the specialist for the firm's stock at the time of Lehman's bankruptcy and zero otherwise.
Lehman's share of client's common stock offerings	Client's public common stock offerings underwritten by Lehman divided by the total number of public common stock offerings conducted by the client during Sep. 14, 1998 to Sep. 14, 2008. For offerings in which Lehman was one of n lead underwriters, Lehman is credited with a $1/n$ share of the offering.
Lehman's share of client's common stock proceeds	Client's public common stock proceeds (in December 2007 $ million) underwritten by Lehman during the period Sep 14, 1998 to Sep. 14, 2008 divided by the total amount of public commons stock proceeds raised by the client during the same period (in December 2007 $ millions). For offerings in which Lehman was one of n lead underwriters, Lehman is credited with 1/n share of the proceeds. Proceeds are converted to Dec. 2007 $ using the Producer Price Index.
Lehman's share of client's debt offerings	Client's public debt (straight and convertible) offerings underwritten by Lehman divided by the total number of public debt offerings conducted by the client during Sep. 14, 1998 to Sep. 14, 2008. For offerings in which Lehman was one of n lead underwriters, Lehman is credited with a $1/n$ share of the offering.
Lehman's share of client's M&A deals	Firm's completed acquisitions of U.S. targets advised by Lehman divided by the firm's total number of completed acquisitions of U.S. targets announced during Sep. 14, 1998 to Sep. 14, 2008. For deals in which Lehman was one of n financial advisors to the firm, Lehman is credited with a $1/n$ share of the deal.
Lehman straight debt underwriting client	Dummy variable: = 1 if the firm employed Lehman as a lead underwriter in a public straight debt offering during Sep. 14 1998 to Sep. 2008 and zero otherwise.
Leverage	Long term debt (#9) plus short term debt (#34) divided by the market value of assets for the latest fiscal year, where the market value of assets equals the book value of assets (#6) minus the book value of common equity (#60) plus the market value of common equity (#6*#199).
Ln(# of non-Lehman analysts)	Natural logarithm of the number of equity analysts in I/B/E/S that were not employed by Lehman during the firm's current fiscal quarter or last fiscal quarter that made at least one earnings forecast during the same period, where the current fiscal quarter contains Sep. 14, 2008.
Ln(age)	Natural logarithm of the number of years elapsed between the time that the client first appears in CRSP and Sep. 14, 2008.
Ln(market cap)	Natural log of the market value of common equity (#6*#199) for the latest fiscal year ($ millions).
Market cap	Market value of common equity (#6*#199) for the latest fiscal year ($ millions).

A.1: Variable Definitions (continued)	
Net market leverage	Long term debt (#9) plus short term debt (#34) minus cash and short-term investments (#1) divided by the market value of assets for the latest fiscal year, where the market value of assets equals the book value of assets (#6) minus the book value of common equity (#60) plus the market value of common equity (#6*#199).
Pending M&A deal with Lehman	Dummy variable: = 1 if Lehman advised the firm in an acquisition of a U.S. target that was announced prior to Sep. 14, 2008 and completed after Sep. 14, 2008 and zero otherwise.
Proportion of outstanding shares owned by Lehman Brothers Holdings Inc.	Number of the firm's common shares owned by Lehman Brothers Holdings Inc. (LBHI) divided by the client's total number outstanding shares as of June 30, 2008. From Thomson CDS/Spectrum database on 13f Holdings (available through WRDS).
Proportion of outstanding shares owned by Neuberger Berman LLC.	Number of the firm's common shares owned by Neuberger Berman LLC divided by the client's total number outstanding shares as of June 30, 2008. From Thomson CDS/Spectrum database on 13f Holdings (available through WRDS).
Proportion of outstanding shares owned by non-Lehman institutions	Number of the firm's common shares owned by institutions required to report holdings under SEC Rule 13f other than Lehman Brothers Holdings Inc. and Neuberger Berman LLC divided by the client's total number outstanding shares as of June 30, 2008. From Thomson CDS/Spectrum database on 13f Holdings (available through WRDS).
Recent IPO underwritten by Lehman	Dummy variable: = 1 if the Lehman served as a lead underwriter for the client's IPO and the IPO took place during Sep. 14, 1998 to Sep. 14, 2008
Share turnover	Total number of shares traded during Aug. 2008 divided by the total number of shares outstanding.
Total common stock offerings	Total number of public common stock offerings conducted by the firm during Sep. 14, 1998 to Sep. 14, 2008.
Total common stock proceeds	Total public common stock proceeds (in December 2007 $ millions) raised by the firm during Sep 14, 1998 to Sep. 14, 2008. Proceeds are converted to Dec. 2007 $ using the Producer Price Index.
Z-score	From Altman (1968): = (3.3*EBIT + 1.0*sales + 1.4*retained earnings + 1.2*working capital)/(total assets) + 0.6*(market cap)/total liabilities.

A.2   Estimation of Size/Book-to-Market Adjusted Abnormal Returns

We compute size/book-to-market adjusted abnormal returns by matching sample firms under study to reference portfolios that contain firms with similar market capitalization and book-to-market ratios following the procedure outlined in Lyon, Barber, and Tsai (1999). To estimate daily abnormal returns over the event and post-event periods (Day -5 to Day +30), we use the entire population of non-financial, non-utility firms in CRSP with non-missing, non-negative book-to-market ratios from the most recent fiscal year in Compustat to first form fourteen size portfolios based on end-of-day market capitalization on August 29, 2008 (Day -10). Specifically, we rank all NYSE firms on the basis of market capitalization on Day -10 and form size deciles based on these rankings. Nasdaq and AMEX firms are then placed in the appropriate NYSE size decile. Because Nasdaq firms tend to be small firms, this procedure causes the smallest size decile to contain many more firms than the other nine deciles. Therefore, the smallest size decile is further partitioned into quintiles on the basis of size without regard to exchange, resulting in fourteen size portfolios. Each of these fourteen size portfolios is then further partitioned into five book-to-market quintiles, without regard to exchange, resulting in seventy size/book-to-market reference portfolios. After purging these reference portfolios of our sample firms under study (Lehman clients and clients of banks with industry status similar to that of Lehman), we match each sample firm to all remaining firms from the same size/book-to-market reference portfolio. Abnormal returns are computed in the usual manner by subtracting the return on the equally-weighted portfolio of matched firms from the sample firm's realized return. One complication is that a small number of firms in our sample have negative book-to-market ratios. In order to include these firms in the analysis, we form additional reference portfolios that contain only firms with negative book-to-market ratios. Using all non-financial, non-utility firms in CRSP/Compustat with negative book-to-market ratios, we form fourteen additional portfolios on the basis of size that have the same cutoffs as the fourteen previously-formed size portfolios. The sample firms under study with negative book-to-market ratios are then purged from these portfolios and matched to all remaining firms with negative book-to-market ratios from the same reference portfolio. The results discussed in the body of the paper are based on this procedure that includes firms with negative book-to-market ratios. However, we also conducted the analysis using the conventional approach that simply excludes these firms, and it did not change our inferences and conclusions. The procedure above is used to estimate size/book-to-market adjusted abnormal returns over the event windows that include the event period and post-event period (Day -5 to Day +30). To estimate daily abnormal returns over the pre-event period (Day -30 to Day -6) we repeat the procedure outlined above except that we use end-of-day market capitalizations on Day -40 to form the size/book-to-market reference portfolios.