Capacity Constraints and IPO Underpricing in the Property and Liability Insurance Industry

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Abstract: We analyze the impact of capacity constraints on IPO underpricing in the US property and liability (P&L) insurance industry. Our results show that insurer IPOs experience much less underpricing when insurers go public during capacity-constrained periods. Monte Carlo simulation shows that IPOs in other industries do not exhibit similar traits, suggesting our findings are specific to the P&L insurance industry. In addition, our regression analyses confirm that IPO underpricing is negatively associated with P&L insurance industry capacity measures. Going public provides P&L insurers with better access to the capital market, thus alleviating the constraint on their capacity to provide insurance coverage. However, going public after capital shocks may not be ideal for firms whose performance is adversely affected by shocks due to higher IPO costs and stricter disclosure requirements. IPOs during capacity-constrained periods are less underpriced since capacity constraints assist in screening out poor performers. [Key words: IPO, underpricings, information asymmetry, quality screening]

INTRODUCTION

Both anecdotal and academic evidence show that the US property and liability (P&L) insurance market is cyclical. The property and liability insurance industry periodically experiences so-called "capital shocks" when insurers make large claim payments to cover unexpected losses.

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Examples include (1) the liability insurance crisis in the mid-1980s, (2) major catastrophic loss events in late 1980s and early 1990s, and (3) the period following the 2001 World Trade Center (WTC) attack. A large increase in claim costs greatly reduces insurers' capital and their capacity to offer insurance (Winter, 1994; Gron, 1994; Froot and O'Connell, 1999; Lai et al., 2000). One way for insurers to replenish capital and alleviate capacity constraints is to go public.

We examine the impact of capacity constraints on IPO underpricing in the US property and liability insurance industry. IPO underpricing exists when the IPO offer price on average is below the first-day closing price. Studies show that IPO underpricing is more severe when information asymmetry exists among parties involved in an IPO transaction. As insurance firms are affected heterogeneously by capital shocks, an increase in loss uncertainty makes it more difficult for investors to estimate the future growth potential of individual insurers (Cummins and Lewis, 2002). As a result, capital shocks lead to an increase in information asymmetry among corporate insiders, outside investors, and policyholders. The conventional wisdom predicts greater IPO underpricing in capacity-constrained periods.

Interestingly, our findings do not support this view. We find that IPO underpricing is significantly lower during capacity-constrained periods than during non-constrained periods. Our results support the concept of "quality screening" introduced in Yu, Brooks, and Chen (2003). They show that low-quality firms have little incentive to issue equity when their net present value (NPV) of investing in a new project after adjusting for the cost of issuing equity is negative. After major capital shocks, large claim payments may have a different impact on an insurer's future performance. Shocks may not significantly reduce performance of well-diversified insurers if they can reallocate capital internally, e.g., receiving subsidies from non-P&L lines or profiting from post-shock price increases.[1] However, capital shocks may have a greater impact on the growth potential of firms with limited resources to cover the unexpected claim costs. These firms may have to spend a considerable amount of time to recover and regain financial stability even if they manage to survive capital shocks.

Lucas and McDonald (1990) suggest that firms typically do not issue equity if their stocks are undervalued. Firms whose future performance is severely influenced by capital shocks will have little incentive to go public immediately following major capital shocks. Moreover, disclosure requirements during the IPO process and subsequent analysts' coverage may require insurers to release more information about their status than desired. The unwillingness to reveal detailed loss information may discourage some insurers from going public during shock periods. These

insurers may prefer a private placement to a public offering. As capacity constraints reduce the likelihood of low quality firms to go public, asymmetric information regarding potential issuers' quality is reduced. This explains why we observe less underpricing during capacity-constrained periods.

The remainder of this study is organized as follows. Section 2 provides a literature review. Section 3 describes our sample and provides some descriptive statistics. Section 4 discusses methodologies, while section 5 presents the results of our empirical tests. Finally, section 6 offers conclusions arising from this study.

LITERATURE REVIEW

IPOs are on average underpriced. Ritter and Welch (2002) show that IPO underpricing persists across time and nations and that the average IPO underpricing in the US from 1980 to 2001 is over 18 percent. A large body of IPO studies attribute the underpricing phenomenon to information asymmetry that may take place between (1) the issuer and the underwriter/investor, (2) the issuer/underwriter and the investor, and (3) different groups of investors.[2] Baron (1982) proposes that underwriters' information about the new-issue market is superior to that of issuers. Therefore, issuers have an incentive to permit some underpricing to induce underwriters' best efforts in marketing shares. On the other hand, if asymmetric information occurs among different investors, underpricing becomes necessary to ease the concern of a winner's curse (Rock, 1986) or a negative informational cascade (Welch, 1992).[3] Moreover, consistent with the information asymmetry argument, Hanley (1993) and Sherman and Titman (2002) show that underwriters acquire investor information about market demand through underpricing.

