Valuation Uncertainty and IPO's: Investment Bank vs. Commercial Bank Underwriters

Gregory M. Hebb[*]

Gregory H. MacKinnon

Dept. of Finance & Management Science
Saint Mary's University
Halifax, Nova Scotia, Canada
B3H 3C3

[*] We wish to thank Mark Huson and Don Fraser for valuable comments as well as participants at the Atlantic Schools of Business 2000 conference. Part of this research was conducted while Greg Hebb was at Texas A&M University.

Corresponding Author: Gregory H. MacKinnon
Dept. of Finance & Management Science
Saint Mary's University
Halifax, Nova Scotia, Canada
B3H 3C3

Abstract

This paper examines the microstructure trading characteristics of initial public offerings underwritten by commercial banks. The degree of asymmetric information present in the market for these issues is measured by the price impact of trades and the size of the bid-ask spread. If there is more uncertainty in the market about the value of issues underwritten by commercial banks, than these securities should exhibit a greater degree of asymmetric information in their trading environment than non-commercial bank underwritten initial public offerings. More uncertainty could be due to a perceived conflict of interest when commercial banks underwrite securities. Conversely, if the market believes that commercial bank involvement signals firm quality and provides additional information to the public, less asymmetric information will be present in the market. This topic has recently gained in importance with the passage of the Financial Services Reform Act in November 1999 and the inevitable move towards universal banking. We find that, when characteristics of the IPO are controlled for, trades in commercial bank underwritten issues exhibit significantly higher price impacts. This is consistent with greater uncertainty about the value of commercial bank underwritten IPO's and also consistent with the market perceiving a possible conflict of interest on the part of commercial banks.

JEL Classification Codes: G21, G24

Key Words: commercial banks, conflict of interest, initial public offerings, underwriters, bid-ask spread

1. Introduction

The Glass-Steagall Act of 1933 separated the roles of commercial and investment banking. Regulators passed this act partially in response to strong public concern over the activities of commercial banks in the securities market. While subsequent research has questioned the rationale of much of this concern (e.g., Benston, 1996), until the late 1980s commercial banks and their subsidiaries were not allowed to underwrite corporate debt or equity securities. The restrictions were relaxed beginning in 1988 for debt securities and 1990 for equities. On November 14, 1999 President Clinton signed into law the Gramm-Leach-Bliley Act which effectively revokes the Glass-Steagall Act. Under this new law, bank holding companies can apply to create a new entity known as a financial holding company. This financial holding company has expanded powers compared to the old bank holding companies (including underwriting securities and insurance.) While the laws have changed, there is still concern regarding how commercial banks will use information gathered in one area of banking in their other divisions. The President has clearly stated that regulation will be required to control how information will be shared within banking conglomerates (American Banker, Nov.15, 1999). With the large number of bank holding companies planning to establish financial holding companies (more than 100 had applied by early March of 2000 (American Banker, March 10, 2000)), an understanding how banks will use this information and how markets will perceive this use is of growing importance.

The issue of cross-usage of banking information has been examined extensively in the academic literature. This paper extends previous literature on the potential conflict of interest faced by commercial banks that are allowed to underwrite securities. That is, do commercial banks place their own interests before that of their customers? One way this can be done is by

requiring loan customers with poor quality loans (who's true quality may be unknown to the market) to issue public securities and use the proceeds to repay the bank, effectively shifting the risk of default from the bank to the market. This is commonly known as the conflict of interest hypothesis.

It is possible, however, that banks can use information gathered from other dealings with a company to provide more information to the market about the security they are underwriting. Investment banks, because they have no previous banking relationship with the firm, must acquire this information. This information acquisition is costly and investment banks have an incentive to minimize these costs. By underwriting for a firm that the commercial bank has had prior dealings with, the commercial bank, because it has no incentive to minimize on information collection costs, may be certifying the true value of the company. This is the certification of value hypothesis.

The majority of previous research has suffered from a lack of current data. As banks had been restricted, until recently, from engaging in security activities, most papers have had to rely on pre-1933 data. A number of researchers have examined debt securities underwritten by commercial banks for evidence of a conflict of interest. If the market is rational and believes that a bank conflict of interest exists, they should require a higher yield for bank-underwritten securities compared to investment bank underwritten securities, ceteris paribus. Puri (1996) and Kroszner and Rajan (1994) both find that bank-underwritten debt securities had lower yields (higher prices) than investment bank underwritten debt. They claim that the certification effect from a commercial bank underwriting the security more than offset the potential for a conflict of interest. Gande, Puri, Saunders, and Walter (1997) use modern US data to study the conflict of

interest faced by commercial banks. They use post-1987 section 20 subsidiary[1] data to find that initial yields on bank and investment bank underwritten debt securities are significantly different under certain conditions. There is a positive significant difference in price between commercial bank and investment bank underwritten debt for low credit securities whose proceeds were not being used to pay back a bank loan. In other situations, there is no significant difference in pricing between commercial and investment bank underwritten debt. This suggests that banks may still provide a beneficial certification role for information-sensitive securities.

Puri (1994), Ang and Richardson (1994) and Kroszner and Rajan (1994) all examine long term performance of debt securities for evidence of a conflict of interest. If banks do suffer from a conflict of interest, one would expect that the poorer quality of the securities would show up in a higher ex post default rate. Using pre-Glass-Steagall data, all of these papers find that debt securities underwritten by banks defaulted less than investment bank underwritten securities of similar characteristics. This suggests that banks did not tend to underwrite securities for troubled firms and, therefore, did not suffer from a conflict of interest.

Both the conflict of interest and the certification of value hypotheses depend on the information sensitivity of the securities issued and the potential for differential information regarding their true value. As pointed out by Hebb (2000), this means that if there is a conflict of interest in commercial bank underwriting activities then the most likely place to observe it is in equity underwriting activities rather than debt. Hence, this study attempts to distinguish between the two hypotheses through an examination of equity issues underwritten by commercial and investment banks.

[1] Section 20 subsidiaries are subsidiaries of bank holding companies that have limited security underwriting powers.

If the market perceives that commercial banks may underwrite equity issues for firms they know to be of poor quality in order to reduce the degree of default risk, then more uncertainty on the part of investors should surround those issues. Hebb (2000) examines IPO underpricing as a measure of the ex ante uncertainty about firm value. He finds results similar to previous findings for debt issues; no evidence of conflict of interest and evidence in favor of the certification hypothesis in certain circumstances.

This study uses a different methodology to examine equity IPO's underwritten by commercial banks for possible conflicts of interest. Using methods from the market microstructure literature we are able to more directly measure the extent of uncertainty about firm value on the part of public investors. While IPO underpricing is often used as a proxy for ex ante uncertainty about the value of an issue, as per Rock (1986), there are alternative interpretations. For instance, Allen and Faulhaber (1989) develop a model in which high quality firms choose to underprice as a signal of quality. Further, Ellis, Michaely and O'Hara (2000) show that total underwriter profits are positively related to the degree of underpricing and suggest that offer price decisions may be partially set to maximize underwriter profits. By using trade-by-trade data for a period after the issue starts trading, we are able to measure the degree of valuation uncertainty present in the market independently of the initial offer price.

