THE JOURNAL OF FINANCE • VOL. LIX, NO. 5 • OCTOBER 2004

Monitoring as a Motivation for IPO Underpricing

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ABSTRACT

Brennan and Franks (1997) and Stoughton and Zechner (1998) provide contrasting arguments for why monitoring considerations create incentives for managers to underprice their firms' IPOs (initial public offerings). Like Smart and Zutter (2003), we examine these arguments using a sample of U.S. IPOs. However, we find evidence that the determinants of initial returns, institutional shareholdings, and post-IPO likelihood of acquisition are not consistent with these arguments. Thus, we conclude that monitoring considerations are not important determinants of IPO underpricing.

EVIDENCE THAT THE PRICES OF UNSEASONED NEW ISSUES of common stock (IPOs) in early secondary market trading are substantially higher, on average, than their offer prices has evoked an extensive literature trying to explain such underpricing. While prior literature has tended to focus on uncertainty/asymmetric information stories for such underpricing (e.g., Rock (1986) and Benveniste and Spindt (1989)), recent literature has suggested that post-IPO ownership considerations are also important. More specifically, this literature has suggested that monitoring considerations create incentives for managers to underprice their firm's stock in its first public offering.

Brennan and Franks (1997), for example, argue that insiders have an incentive to underprice the IPO of their firm's stock in order to ensure its wide distribution, thereby reducing the likelihood of being monitored or removed by new shareholders, particularly institutional shareholders. Brennan and Franks call their hypothesis the reduced monitoring hypothesis. Consistent with their hypothesis, for a sample of 69 U.K. IPOs during 1986 to 1989, they find that: (1) Smaller applicants are allocated a larger share of oversubscribed/underpriced issues, and (2) the size and amount of subsequent outside large shareholdings are inversely related to the firm's degree of IPO underpricing.[1]

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[1] They examine the fraction of outside (nonaffiliated) holdings held by the largest outside shareholder and the fraction of outside holdings held by all large shareholders, where "large" shareholders are shareholders with more than 3% of the firm's stock.

In contrast to the reduced monitoring hypothesis is what might be referred to as the increased monitoring hypothesis. Stoughton and Zechner (1998) posit that large investors provide more monitoring than small investors and that an IPO firm's revenues are increasing in outside monitoring. Thus, they argue that entrepreneurs wishing to maximize firm value will want to ration IPO shares going to small investors in order to increase large investors' stakes in the firm. In their model, rationing is related to underpricing, and so underpricing will be correlated with large investors taking a greater stake in the post-IPO firm. Thus, Stoughton and Zechner's model makes different predictions than Brennan and Franks' model on this and other features of an IPO.

While Field and Karpoff (2002) suggest that their observation of a negative relationship between IPO antitakeover defenses and an IPO's likelihood of being subsequently acquired is consistent with Brennan and Franks' argument, they do not really directly test Brennan and Franks' arguments.[2] In this regard, Smart and Zutter (2003) provide more direct evidence. Smart and Zutter address the above contrasting arguments by comparing dual-class and single-class IPOs using a sample of U.S. IPOs from January 1990 through September 1998.[3] Based upon their sample, Smart and Zutter arrive at four important inferences with respect to the above monitoring arguments. First, dual-class IPOs are underpriced less than single-class IPOs, even when other factors influencing IPO underpricing are accounted for in the analysis. Second, dual-class IPO firms have higher early post-IPO average institutional ownership than single-class IPO firms. Third, there is a significant negative relationship between early post-IPO institutional ownership and the initial returns of single-class IPOs. Fourth, dual-class firms face significantly lowered odds of being acquired due to their dual-class stock structure. Based upon these inferences, Smart and Zutter conclude that monitoring/control is a motivation for IPO underpricing and that their evidence is broadly consistent with Brennan and Franks' arguments.