The essence of the information asymmetry argument is that IPOs are underpriced to alleviate the information asymmetry among the issuer, investment banks, and investors. Proponents of this argument predict a positive relation between the magnitude of information asymmetry and IPO underpricing. An interesting phenomenon in the insurance industry, however, is that IPO underpricing tends to be lower when insurers experience capital shocks and when investors have more difficulty in estimating the future growth potential of individual insurers—i.e., the period when information asymmetry tends to be greater.

Yu, Brooks, and Chen (2003) shed light on this puzzling phenomenon by introducing a framework that jointly considers the "lemons"roblem and the quality screening effect. The quality screening effect pertains to a firm's

disincentive to issue equity when it has no positive NPV projects. Specifically, a shock may reduce a low-quality firm's growth potential while inflating the cost of raising external capital. Under certain conditions of low growth potential and/or high costs of going public, the cost-adjusted NPV of going public for some firms could turn negative during capacity-constrained periods. Low-quality firms would have no incentive to go public in shock periods. As a result, screening is stronger or the cost of mimicking is higher during capacity-constrained periods. The quality screening hypothesis suggests that low-quality issuers are purged during capacity-constrained periods. Thus, the relationship between the magnitude of information asymmetry and IPO underpricing is not necessarily positive since capacity constraints in the insurance industry increase both the industry-wide asymmetric information and the quality screening effect.

Several studies on seasoned equity offerings (SEOs) find evidence that is consistent with the quality screening argument. Gron and Lucas (1998) find that capital market reactions were more favorable for firms raising equity funds during the mid-1980s liability insurance crisis than in other periods. Cornett and Tehranian (1994) discover a more favorable reaction to the banking industry equity offerings when equity is issued to meet involuntary equity reserve requirements versus when proceeds are used for other discretional purposes. Moreover, Yu, Brooks, and Chen (2003) suggest that the announcement effect of SEOs in outperforming industries is more negative than the announcement effect of SEOs in underperforming industries. The benefit from issuing new equity is lower for poorer-performing firms in underperforming industries than for their counterparts in outperforming industries.

DATA

Sample

Our sample includes IPOs issued by property and liability insurers from January 1982 through December 1998, a period covering both (1) the liability insurance crisis of the 1980s and (2) the catastrophic loss period of the early 1990s. We exclude IPOs during the "Dot-Com" era of the late 1990s when IPOs were significantly underpriced. Using IPO data from the Security Data Corporation (SDC) database, we find that the average IPO underpricing during the period from 1982 to 1998 is 12.5 percent. By contrast, the average IPO underpricing in 1999 and 2000 is 48 percent, indicating that the nature of IPOs in the late 1990s differs significantly from those in the prior period.

Table 1. Sample Selection Process for P&L Insurer IPOs

	Number of firms
Initial list of P&L insurance firms identified with CRSP, with SIC codes of 6330, 6331, 6350, 6351, 6360, 6361	99
Merge with SDC database	71
Additional IPOs identitied with SDC	7
Delete non-insurance firms due to misclassification	5
Delete firms with less than 50 percent business in P&L lines	12
Final sample	61

We describe our sample selection process in Table 1. The P&L insurer IPO sample is initially obtained from the Center for Research in Stock Prices (CRSP). CRSP allows us to trace each firm back to its IPO date. A firm is treated as a property and liability insurer if its Standard Industrial Classification (SIC) code is 6330, 6331, 6350, 6351, 6360, or 6361, and if the initial record of the firm appears in CRSP between 1982 and 1998. This process identifies 99 P&L insurers. The sample is then merged with SDC for IPO information, such as offer prices and proceeds. A total of 71 IPOs are identified.

SIC codes included in the CRSP database are occasionally inaccurate. This could lead to either the exclusion of some P&L insurers that should be included in our sample or misclassification of some non-insurance firms as P&L insurers. To avoid sample misclassification as a result of errors in CRSP SIC codes, we identify a sample of P&L insurers from the SDC database with the qualified SIC codes. We add 7 P&L insurers after merging this list with the CRSP sample. We review the 78 public firms' business descriptions and remove 5 firms that apparently belong to other industries.