If the market perceives a possibility that some commercial bank underwritten issues will involve a conflict of interest, but is uncertain which ones do and which ones do not, then a greater degree of uncertainty about the true value of all commercial bank underwritten equities should be observed, ceteris paribus. As time passes and market participants are better able to determine (through public information releases) which, if any, of the commercial bank underwritten issues involved a conflict, then this uncertainty should resolve itself. As an

example, assume that commercial bank subsidiaries underwrite ten initial public offerings. The market suspects that some of them may involve a conflict of interest on the part of the underwriting bank but is uncertain which of the ten may (or if any) involve a conflict. This creates more uncertainty in the pricing of all ten issues. After trading begins and sufficient public information is released this uncertainty should dissipate. The uncertainty will be reduced for all issues (ones determined to not have any conflict as well as ones deemed to have one) once investors are better able to determine the true nature of each IPO. Hence, our tests which compare the degree of asymmetric information (and hence uncertainty) between investment and commercial bank underwritten issues can not determine which, if any, issues exhibit conflicts. However, our tests can help us determine if there is evidence consistent with the market considering a possibility of conflicts in commercial bank underwriting. Assuming rationality in the market, a finding of this type would indicate that there is, at least occasionally, a conflict. The strength of our findings will help determine how widespread the markets' perception of conflict of interest may be.

We examine all trades and quotes over the first sixty days of trading for matched samples of commercial and investment bank underwritten IPO's. The results show that in the first twenty days of trading, commercial bank underwritten issues have lower spreads but also lower quoted depths than equivalent investment bank underwritten issues. Hence, the results are ambiguous based upon the first twenty days of trading; however, this is a period known to involve significant market activities by underwriters engaging in price support activities, which may cloud results. Neither spreads nor depths are significantly different in the 21 to 60 trading days after the issue. When the average price impact of a trade is examined the results show that in the period 21 to 40 days after the IPO, price impacts are significantly higher for commercial bank

underwritten issues. There is no significant difference over days 41 to 60. As price impact is a measure of asymmetric information in the market and the degree of uncertainty about value on the part of public investors, the results are consistent with more uncertainty about commercial bank underwritten issues. The effect fades over time as uncertainty is resolved indicating that the difference is most likely due to characteristics of the IPO (i.e. type of underwriter) as opposed to underlying differences in the two groups of firms. Overall, our results are consistent with the market incorporating the possibility of a conflict of interest problem in commercial bank underwriters.

The paper is organized as follows: the next section provides a brief history of the Glass-Steagall Act and how the act has been changed over the years; section 3 describes that data and methodology employed; section 4 contains the results and section 5 concludes.

2. History of the Glass-Steagall Act

Prior to 1933 and the passage of the Glass-Steagall Act, commercial banks were allowed to underwrite corporate securities. Non-federal reserve member state banks were unrestricted in their security underwritings. National banks were given permission by the 1927 McFadden Act to underwrite bonds and certain equity issues, although they were already engaged in these activities prior to this through the use of state-chartered subsidiaries.

Unease in the financial markets of the late 1920's and early 1930's led to public concern over bank involvement in the securities market. Many people blamed the stock market crash on banks, leading congress to conduct the Pecora hearings of 1933. Two major conclusions of the investigation regarding bank involvement in the securities market were:

1. Due to the variability of the securities market, bank involvement in this area could potentially increase bank riskiness and thus endanger the stability of the entire US

banking system.

2. Banks may have an incentive to underwrite securities for companies in which they also have loans outstanding. This may lead to a conflict of interest if the bank acts in its own interests at the expense of the issuing firm or the bank's customers. For instance, by underwriting securities and using the proceeds to pay off a loan, a bank can shift risk from themselves to a possibly unsuspecting market.

The second point is still a source of debate today and is central to this paper. The Pecora hearings led to the passage of the Glass-Steagall Act, which, among other things, separated the role of commercial and investment banking. After the passage of the act, federally chartered banks were no longer permitted to engage in most security activities ("eligible" security activities include underwriting government bonds and private placement of commercial paper.)

Glass-Steagall effectively shut banks out of the securities market until 1987 when the Federal Reserve began interpreting Section 20 of the Act differently. Section 20 states that a commercial bank cannot be affiliated with any organization or have a subsidiary that is "engaged principally" in underwriting corporate securities. "Engaged principally" is never defined explicitly in the act. Beginning in December of 1986, the Fed concluded that section 20 would not be violated if two conditions were met. One, no more than 5% of the subsidiary's revenues came from "ineligible" activities. Two, certain firewalls between the subsidiary and parent bank had to be maintained. This interpretation resulted in the Fed permitting subsidiaries of banks (called Section 20 Subs) to underwrite commercial paper beginning in 1988, corporate debt in 1989, and finally equity in 1990. The 5% revenue limit was increased to 10% in 1994. When even a 10% limit became binding in 1996, it was again increased to 25%. As well, many of the firewalls that were required previously were removed in the 1996 changes.

Over the years, there have been many attempts to repeal the Glass-Steagall Act. Strong lobbying by the affected parties, however, had always defeated these attempts. This changed in May of 1998 when congress passed (by one vote) HR-10 (the Financial Modernization Bill.) HR-10, however, stalled when it went to the senate. Senate Republicans, while supporting the basic premise of Glass-Steagall repeal, refused to support some of the attached amendments (specifically those dealing with the Community Reinvestment Act.) The bill appeared to be destined to fail until a last minute compromise between the house and senate was reached on October 24, 1999. President Clinton signed the bill on November 14, 1999. The Gramm-Leach-Bliley Act of 1999 will allow banks, securities firms, and insurance companies to form one-stop financial shopping conglomerates.

Given that commercial banks now have greater access to financial market activities than at any time since 1933, the question of how banks might use this access in combination with their traditional banking activities is vitally important. Specifically, will banks use their special knowledge about firms to better serve those firms or to reduce the banks' own risk? It is this question that is at the heart of conflict of interest/certification hypothesis debate.

3. Data and Methodology

A. Data

The sample consists of IPO's between January 1996 and December 1998 available from the Security Data Corporation initial offering database. Prior to 1996 there were only 3 IPO's in which a commercial bank was the lead underwriter. Because information on these issues is not available on the SEC Edgar database, they were dropped from the sample.

IPO's for financial or other regulated firms are excluded as are all ADR's and spinoffs. Finally, only firm-commitment IPO's with no unit offerings are retained.

Each IPO is classified as either investment bank underwritten (no commercial bank involvement) or commercial bank underwritten (the lead manager was a section 20 subsidiary of a commercial bank). While the majority of issues actually had a syndicate of banks, consistent with other work in this area, we classify the type of issue based on the class of lead underwriter. This resulted in a sample of 98 commercial bank underwritten IPO's and 293 investment bank underwritten IPO's. Each commercial bank underwritten issue was then matched to an investment bank underwritten issue based on industry, offer date and size. Specifically, the matched investment bank IPO had to have the same 2 digit SIC code and an offer date within 180 days of the commercial bank IPO[2]. If more than one investment bank IPO met these criteria, the one closest in size was used as the match. The final sample consists of 86 pairs of IPO's (172 total). Tables I and II present summary statistics of the sample.

Table I presents the average underpricing for investment and commercial banks as well as the average size of the offer in the two samples. Consistent with previous research, the mean underpricing is smaller for commercial banks, although not significantly so. The mean size of the offer is slightly bigger for commercial bank underwritten, although not significantly different. The industry distribution is identical. This table indicates that our matching routine has done a good job of creating comparable samples.

Table II shows that the distribution through time of the two samples is reasonably consistent. The most active time period is late 1997/early 1998 for both the commercial and investment bank samples. The remainder of the samples is distributed fairly evenly through the sample period.

[2] 12 commercial bank underwritten IPO's could not be matched at the 2 digit level or did not have trading data available on the TAQ database. These IPO's were dropped from the sample.

In theory, a conflict of interest or a certification of value should occur only when the commercial bank has had a previous relationship with the IPO firm. However, identifying this relationship is difficult, as the firms in this sample are private before the IPO, limiting the information available to the public regarding their banking relationships. Limiting to firms with information available on previous banking relationships greatly reduces the size of our sample. Hence, our tests are based simply on commercial bank versus investment bank underwriters. Doing so will bias our test against finding any significant differences between types of underwriters. A caveat is that any differences reported are likely underestimated.

For each IPO, all trades and quotes are gathered from the TAQ database for the first 60 trading days following the issue. To control for non-synchronous recording of trades and quotes, all trades times were lagged by 5 seconds. As a filter for typographical errors in the data, for each trade a range was defined as the minimum range that includes the prevailing bid and ask prices and the bid and ask prices following the trade. If the trade price falls outside this range by more than four times the width of the range, the trade was discarded. In the price impact measures described later, all overnight price impacts were ignored.

B. Methodology

Transaction level data provides an ideal forum in which to examine market uncertainty about an issue. Extant microstructure literature describes the costs faced by a market maker as coming from three sources: order processing, inventory, and adverse selection. The first two correspond to the fixed costs of being a market maker and the risk associated with holding inventories of a stock, respectively. The third cost, adverse selection, is the one of interest in this study.

Bagehot (1971) was amongst the first to discuss the adverse selection problem of the market maker. Essentially, when a market maker posts a price at which they are willing to buy (sell) a

security, they are exposed to the risk that traders who possess superior information will know that the posted price is too high (low). Thus, the market maker's quotes will tend to attract trades from informed traders who will profit at the market maker's expense.

The greater the uncertainty regarding the true value of the security (from the perspective of uninformed traders, of which the market maker is one), the greater the potential for market maker losses to informed traders. Kyle (1985), for instance, uses uncertainty about the liquidation value of an asset as a measure of the value of information and hence the advantage of informed traders. An increase in adverse selection has two effects. First, market makers will attempt to recoup losses to informed traders by quoting wider bid-ask spreads as in Copeland and Galai (1983) and Glosten and Milgrom (1985). Second, market makers adjust their quotes to the information contained in trades. The greater the information disparity between the uninformed market makers and informed traders, and the greater the proportion of traders who are informed, the greater the perceived information content of each trade. For example, if an order to buy arrives, the market maker rationally ascribes a probability that the order is from a trader with superior information and will adjust their estimate of the true value of the security (and therefore their quotes) upwards. The same logic holds for downward revisions of quotes due to sell orders. A number of theoretical models exist which model the informational impact of trading on security prices, among them the models of Huang and Stoll (1997) and Mahhavan, Richardson and Roomans (1997).

For our purposes, the main point of the preceding discussion is that, ceteris paribus, the greater the public uncertainty about the true value of an issue, the greater will be the advantage of informed traders resulting in wider bid-ask spreads. As well, trades will have, on average, a greater impact on prices for securities in which there is greater uncertainty. Based on this, we

examine two hypotheses:

1. Conflict of Interest hypothesis: If the market believes that some commercial banks have a conflict of interest and may underwrite equity securities for firms that will not be able to repay their loans (lemons), greater uncertainty will be created. Because of this, issues underwritten by commercial banks should be on average less liquid (higher spreads, higher price impacts).
2. Certification of Value hypothesis: If, due to its previous dealings with a firm, a bank is more informed about the firm's true value than the market (and therefore does not have the incentive to minimize information collection such as an investment bank), a bank's participation in the firm's equity underwriting should reduce uncertainty and provide a certification of the firm's true value. This should result in issues underwritten by commercial banks being on average more liquid (lower spreads, lower price impacts).

We utilize several measures to test the two hypotheses. First, we calculate the relative effective spread for each stock. The relative effective spread is calculated as:

$$\frac{2\left|P_t - MP_t\right|}{MP_t} \qquad (1)$$

where P_t is the trade price and MP_t is the midpoint of the bid-ask spread prevailing immediately prior to the trade at time t. Compared to quoted spreads, the effective spread allows for price improvement as trades occur inside the posted quotes[3]. The relative effective spread is calculated for each trade and then averaged across all trades for each stock.

[3] Price improvement can occur when public orders are matched against each other rather than going through the specialist and when traders on the exchange floor improve upon posted prices in order to pick up incoming orders. Ross, Shapiro and Smith (1996) report that 26% of orders arriving at NYSE via SuperDot receive price improvement over the posted bid and ask prices.

To protect themselves from informed trading, market makers adjust the number of shares available at the posted quotes as well as the bid and ask prices. Because of this, we also examine the total depth available. The total of the bid and ask depth is averaged across all quotes in the sample period for each stock.

To measure the price impact of trades we adopt the approach of Hasbrouck (1991) and Jones and Lipson (1999). The change in midpoint due to a trade at time t is defined as:

$$\Delta MP_t = \ln\left(\frac{MP_{t,post}}{MP_t}\right) \tag{2}$$

where $MP_{t,post}$ is the midpoint of the first quote revision following the trade. Each trade is signed as a buy (+1) if the trade price is above the prevailing midpoint, as a sell (-1) if below the midpoint and is given a sign of zero if the trade occurs at the midpoint. The greater the degree of uncertainty about the value of a security, the greater should be ΔMP_t in response to a trade. To account for the fact that it is only the unexpected portion of a trade that contains information, the trade signs and midpoint impacts are set up as a bivariate vector autoregression:

$$\begin{aligned} \Delta MP_t &= \sum_{j=0}^{5} \alpha_j S_{t-j} + \sum_{i=1}^{5} \beta_i \Delta MP_{t-i} + \upsilon_t \\ S_t &= \sum_{j=1}^{5} \gamma_j S_{t-j} + \sum_{i=1}^{5} \eta_i \Delta MP_{t-i} + \varepsilon_t \end{aligned} \tag{3}$$

where S_t is the trade sign of trade t and ν_t and ε_t are independent error terms. The coefficient α_o represents the contemporaneous effect of a trade on the midpoint. Thus, α_o is a measure of the immediate price impact of a trade while the cumulative impulse response function over multiple lags will reveal the permanent price impact of a trade. The permanent impact of a trade on the price is a measure of the information content of the trade. The greater the average price impact of

a trade, the greater must be the uncertainty of uninformed traders[4] about the true value of the security. This follows because the market maker allows the trading process to have greater influence on the prices that he or she sets. This indicates that the market maker gives more consideration to the possibility that a lemons type problem exists wherein buy (sell) orders arrive from better informed traders who buy (sell) because they know the posted prices to be too low (high). This effect is measured by the price impact.