Another problem with using SIC codes is that sometimes the main SIC codes do not represent the dominant business segment of a firm. Some firms may include segments that have a substantial portion of non-insurance business operations. To mitigate this problem, we obtain segment information from the Compustat Database and calculate the percentage of sales generated from segments using the above six SIC codes. To be included in the final sample, the firm must have at least fifty percent of its revenue derived from property and liability insurance. The final sample contains 61 insurer IPOs. The complete list of our sample firms is provided in Appendix A.

Table 2. Summary Statistics of Insurer IPOs from 1980 to 1998[1]

Year	Number of IPOs	Offer price ($) mean/median ($)	Proceeds mean/median (million $)	Insurance sample mean/median underpricing (%)	All IPOs mean/median underpricing (%)
1982	1	8.0/8.0	3.2/3.2	–0.8/–0.8	10.6/6.8
1983	2	6.5/6.5	6.75/6.75	2.3/2.3	12.8/6.4
1984	1	12.0/12.0	10.5/10.5	–3.1/–3.1	2.7/1.2
1985	2	17.4/13.4	415.6/415.6	5.9/5.9	10.0/5.1
1986	12	11.6/10.5	16.0/9.75	1.5/–0.1	9.1/4.2
1987	5	10.0/12	17.6/18.0	3.9/0.1	8.6/4.3
1988	1	6.3/6.3	4.6/4.6	6.0/6.0	8.6/3.3
1989	2	7.8/7.8	5.1/5.05	0.1/0.1	10.0/4.8
1991	7	16.3/16.5	122.6/72.5	5.5/1.9	11.1/5.4
1992	7	16.5/15.3	70.8/77.6	8.3/5.5	8.1/1.4
1993	10	16.0/13.8	238.5/36.1	7.0/6.5	9.7/6.9
1994	1	12.0/12.0	36.5/36.0	0.0/0.0	9.7/3.5
1995	3	16.6/16.0	119.8/148.5	17.3/15.4	20.4/14.2
1996	5	19.1/16.0	75.3/37.5	7.0/5.0	16.7/9.4
1997	1	18.5/18.5	46.3/46.3	29.1/29.1	23.5/12.5
1998	1	6.5/7.5	9.4/9.4	0.0/0.0	17.7/9.3
Full sample	61	13.5/13.9	86.1/28.0	5.5/3.2	12.5/6.4

[1]Insurance IPO underpricing is computed by subtracting the offer price from the first-day closing price, then dividing by the first-day closing price. The mean/median offer price is the equally weighted mean/median insurer IPO offer price in a given year. The mean/median proceed is the equally weighted mean/median of insurer IPO proceeds in a given year. Insurance sample mean and median underpricing are the equally weighted mean and median underpricing of insurer IPOs in a given year. All IPOs mean and median underpricing is the equally weighted mean and median underpricing of all IPOs in a given year.

Descriptive Statistics

Table 2 shows that the equally weighted mean offer price is $13.50 and the median is $13.90. This finding is generally consistent with other studies examining IPOs of non-financial firms. Purnanandam and Swaminathan (2001) report a mean (median) offer price of $12.08 ($12.00). The distribution of insurer IPO proceeds is quite skewed. The mean IPO proceeds of the insurer IPO sample is $86.12 million, while the median IPO proceeds

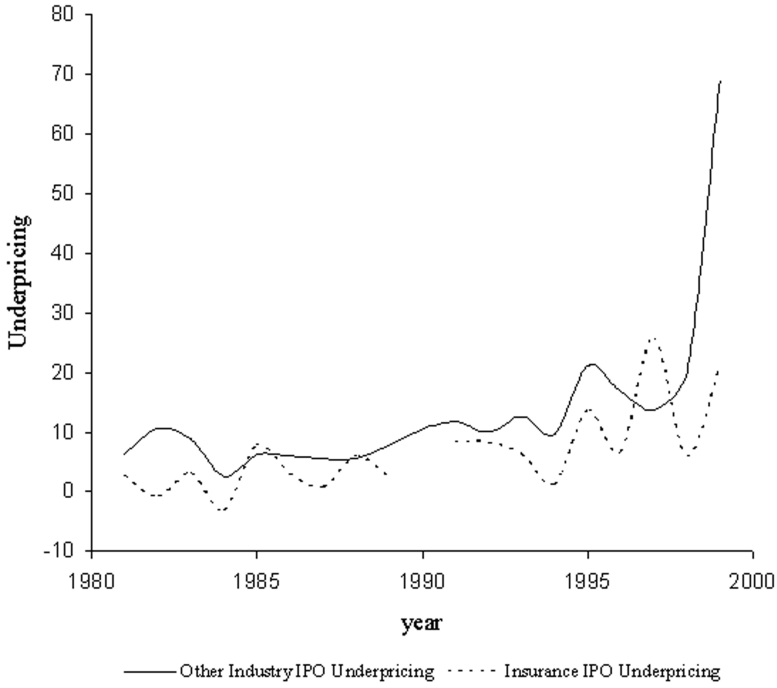

Fig. 1. Insurance IPO Underpricing vs. Other-Industry IPO Underpricing
Insurance IPO underpricing is computed by subtracting the IPO first-day offer price from the first-day closing price, then dividing by the first-day offer price. Data on IPO underpricing of other industry sectors are obtained from Ritter and Welch (2002).

of the IPO sample is $28 million. Ritter and Welch (2002) report that the average IPO proceeds of all industry sectors between 1980 and 1998 is $78 million. The difference in IPO offer sizes of the insurer IPO sample and all IPOs may be due to the size of insurance companies relative to the size of other firms.

In addition, Table 2 reveals that insurer IPOs are much less underpriced than IPOs of other industries. The equally-weighted mean/median insurer IPO underpricing is 5.5/3.2 percent, while that of all IPOs is 12.5/6.4 percent.[4] Our results are consistent with Rahman and Yung (1999), who examine insurer IPOs from 1983 to 1990. They find an average underpricing of 5.1 percent. In addition, Table 2 also shows there is a high incidence of P&L insurers' going public during the capacity-constrained periods. Year 1986 (one of the representative years of the liability insurance crisis) and 1993 (a high catastrophic loss year) rank first and second in the number of

IPOs (12 IPOs in 1986 and 10 IPOs in 1993). This is consistent with the Cummins and Danzon (1997) analysis that shows insurance firms raising more capital during capacity-constrained periods.

Figure 1 illustrates the difference between the magnitude of underpricing in the P&L insurer IPO sample and that of all-industry IPOs documented in Ritter and Welch (2002). Insurer IPO underpricing and all-industry IPO underpricing are highly correlated. The Pearson correlation test shows that the correlation between underpricing for our insurer sample and for those documented in Ritter and Welch (2002) is 0.61.

METHODOLOGIES

Measure of IPO Underpricing

Following Ritter (1984), IPO underpricing is calculated using the first-day return of an IPO:

$$Underpricing = (Closing\ Price - Offer\ Price) / Offer\ Price$$

The IPO offer price is subtracted from the closing price on the first trading day, then scaled by the IPO offer price. If the first-day closing price is not available, the mid-price of bid and ask is used.

Empirical Design

First, we conduct univariate comparisons of insurer IPO underpricing in capacity-constrained periods and non-constrained periods. We measure the magnitude of the capacity constraint in the insurance industry using the following two methods. First, we classify our sample period into the capacity-constrained and non-constrained periods. Within our sample period, the 1984–86 period is known to be a hard market period for the P&L insurance industry, when insurers faced significant capacity constraints.[5] Moreover, studies treat the late 1980s and early 1990s as periods with large catastrophic losses. We compute the total amount of catastrophe losses for the late 1980s and early 1990s, and find that industry losses are much higher in 1989, 1992, 1993, and 1994.[6] Consequently, we define capital-constrained periods to be (1) the hard markets in the P&L industry and (2) years with large catastrophe losses.

Second, we conduct multivariate regressions to examine how insurer IPO underpricing responds to capacity constraints in the insurance market after we control for other factors, such as issue size and market timing. We measure industry capacity with (1) the ratio of policyholders' surplus to total assets and (2) the ratio of policyholders' surplus to gross domestic

product (GDP). These measures, frequently used in insurance industry research, simultaneously reflect the current industry surplus position and future liabilities. The capacity constraint is more severe when these ratios are lower. Data used to construct these industry capacity measures are obtained from various annual editions of *Best's Aggregates and Averages: Property and Liability*. Besides capacity measures, our analysis includes a number of control variables regarding IPO offer size, aggregate IPO proceeds, and market and industry conditions.