Because our sample consists of IPO's beginning to trade, we must be careful with the time periods examined. In aftermarket trading for an IPO it is known that the underwriter often engages in price support activities. The presence of the underwriter in the aftermarket may change the microstructure characteristics of trading and cloud our results. Aggarwal (2000) finds that most price support activities end within 10 to 15 days after trading begins. Ellis, Michaely and O'Hara (2000) find price support lasts an average of 15 days (21 days for "cold" IPO's). Results based on the first days after the IPO may therefore be misleading. Further, if there is a difference in market uncertainty between investment bank and commercial bank underwritten IPO's, one would expect the difference to fade over time as uncertainty is resolved. Looking at the elasticities of spreads with respect to underlying factors, Hegde and Miller (1989) find that it takes 40 trading days (eight weeks) for an IPO to "season" from a market maker's perspective. After 40 trading days, IPO spreads are no more sensitive to information asymmetry proxies than they are for seasoned issues, indicating that it takes on average 40 days for the information environment of IPO's to become similar to seasoned issues.

Based on the above, we break the first 60 trading days of each IPO into three periods;

[4] The uncertainty of uninformed traders is measured relative to the knowledge of informed traders about the true value of the security.

days +1 to +20, days +21 to +40 and days +41 to +60. These correspond roughly to the first three calendar months of trading. Equation (3) is estimated separately over each period for each of the firms in our sample. It is uncertain what differences, if any to expect in the first 20 days because of price support activities by underwriters. If there are differences between commercial and investment bank underwriters we expect them to be apparent in days +21 to +40, after price support activity has subsided.

Despite our attempts to match the investment bank and commercial bank samples as closely as possible and to control for other differences in the regressions (presented later), there is always that possibility that certain types of firms self-select with respect to the type of underwriter they choose. This could potentially bias our results. However, any differences in the microstructure characteristics of the samples that are due to underlying differences in the firms should be permanent. Any differences which are due to the type of underwriter should fade as uncertainty is resolved. Therefore, the last twenty days of our sample (days +41 to +60) can be used as a type of control. If observed differences fade over this period, then we can ascribe the differences to the characteristics of the IPO process (i.e. type of underwriter) rather than differences in some unknown characteristic of the firms themselves.

4. Results

A. Spreads and Depths

Table III presents the cross-sectional mean dollar effective spreads, relative effective spreads and total depth for the samples of commercial and investment bank issues. Neither standard t-tests nor Wilcoxon rank sum tests show any significant difference between the samples. However, univariate tests can be misleading in this case because there are a number of factors

that must be controlled for, which we now do within a regression framework.

Our regressions include a number of variables that are known (from the microstructure literature) to affect the size of spreads, or are known (from the IPO literature) to be correlated to the degree of ex ante uncertainty surrounding the issue.

Within each 20-day period, closing prices each day are used to calculate the standard deviation of daily returns as this is known to be positively related to the size of the spread. As well, the natural log of share volume within each 20-day period is also included in the regression as this is typically negatively related to the spread. In order to control for differences between dealer and auction markets we include a dummy equal to one if the issue is on the New York or American Stock Exchanges and equal to zero if on Nasdaq. As relative spreads differ according to price level we also control for the closing price on the first day of trade. As a final microstructure control, we note that the sample straddles two different tick regimes in the US. In June 1997, US markets moved from one-eighth ticks to one-sixteenth. A dummy variable is included which equals one if the IPO begins trading after the move to smaller ticks.

In order to control for other sources of ex ante uncertainty around the IPO, we include four other variables in the regressions. The change in the level of inside ownership before and after the IPO is known to be a signal of ex ante uncertainty. The natural log of the age of the firm is also included. Carter and Manaster (1990) find underwriter reputation to be correlated with uncertainty. To proxy for underwriter reputation we use the market share of the underwriter as in Megginson & Weiss (1991). Finally, we include underpricing (first day return) as a control variable. This serves three purposes. First, it allows us to determine if our measures of uncertainty have explanatory power beyond previous studies using underpricing. Second, underwriter reputation is hard to measure precisely. However, since short-run underpricing is

negatively correlated with reputation, including underpricing as a control variable should control for any reputational effects not picked up by our market share proxy. Finally, the model of Rock (1986) indicates that the relative proportion of informed and uninformed investors will vary with the degree of underpricing, which will affect the trading characteristics of the issue. Including underpricing in the regression will control for this effect.

Table IV presents regression results of relative effective spread and total quoted depth regressed on the control variables and a dummy variable equal to one if the lead underwriter is a Section 20 subsidiary of a commercial bank, and zero otherwise. Because quoted depth is highly skewed across the sample, the natural log of depth is used as a dependant variable. Regressions are estimated separately for each of the three 20 day periods.

The first column of Table IV shows that during the first twenty days of trading commercial bank underwritten issues have significantly lower relative effective spreads when controlling for the other attributes of the issue. However, the second column of Table IV shows that significantly lower depths also characterize commercial bank issues[5]. The combination of lower spreads but lower depths means that our overall comparison over the first twenty trading days is ambiguous. However, given the previous discussion on underwriter price support over this period this finding is perhaps not surprising.

Table IV also shows that the coefficient on the underpricing variable is significantly positive over the first twenty days, but insignificant for the later periods. This is consistent with price support activities by underwriters being greater for "cold" issues and these activities affecting

[5] Because underwriter price support could be affecting our results on depth, we calculated the average depth available at the ask price for each firm since depth on that side of the market should not be affected by price support activities. We re-estimated all of the depth regressions using the natural log of the ask depth as the dependant variable and the results were unchanged.

trading characteristics. This reinforces our contention price support makes conclusions based on the first twenty days of trading unreliable.

The last four columns of Table IV present the regression results when estimated over days +21 to +40 and +41 to +60. In all regressions there is no significant difference between commercial and investment bank underwritten issues. Based on this there would appear to be no evidence of either the conflict of interest or certification hypotheses. However, as mentioned previously, there are a number of components to the spread of which adverse selection is only one. We now turn to the results for a more direct measure of the information content of trades and market uncertainty.

B. Price Impacts

As shown in Jones and Lipson (1999), the information effects of a trade may not be fully incorporated into the price until several subsequent trades have occurred. As well, in order to properly measure the information content of trades one must allow for future offsetting trades that counter inventory effects. The measure of the information content of a trade (and therefore the measure of market uncertainty about security value) used here is the cumulative impulse response to the introduction of ε_t=+1 as an error term in the trade sign equation in (3). This is equivalent to studying the cumulative effect on the midpoint of the arrival of an entirely unexpected buy order.