Monte Carlo Simulation

We conduct Monte Carlo simulation to examine whether our findings are specific to the insurance industry. We simulate 1,000 insurer IPO samples in capacity-constrained and non-constrained periods. With replacement, we randomly pick up the same number of IPOs as in those periods from the general IPO sample in each draw. Two sample comparisons on the simulated data are constructed, including a t-test for the mean comparisons and the Wilcoxon Ranked Sum test for the median comparisons. We evaluate the percentile of actual test statistics—i.e., empirical *p* values—to examine the significance level of our actual test statistics, including the t-statistic and z-statistic of the Wilcoxon Ranked Sum test using insurer IPO samples.

EMPIRICAL FINDINGS

IPO Underpricing: Constrained versus Non-Constrained Periods

We begin our analyses by examining the difference in insurer IPO underpricing during capacity-constrained and non-constrained periods. In Panel A of Table 3, the liability insurance crisis period (1984–86) is treated as a capacity-constrained period. The mean and median IPO underpricing during constrained and non-constrained periods and the associated t-statistic and z-statistic using Wilcoxon Ranked sum test are reported in the "Insurance IPO Sample" section.

The mean underpricing in the non-constrained period is 6.8 percent, as compared to 1.8 percent during the constrained period. Similarly, the median underpricing in the non-constrained period is 4.4 percent, compared with 0.1 percent in the constrained period. The mean and median differences of underpricing between IPOs in constrained and non-constrained periods are –5.0 percent and –4.5 percent, respectively, significant at the five and ten percent levels. In untabulated tests, we examine

Table 3. Comparisons of IPO Underpricing: IPO Sample vs. Simulated Data[1]

	Number of IPOs	Mean (%)	T-statistic (difference in mean)	Median (%)	Z-statistic (difference in median)
Panel A: Insurance Hard Market as the Capital-Constrained Period					
Insurance IPO sample					
Hard market (1984–1986)	15	1.8	–5.0 (–2.91)*	0.1	–4.5 (–2.71)*
Soft market	46	6.8		4.4	
Simulated IPO samples					
Hard market (1984–1986)	15	9.6	–3.7 (–0.46)	2.8	–2.0 (–0.73)
Soft market	46	13.3		4.8	
Panel B: Insurance Hard Market and High-Catastrophic-Loss Periods as the Capital-Constrained Period					
Insurance IPO sample					
Hard market and catastrophic period	25	3.4	–3.6 (–2.00)**	1.6	–3.0 (–1.92)**
Non-constrained period	36	7.0		4.3	
Simulated IPO samples					
Hard market and catastrophic period	25	9.4	–3.5 (–0.78)	2.7	–3.2 (–0.91)
Non-constrained period	36	13.9		5.9	

*Significant at 1%. **Significant at 5%. ***Significant at 10%

[1]Insurer IPO underpricing is computed by subtracting the offer price from the first-day closing price, then dividing by offer price (first-day return). In Panel A, capacity-constrained periods include only years of the liability insurance crisis (1984–1986). The rest are considered to be non-constrained periods. In Panel B, capacity-constrained periods include both the liability insurance crisis (1984–1986) and high-catastrophic-loss periods (1989, 1992, 1993, and 1994). We simulate 1000 insurer IPO samples in capacity-constrained and non-constrained periods by randomly drawing the same number of IPOs as those in the capacity-constrained and the non-constrained periods, respectively, from the universal IPO sample. Two sample comparisons on the simulated data are constructed, including a t-test for the mean comparisons and the Wilcoxon Ranked Sum test for the median comparisons. We report the two-sample comparison results using actual insurance IPO sample in the "Insurance IPO sample" section and report the average of two-sample comparison results using simulated samples in the "Simulated IPO sample" section (t-statistics are reported in parentheses).

the relative underpricing of insurance IPOs to the general-market IPOs. We find that insurer IPOs are more underpriced relative to the general IPO (all non-insurance IPOs from SDC) underpricing during capacity-constrained periods. Specifically, the mean underpricing of insurer IPOs during the liability crisis period is 1.8 percent, while that of general-market IPOs is 7.8 percent. The difference is significant at the one percent level.

Gron and Lucas (1998) find that the capital market reacts to seasoned equity offerings (SEOs) issued by insurance companies more favorably than SEOs during capacity-constrained periods. They offer two possible explanations for their findings. One is that the need for capital is more apparent in capacity-constrained periods, making SEOs more attractive. Alternatively, they suggest that the improved market response to SEOs in capacity-constrained periods also is attributable to the coincidence of the insurance industry hard market and hot market conditions when SEOs are typically more favorably priced. To ensure that our results are not driven by the overall IPO market condition, we conduct Monte Carlo simulation that randomly draws IPOs from the entire IPO universe. The results are reported under the section titled "Simulated IPO samples" in Table 3.