Figures 1, 2 and 3 present the average cumulative response to ε_t=+1 over lags up to 30 trades. All figures show the upward sloping trend typical of slow incorporation of information. Figure 1 shows the average response during the first twenty trading days. The response of prices to trades would appear to be virtually indistinguishable between investment and commercial bank underwritten issues. Table V shows the differences to be statistically insignificant at both 5 and

30 lags.

Figure 2 shows the average price impact during days +21 to +40, the period of most interest. In the second twenty trading day period, commercial banks have higher price impacts at all lags with the difference widening as more information becomes incorporated at the longer lags. Table V indicates that this difference is statistically significant in both t-tests and Wilcoxon tests at 5 and 30 lags.

In Figure 3, it is apparent that commercial bank underwritten issue still exhibit larger price impacts over days +41 to +60, however the difference is much smaller than during the previous twenty trading days. Table VI indicates that the difference is no longer statistically significant.

Overall, the evidence is consistent with market participants allowing for the possibility of a conflict of interest. Given that the results in the first twenty days will be clouded by price support activities, it appears that commercial bank underwritten issues exhibit significantly more market uncertainty than do investment bank underwritten issues during the second twenty day period. The effect fades in the third twenty-day period, consistent with a gradual resolution of this uncertainty. This is consistent with the source of uncertainty being the IPO process itself rather than some unknown characteristic of the commercial bank underwritten firms. Our results are therefore in contrast to previous results on commercial bank equity underwriting activities (e.g. Hebb (2000)) which bases its results on the degree of underpricing.

Before drawing firm conclusions it must be determined if the results hold while controlling for other characteristics of the issue. Table VI contains regressions where the cumulative response at 5 and 30 lags in each of the three periods are used as the dependant variables. The independent variables are the same as were used in the spread/depth regressions. The results indicate that the commercial/investment bank underwriter variable is insignificant over the first

twenty days when controlling for the other characteristics. Over the second twenty-day period, it is again shown that commercial banks have significantly higher price impacts, consistent with the evidence above. In the third period, there is no longer any significant difference due to the two types of underwriters.

Overall, the regression results support our previous finding that there is more market uncertainty about the true value of an IPO when the Section 20 subsidiary of a commercial bank acts as the lead underwriter. This is consistent with a perception by the market of a possible conflict of interest when commercial banks underwrite equity issues.

5. Conclusions and Implications

Microstructure techniques were used to examine the characteristics of aftermarket trading in IPO's in which the lead underwriter was the Section 20 subsidiary of a commercial bank and compare them to IPO's underwritten by investment banks. A sample of commercial and investment bank issues matched on industry, date of issue and size of offer is used to study the two groups.

After allowing time to elapse to control for price support activities immediately following the IPO, the results show there to be significantly greater uncertainty in the market about the true value of commercial bank underwritten issues. The result holds when controlling for other characteristics of the issue. Further, the result tends to fade as time elapses. This indicates that the source of the uncertainty is a characteristic of the IPO process itself (e.g. the type of underwriter) rather than a characteristic of the firms and that the market gradually resolves this uncertainty as trading progresses in the aftermarket.

The results provide empirical support for the hypothesis that the market perceives the possibility of a conflict of interest when commercial banks underwrite equity issues, this is in

contrast to previous research on equity issues which uses IPO underpricing as a measure of uncertainty.

Given the recent repeal of Glass-Steagall, our results have increased importance. While commercial banks have much greater leeway to engage in equity market activities, the question now is whether new or different limits should be placed upon those activities. The results presented here indicate that regulators should keep the possibility of conflict of interest in mind when formulating new regulations.

References

Aggarwal, R.(2000). Stabilization activities by underwriters after initial public offerings. *Journal of Finance*, forthcoming.

Allen, F. and G.R. Faulhaber, (1989). Signaling by underpricing in the IPO market. *Journal of Financial Economics* 23, 303-323.

Ang, J. and T. Richardson, (1994). The underwriting experience of commercial bank affiliates prior to the Glass-Steagall Act: A re-examination of evidence for passage of the act. *Journal of Banking and Finance*, 351-395.

Bagehot, W. (pseudonym). (1971). The only game in town. *Financial Analysts Journal* 27, 31-53.

Benston, G. (1996). The Origins and Justification for the Glass-Steagall Act (New York University).

Carter, R., F. Dark, and A. Singh, (1998). Underwriter reputation, initial returns, and the long-run performance of IPO stocks. *Journal of Finance* 53(1), 285-313.

Carter, R. and S. Manaster, (1990). Initial public offerings and underwriter reputation. *Journal of Finance* 45, 1045-1068.

Copeland, W.G. and D. Galai, (1983). Information effects of the bid-ask spread. *Journal of Finance* 38, 1457-1469.

Ellis, K., R. Michaely and M. O'Hara, (2000). When the underwriter is the market maker: An examination of trading in the IPO aftermarket. *Journal of Finance*, forthcoming.

Fama, E. (1985). What's different about banks? *Journal of Monetary Economic* 15, 29-39.

Gande, A., M. Puri, A. Saunders, and I. Walter, (1997). Bank underwriting of debt securities: Modern evidence. *Review of Financial Studies* 10, 1175-1202.

Glosten, L. and P. Milgrom, (1985). Bid, ask and transaction prices in a specialist market with heterogeneously informed traders. *Journal of Financial Economics* 14, 71-100.

Gompers, P. and J. Lerner, (1999). Conflict of interest and reputation in the issuance of public securities: Evidence from venture capital. *Journal of Law and Economics* XLII(1), 1-29.

Hasbrouck, J., (1991). Measuring the information content of stock trades. *Journal of Finance* 46, 179-207.

Hebb, G., (2000). Commercial Bank Involvement in Equity Underwritings, Saint Mary's University Working Paper.

Hegde, S. and R. Miller, (1989). Market-making in initial public offerings of common stocks: An empirical analysis. *Journal of Financial and Quantitative Analysis* 24, 75-90.

Huang, R. and H. Stoll, (1997). The components of the bid-ask spread: A general approach.

Review of Financial Studies 10, 995-1034.

James.C., (1987). Some evidence on the uniqueness of bank loans. *Journal of Financial Economics* 19, 217-235.

Jones, C.M. and M.L. Lipson, (1999). Price impacts and quote adjustment on the Nasdaq and NYSE/AMEX. working paper, Columbia University

Kroszner, R. and R. Rajan, (1994). Is the Glass-Steagall Act justified? A study of the US experience with universal banking before 1933. *American Economic Review* 84, 810-832.

Kyle, A., (1985). Continuous auctions and insider trading. *Econometrica* 53, 1315-1335.

Madhavan, A., M. Richardson and M. Roomans, (1997). Why do security prices change? A transaction-level analysis of NYSE stocks. *Review of Financial Studies* 10, 1035-1064.

Megginson, W L. and K A Weiss, (1991). Venture Capitalist Certification in Initial Public Offerings. *The Journal of Finance*, Vol. 46, Iss. 3; pg. 879-904.

Puri, M., (1994). The long-term default performance of bank underwritten security issues. *Journal of Banking and Finance* 18(2), 397-418.

Puri, M., (1996). Commercial banks in investment banking: Conflict of interest or certification role? *Journal of Financial Economics* 40, 373-401.

Rock, K., (1986). Why new issues are underpriced. *Journal of Financial Economics* 15, 187-212.

Ross, K., J. Shapiro and K. Smith, (1996). Price Improvement of Super Dot Market Orders on the NYSE. NYSE working paper #96-02.

Saunders.A., (1985). Conflict of interest: An economic view. In I. Walter, editor, Deregulating Wall St.: Commercial Bank Penetration of the Corporate Securities Market, (John Wiley and Sons ,New York).

Saunders, A. and I. Walter, (1994). Universal Banking in the United States. (Oxford University Press).

Figure 1

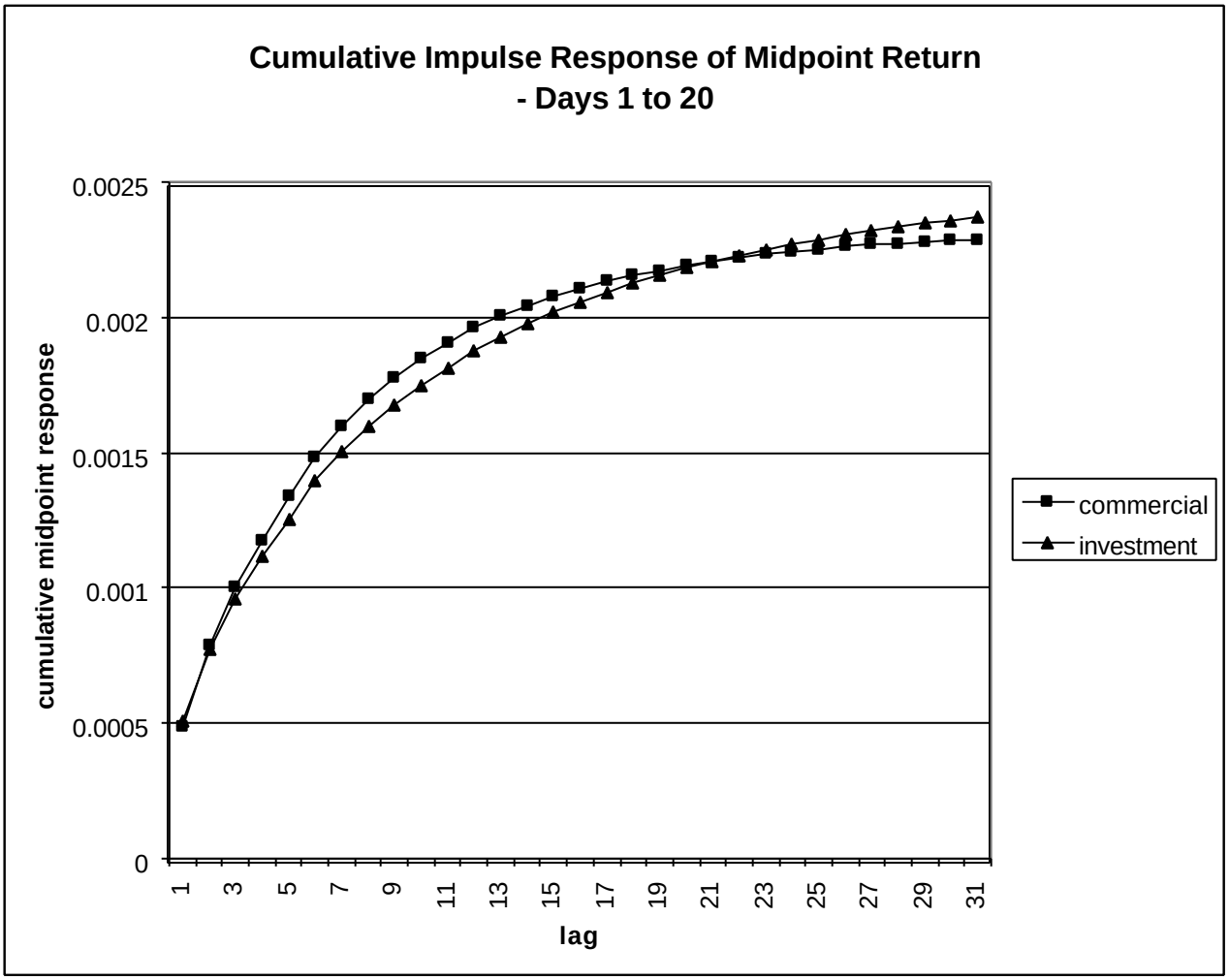
Cumulative Impulse Response of Midpoint Return
- Days 1 to 20
cumulative midpoint response
0.0025
0.002
0.0015
0.001
0.0005
0
1
3
5
7
9
11
13
15
17
19
21
23
25
27
29
31
lag
commercial
investment

Figure 2

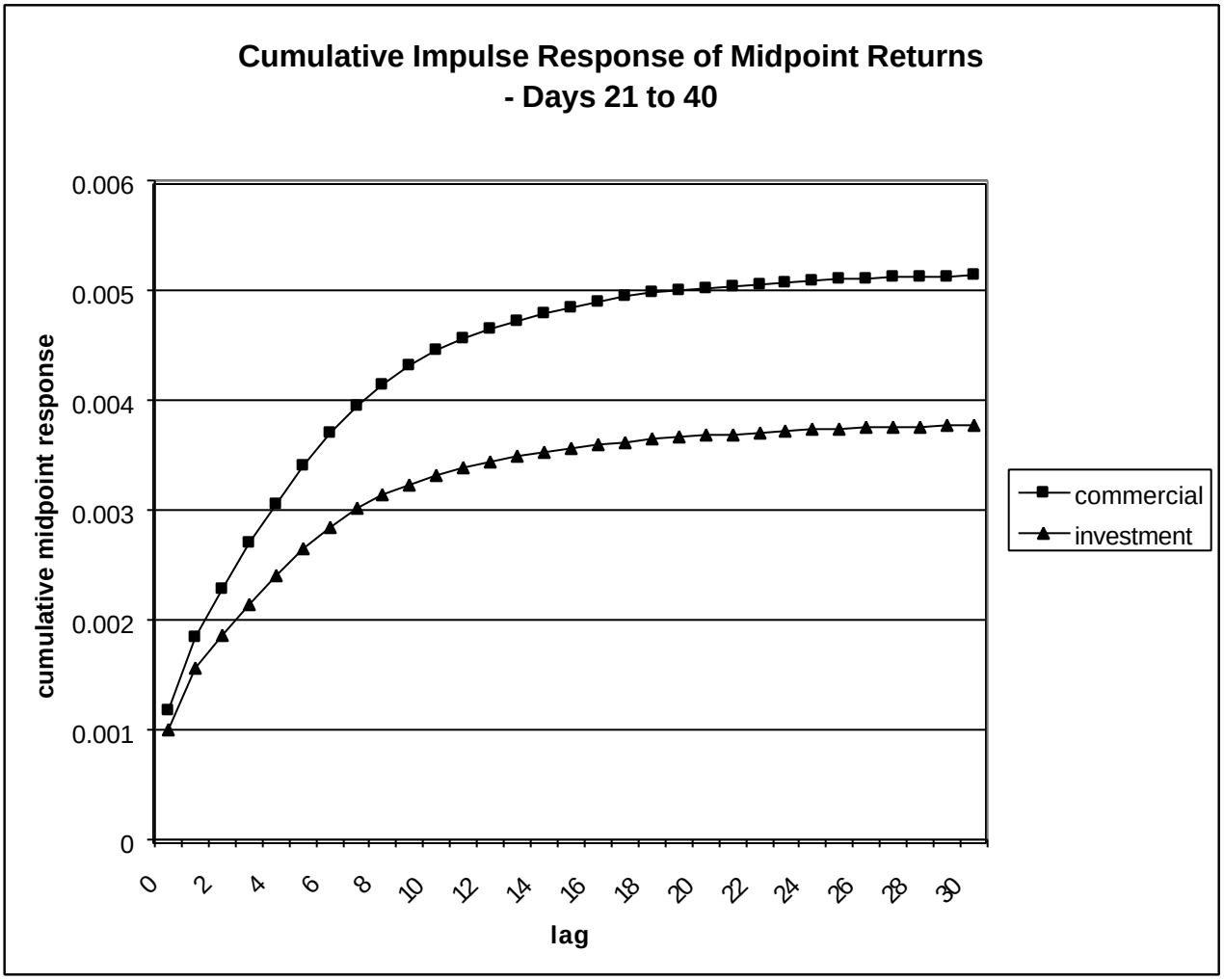
Cumulative Impulse Response of Midpoint Returns
- Days 21 to 40
cumulative midpoint response
0.006
0.005
0.004
0.003
0.002
0.001
0
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
lag
commercial
investment