Specifically, to construct Panel A, we randomly draw 15 constrained-period IPOs and 46 non-constrained-period IPOs from the IPO universe. Using simulated data, we find that the mean and median differences of underpricing during the capacity-constrained period versus the non-constrained period are insignificant. This result suggests that the average of random draws from the IPO universe does not exhibit the same trait indicated in our insurer IPO sample. In addition, we also evaluate the empirical p values of the t-statistic for the mean difference and z-statistic for the median difference as reported in the "insurance IPO sample" section.[7] They are 2.4 percent and 12.5 percent, respectively. This suggests that it is unlikely that our results are random realizations of general IPO samples.[8]

Panel B of Table 3 reports our results when high-catastrophic-loss years (1989, 1992, 1993, and 1994) are added to capacity-constrained periods. Mean (median) underpricing in capacity-constrained periods is 3.4 (1.6) percent, while that in non-constrained periods is 7.0 (4.3) percent. The differences in both cases are significant at the ten percent level. In contrast, underpricing in the capacity-constrained period is significantly lower than that in the non-constrained period. Empirical p values of the t-statistic for the mean difference and z-statistic for the median difference using insurer IPO data are 9.6 percent and 18.9 percent, respectively.

In sum, the results reported in Table 3 suggest that insurance companies that go public during capacity-constrained periods are less underpriced. This phenomenon cannot be replicated with random realizations

of general IPOs. This result is consistent with the quality screening argument that predicts less IPO underpricing for P&L insurers during constrained periods than in non-constrained periods.

Multivariate Analyses of Insurance IPO Underpricing

Besides the capacity measures defined in the methodology section, we include the following control variables: (1) IPO offer size, (2) aggregate IPO market proceeds, (3) market and industry conditions, and (4) a dummy variable to indicate if an IPO was issued in the 1990s.[9] The regression model takes the following form:

Underpricing = f (Capacity, Firm IPO size, Aggregate IPO market proceeds, Market and industry conditions, Post_90)

First, we control for offer size by including the natural logarithm of gross IPO proceeds. Second, we control for overall IPO market activities by using the logarithm of total IPO proceeds in each year. Third, we control for the impact of market or industry conditions on insurer IPO underpricing. Investor over optimism may drive up the price of IPOs, leading to IPO underpricing. Huang and Levich (1999) use the stock market trend in the month prior to the offering as an indicator of investor sentiment. Specifically, we measure investor sentiment as the ratio of the value-weighted market index level during the month of an insurer IPO divided by the average of the value-weighted market index levels in the past six months. Moreover, we also consider the impact of industry conditions on IPO underpricing by constructing an industry return proxy. We calculate monthly value-weighted industry returns by including firms with the targeted SIC codes. The industry return proxy is computed as the ratio of the value-weighted industry return in the month of an insurance IPO divided by the average of the value-weighted returns in the past six months.[10]

Finally, Fenn and Cole (1994) and Polonchek and Miller (1999) suggest that the well-publicized asset quality problem of two major life insurance companies in 1990 greatly changed investors' perception on insurers' risk-taking behavior. Fenn and Cole suggest that concerns about insurers' asset quality could aggravate the "lemons" problem in the insurance industry after 1990. As a result, we include the dummy variable Post_90 to control for the difference in the magnitude of information asymmetry before and after 1990.

Table 4 reports the regression results, including industry capacity measures and IPO size as explanatory variables. Regressions (1) and (3) include capacity and the logarithm of IPO offer size. We find that the coefficient on the surplus-asset ratio is 0.86 (reported in Regression 1) and

Table 4. Additional Regression Results of IPO Underpricing[1]

	Surplus-asset ratio as capacity measure		Surplus-GDP ratio as capacity measure	
	(1)	(2)	(3)	(4)
Intercept	–0.24 (–2.75)**	–0.60 (–2.73)*	–0.05 (–1.52)	–0.21 (–0.82)
Capacity	0.86 (3.00)*	0.95 (2.54)*	3.21 (3.03)*	3.80 (3.13)*
Log (Offer size)	0.01 (1.51)	0.005 (0.79)	0.01 (0.67)	0.004 (0.66)
Log (Market IPO proceeds)		0.006 (0.38)		–0.009 (–0.52)
Market condition		0.04 (0.24)		0.08 (0.51)
Industry condition		0.13 (0.75)		0.08 (0.48)
Post_90		0.03 (1.25)		–0.03 (–0.93)
Number of observations	61	61	61	61
Adjusted R-square	0.14	0.16	0.14	0.14

*Significant at 1%. **Significant at 5%. ***Significant at 10%.

[1]The dependent variable is IPO underpricing, computed by subtracting the IPO offer price from the first-day closing price (first-day return) then dividing by the first-day closing price. The surplus-asset ratio is defined as the aggregate industry surplus / aggregate industry assets. The surplus-GDP ratio is defined as aggregate industry surplus / GDP. The log of the insurer firm IPO proceeds is used to control for the size of the firm. The logarithm of the total market IPO proceeds is used to control for IPO market activities. Finally, market condition is measured as the ratio of value-weighted market index level for the IPO month divided by the average of value-weighted market index level in the past six months. Industry returns are computed as the ratio of the value-weighted industry return in the month of an insurer IPO divided by the average of the value-weighted returns in the past six months. Post_90 equals 1 for post-1990 IPOs and 0 otherwise. t T=statistics are reported in parentheses.

the coefficient of surplus-GDP ratio is 3.21 (in Regression 3), both significant at the one percent level. This result supports the quality screening effect argument, in which the magnitude of IPO underpricing is smaller when the industry has lower capacity.[11] We find the coefficient of the logarithm of IPO offer size is insignificant. One possible explanation is that

since the insurance industry is among the highly regulated industries, insurer IPO offer size may contain little added information.

In regressions (2) and (4), we include other control variables for the IPO underpricing regression, including (1) aggregate IPO proceeds and (2) market and industry conditions, and (3) post_90. The coefficients of alternative capacity measures continue to suggest a positive relationship between capacity and IPO underpricing.

To check the robustness of our results, we perform several other analyses. For brevity, we discuss our major findings here but the detailed results are not provided. First, a concern with regressing IPO underpricing against contemporaneous capacity measures is that firm IPO decisions could lag the catastrophe losses. Particularly, if a major portion of catastrophic losses were realized during the latter part of a year, a firm's decision to go public could be made in the next year on the basis of loss information in the prior year. To address this concern, we regress IPO underpricing on lagged capacity measures and find that the coefficients of capacity measures are still positive and significant.[12] Second, we check the impact of influential observations by removing observations with relatively high values of DFBETA for the coefficient on alternative capacity measures.[13] Our results remain consistent. Third, we construct alternative measures to control for market conditions. We use the issuance market condition measures in Bayless and Chaplinsky (1996) to categorize periods as hot, cold, or normal. We do not find these market condition dummies to have any explanatory power on insurer IPO underpricing.

CONCLUSION

In the insurance industry, an insurer's capacity is a critical factor in determining performance and future growth. This study analyzes the impact of capacity constraints on insurer IPO underpricing. We showthat insurer IPO underpricing during capacity-constrained periods is much lower than that in non-constrained periods. Going public provides insurance firms with a better access to the capital market, thus alleviating the constraint on an individual insurer's capacity to provide insurance coverage. However, going public after a capital shock may not be a wise choice for insurers whose performance is severely affected by the shock because of higher IPO costs and additional disclosures. IPOs during capacity-constrained periods are less underpriced because capacity constraints help to screen out poor performers. Therefore, our findings are consistent with the view of quality screening under which insurer IPO underpricing

reflects the joint impact of the "lemons" problem and the quality-screening phenomenon.

NOTES

[1] Cummins and Lewis (2002) suggest that insurance buyers flight to quality after major catastrophic events. Chen, Lin, and Yu (2003) illustrate that those P&L insurance firms more severely shocked by the WTC attack, on average, have better post-attack growth.

[2] A number of other theories are not information-asymmetry based. For example, Tinic (1988) argues that issuers underprice to reduce their legal liability; Mello and Parsons (1998) and Stoughton and Zechner (1998) suggest that underpricing allows the creation of blockholders, which increases monitoring; Ruud (1993) suggests that underpricing of IPOs may be due to the price support of underwriters, which effectively curtails the left tail of the distribution of initial returns of an IPO. The predictions of these theories, however, have little explanatory power on the difference in insurance IPO underpricing during capacity-constrained periods and non-constrained periods. To see how other factors affect insurance IPO underpricing, refer to Rahman and Yung (1999).

[3] In a winner's curse, investors fear that they will receive full allocations only if they happen to be among the optimistic investors. An investor would receive a full allocation of overpriced IPOs but only a partial allocation of underpriced IPOs. Thus, the investor's expected return conditioned on receiving shares would be below the investor's reservation return. To break even, IPOs need to be underpriced. In an informational cascade, investors attempt to judge the interest of other investors. They request shares only when they believe the offering is hot. Overpricing leaves the issuer with a high probability of complete failure in which investors abstain because other investors abstain.