Figure 3

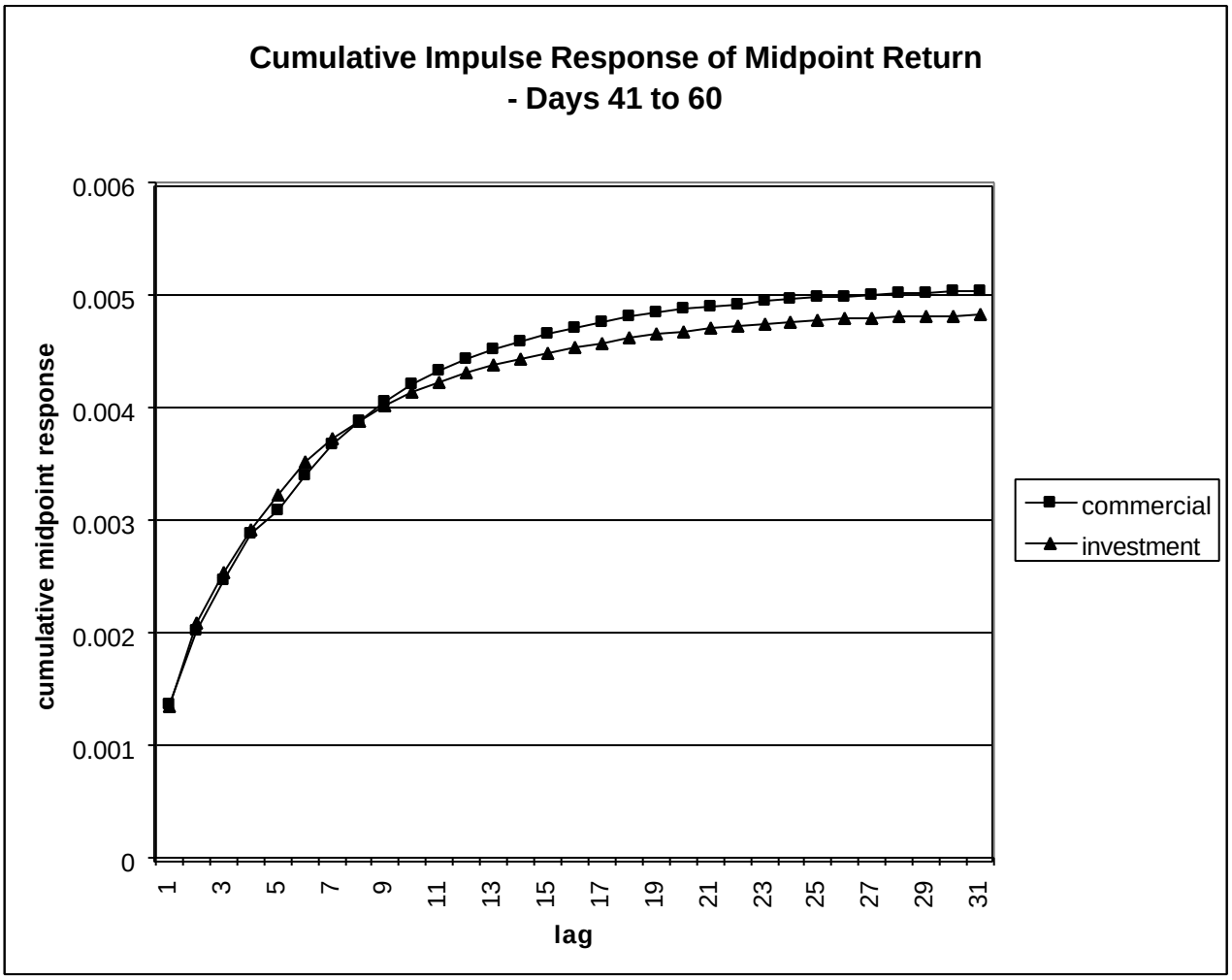
Cumulative Impulse Response of Midpoint Return
- Days 41 to 60
cumulative midpoint response
0.006
0.005
0.004
0.003
0.002
0.001
0
1
3
5
7
9
11
13
15
17
19
21
23
25
27
29
31
lag
commercial
investment

Table I
Summary Statistics of Sample

	Commercial Bank Underwritten	Investment Bank Underwritten	P-Value of Difference
Number of Observations	86	86	
Average Size of Issue ($M)	41.97	37.62	0.248
Average First Day Return (%)	18.73	23.97	0.433
Distribution of SIC codes: (% of sample)			
10 – 19	2.33	2.33	
20 – 29	9.30	9.30	
30 – 39	24.42	24.42	
40 – 49	2.33	2.33	
50 – 59	11.63	11.63	
60 – 69	0.00	0.00	
70 – 79	37.21	37.21	
80 – 89	12.79	12.79	

Table II
Distribution of Sample by Time

Date of Issue (by year:quarter)	Commercial Bank Underwritten	Investment Bank Underwritten
1996:1	3	4
1996:2	7	8
1996:3	5	0
1996:4	4	6
1997:1	4	3
1997:2	2	5
1997:3	7	8
1997:4	15	16
1998:1	10	13
1998:2	17	12
1998:3	8	7
1998:4	4	4

Table III
Effective Spreads, Relative Spreads, and Total Depth

	Commercial Bank Underwritten	**Investment Bank Underwritten**	**(t-test of diff.) [Wilcoxon rank sum test of diff.]**
A. Days 1-20			
effective spread ($)	0.2016	0.2248	(1.627) [0.857]
relative effective spread (%)	1.51	1.62	(0.995) [0.637]
quoted depth (lots)	25.12	49.57	(1.588) [0.889]
B. Days 21-40			
effective spread ($)	0.2479	0.2645	(1.077) [0.542]
relative effective spread (%)	1.92	1.97	(0.419) [0.539]
quoted depth (lots)	33.76	50.17	(0.985) [0.484]
C. Days 41-60			
effective spread ($)	0.2590	0.2787	(1.024) [0.741]
relative effective spread (%)	2.02	2.10	(0.549) [0.105]
quoted depth (lots)	35.47	55.98	(1.079) [0.904]

Note: Figures in tables are means.
*** Rejection of null at 1% level, ** at 5% level, * at 10% level.