[4] We calculate all-IPO under pricing using data from SDC. Our results are consistent with Ritter and Welch (2002), who report an average underpricing of 18.8 percent over the period of 1980 to 2001.

[5] Some studies (e.g., Harrington and Danzon, 1994) do not count 1984 as hard market. As a robustness check, we exclude the year 1984 from the hard market period and obtain similar results as those reported here.

[6] We calculate the by-year catastrophe losses using loss data from the Property Service Office (PSO) database. Insurable catastrophe losses in 1989, 1992, and 1994 are 6.2 billion, 12.5 billion, and 11.5 billion, respectively. This is much higher than the average insurable catastrophe losses of 5.3 billion during 1990s.

[7] Statistical theory (e.g., Hall, 1992) suggests that cross-sectional inference based on t-statistics is more efficient that that based on the parameter itself.

[8] Empirical p values on t-statistics of the mean difference and z-statistics of the median difference are the percentiles of t-statistics and z-statistics of actual data in t-statistics and z-statistics in simulated data.

[9] Ideally, we should also consider individual insurers' capacity constraint. However, that is not included in our analysis mainly because insurance companies go public at the holding company level while insurance companies report to insurance regulators at the state and subsidiary level. The consolidation process could introduce a large amount of noise to the individual insurers' capacity measure. In addition, our access to insurance data goes back only to 1989, a period not covering the mid-1980s general liability crisis.

[10] Our results remain consistent when equally weighted market index level and industry returns are used.

[11] We also estimate the impact of capacity constraints on insurance IPO underpricing using simulated data. The coefficients on both capacity measures are insignificant, indicating that this result is unique to the insurance industry.

[12] We thank an anonymous referee for suggesting this test.

[13] DFBETA of a capacity measure is the change in the coefficient of the capacity measure with and without an observation divided by the standard deviation of coefficient of the capacity measure. The larger the value, the greater the observation's influence.

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Appendix 1. List of IPO Firms from 1981 to 1998

Issuer	Year
21st Century Holding Co	1998
Allmerica Financial Corp	1995
Allstate Corp	1993
AMBAC Inc	1991
American Re Corp	1993
American Reliance Group Inc	1986
Amerin Corp	1995
Amwest Insurance Group Inc	1985
Capital Re Corp	1992
Citizens Security Mutual Ins	1986
Condor Services Inc	1989
Donegal Group (Donegal Mutual)	1986
EMC Insurance Group	1982
Enhance Financial Svcs Grp	1992
Executive Risk Inc	1994
Exstar Financial Corp	1992
Fairmont Financial Corp	1983
Farm Family Holdings Inc	1996
Fireman's Fund Corp	1985
FPIC Insurance Group Inc	1996
Frontier Insurance Co	1986
Gainsco Inc	1986
Gryphon Holdings Inc	1993
Guaranty National Corp	1991
Harleysville Group Inc	1986
HCC Insurance Holdings Inc	1992
Home State Holdings Inc	1993
Horace Mann Educators Corp	1991
HW Kaufman Financial Group	1989
Integon Corp	1992
Intercargo Corp	1988

Table continues

Appendix 1. ***Continued***

Markel Corp	1986
Merchants Group	1986
Meridian Insurance Group Inc	1987
MGIC Investment Corp	1991
Midland Financial Group Inc	1992
Milwaukee Insurance Group Inc	1986
MMI Cos Inc	1993
Mutual Risk Management Ltd	1991
National Re Holdings	1992
Navigators Group Inc	1986
New York Marine & General Ins	1984
Omni Insurance Group Inc	1993
Pac Rim Holding Corp	1991
Pan Atlantic Re	1987
Paula Financial Co	1997
Penn-America Group Inc	1993
Philadelphia Consolidated Hold	1993
Phoenix Reinsurance Corp	1987
RISCORP Inc	1996
RTW Inc	1995
SCOR	1996
State Auto Financial Corp	1991
Symons International Group Inc	1996
Titan Holdings Inc	1993
Trenwick Group Inc	1986
Triad Guaranty Inc	1993
UniCare Financial Corp	1986
Victoria Financial Corp	1983
Walshire Assurance	1987
Western Acceptance Corp	1987

Data Source: Security Data Corporation (SDC) database and CRSP.