Table IV
Regressions of Relative Spread and total Depth

	Days 1 to 20		Days 21 to 40		Days 41 to 60	
Dependant Variable:	Rel. Eff. Spread	ln (Quoted Depth)	Rel. Eff. Spread	ln(Quoted Depth)	Rel. Eff. Spread	ln(Quoted Depth)
constant	0.07485 (8.193)***	1.71700 (1.049)	0.10100 (12.55)***	0.80500 (0.787)	0.09936 (12.183)***	0.77800 (0.838)
commercial/ investment	-0.00169 (-2.555)**	-0.21300 (-1.799)*	-0.00085 (-0.923)	0.00675 (0.058)	-0.00132 (-1.259)	-0.09085 (-0.761)
after June97	-0.00863 (-10.808)***	0.48000 (3.351)***	-0.00710 (-6.448)***	0.64900 (4.647)***	-0.00670 (-5.227)***	0.62000 (4.250)***
underpricing	0.00005 (3.629)***	0.00097 (0.417)	0.00002 (1.379)	0.00093 (0.414)	-0.00001 (-0.574)	0.00163 (0.701)
mkt. share	-0.00004 (-0.348)	-0.00481 (-.247)	0.00011 (.648)	0.01900 (1.008)	0.00012 (0.691)	0.00961 (0.502)
ln(age)	-0.00026 (-0.767)	-0.05894 (-0.962)	-0.00039 (-0.816)	-00.01775 (-0.297)	-0.00038 (-0.713)	-0.04040 (-0.662)
price	-0.00054 (-5.329)***	-0.02528 (-1.390)	-0.00037 (-2.889)***	-0.02016 (-1.257)	-0.00017 (-1.202)	-0.01470 (-0.914)
ch. inside ownership	0.00005 (1.443)	0.00103 (0.179)	0.00007 (1.618)	0.00716 (1.265)	0.00007 (1.286)	0.00411 (0.709)
NYSE	-0.00834 (-6.241)***	2.784 (11.619)***	-0.00801 (-4.327)***	2.637 (11.233)***	-0.00936 (-4.499)***	2.91400 (12.308)***
std.dev.	0.01837 (1.553)	-4.397 (-2.074)**	0.18300 (7.551)***	-2.568 (-0.835)	0.21000 (8.827)***	4.47100 (1.650)
ln(volume)	-0.00296 (-4.466)***	0.08102 (0.682)	-0.00574 (-9.029)***	0.119 (1.477)	-0.00586 (-9.423)***	0.10600 (1.503)
Adj. R^2	0.671	0.546	0.594	0.539	0.580	0.567

*** Rejection of null at 1% level, ** at 5% level, * at 10% level.

Table V
Cumulative Responses

Figures in tables are means.

	Commercial Bank Underwritten	Investment Bank Underwritten	(t-test of diff.) [Wilcoxon rank sum test of diff.]
A. Days 1-20			
Cumulative midpoint response after 5 trades	0.00151	0.00140	(-0.597) [-0.389]
Cumulative midpoint response after 30 trades	0.00228	0.00242	(0.330) [0.346]
B. Days 21-40			
Cumulative midpoint response after 5 trades	0.00340	0.00257	(-2.059)** [-2.814]***
Cumulative midpoint response after 30 trades	0.00524	0.00370	(-2.082)** [-2.509]**
C. Days 41-60			
Cumulative midpoint response after 5 trades	0.00331	0.00328	(-0.054) [-1.118]
Cumulative midpoint response after 30 trades	0.00498	0.00442	(-0.749) [-1.040]

*** Rejection of null at 1% level, ** at 5% level, * at 10% level.

Table VI
Cumulative Response Regressions

	Days 1 to 20		Days 21 to 40		Days 41 to 60	
Dependant Variable:	Cumulative response – 5 lag	Cumulative response – 30 lag	Cumulative response – 5 lag	Cumulative response – 30 lag	Cumulative response – 5 lag	Cumulative response – 30 lag
constant	0.00715 (3.022)***	0.00404 (0.651)	0.01599 (5.570)***	0.02840 (4.722)***	0.01567 (5.141)***	0.01728 (3.189)***
commercial/ investment	0.00015 (0.900)	-0.00005 (-0.113)	0.00090 (2.756)***	0.00174 (2.547)**	0.00012 (0.295)	0.00059 (0.849)
after June97	0.00078 (3.775)***	0.00065 (1.200)	0.00098 (2.495)**	0.00039 (0.477)	0.00265 (5.535)***	0.00322 (3.789)***
underpricing	0.00000 (0.560)	0.00000 (0.139)	0.00000 (0.059)	0.00000 (0.222)	0.00000 (0.771)	-0.00001 (-1.029)
mkt. share	0.00000 (0.189)	0.00000 (0.043)	0.00006 (1.094)	0.00008 (0.719)	0.00009 (0.473)	0.00009 (0.763)
ln(age)	0.00006 (0.647)	0.00012 (0.517)	0.00012 (0.265)	0.00008 (0.235)	-0.00001 (0.056)	0.00003 (0.072)
price	-0.00005 (-2.003)**	-0.00012 (-1.678)*	-0.00004 (-0.961)	0.00000 (0.074)	0.00000 (0.131)	0.00002 (0.209)
ch. inside ownership	0.00000 (-0.588)	-0.00002 (-1.013)	-0.00002 (-1.177)	0.00000 (0.228)	-0.00001 (0.593)	-0.00002 (-0.661)
NYSE	0.00161 (4.478)***	0.00147 (1.562)	0.00389 (5.722)***	0.00365 (2.565)**	0.00245 (3.052)***	0.00172 (1.206)
std.dev.	0.00354 (1.154)	0.00636 (0.791)	0.04797 (5.562)***	0.10500 (5.793)***	0.05217 (5.875)***	0.07270 (4.606)***
ln(volume)	-0.00038 (-2.219)**	-0.00004 (-0.095)	-0.00114 (5.055)***	-0.00219 (-4.615)***	-0.00124 (-5.321)***	-0.00137 (-3.321)***
Adj. R^2	0.279	0.027	0.378	0.281	0.391	0.213

*** Rejection of null at 1% level, ** at 5% level, * at 10% level.