The evidence presented by Smart and Zutter raises several concerns that motivate further study of these issues. First, they use a firm size/uncertainty proxy that was criticized in Habib and Ljungqvist (1998). Second, they estimate linear regressions on initial IPO returns that ignore underwriter stabilization efforts and so are biased for reasons shown in Asquith, Jones, and Kieschnick (1998). And finally, they estimate linear regressions on proportional data when Papke and Wooldridge (1996) show that such regression models are inappropriate for such data.

Addressing these concerns, we examine evidence from a sample of IPOs from January 1990 through December 1999 and arrive at different conclusions about the role of monitoring considerations in IPO underpricing. First, we find that

[2] Any argument that suggests that managers act to reduce takeover risk (e.g., Bebchuk (2002)) is also consistent with Field and Karpoff's evidence. The critical link in Brennan and Franks' argument on this issue is between IPO underpricing and institutional shareholdings.

[3] Such a comparison is attractive, as Brennan and Franks suggested, since control concerns are not important considerations for dual-class IPOs. Brennan and Franks did not perform such a comparison in their study because dual-class IPOs occur less frequently in the U.K. due to institutional rules.

dual-class IPOs are underpriced less than single-class IPOs because they are significantly larger, and therefore should be underpriced less under typical uncertainty/asymmetric information arguments. Second, institutional shareholdings in firms immediately after their IPO are driven by firm size and not by their underpricing or dual-class status. Third, firm size and total institutional shareholdings, rather than dual-class status or IPO underpricing, are significant influences on the likelihood of a firm being acquired within 3 years after its IPO. Consequently, while managers may be concerned with outside monitoring, such considerations are not important determinants of the underpricing of U.S. IPOs, nor is IPO underpricing an important determinant of institutional shareholdings in such firms. Thus, our evidence rejects the arguments of both Brennan and Franks (1997) and Stoughton and Zechner (1998).

To present our evidence, we organize this paper as follows. Section I presents our sample and selected comparisons of single-class and dual-class IPOs. Sections II, III, and IV present analyses of initial IPO returns, institutional investment in post-IPO firms, and control changes in post-IPO firms. Section V summarizes our evidence and conclusions.

I. Sample and Data

We draw an initial sample of IPOs from the Securities Data Corporation's (SDC) *New Issues* database for the time period January 1, 1990 through December 31, 1999, which includes Smart and Zutter's sample period. From this initial sample, we exclude unit offers, foreign firms, firms whose offer price was less than $5, financial service firms (e.g., closed-end mutual funds, etc.), and IPOs that were not firm-commitment offerings. The final sample consists of 3,441 firm-commitment IPOs. Three hundred and twenty-eight of these companies chose to go public with multiple classes of shares (dual-class IPOs).[4]

Table I shows the distribution of our single-class and dual-class IPOs by year within our study period. Overall, around 9.53% of our sample are dual-class IPOs, which compares with 7.2% in Field (1999) for a sample of 1,019 IPOs from 1988 through 1992 and 9.7% for Smart and Zutter's sample of 2,622 IPOs from January 1990 through September 1998. While the proportion of our sample IPOs that are dual-class IPOs is comparable with other studies, it is worth noting that the distribution of single-class and dual-class IPOs by year is not homogeneous because the likelihood-ratio chi-square statistic for this table is 18.89, which is significant at the 1% marginal significance level.

Table II provides information on our distribution of single-class and dual-class firms by industry grouping. We use the U.S. Department of Commerce's grouping of SICs into industries since Clarke (1989) shows that such aggregation is more appropriate for delineating economically relevant similarities and

[4] While we use SDC's database to initially identify dual-class IPOs, we check the resulting identifications against SEC filings and data on dual class IPOs available on Jay Ritter's home page (http://bear.cba.ufl.edu/ritter/dual-class-ipo.htm) in conjunction with Loughran and Ritter (2003).

Table I
Breakdown by Year and Offer Type

We drew the original sample from SDC's *New Issue* database and filtered on several standard criteria. Classification of IPOs was initially based upon information in the SDC's *New Issue* database, but this information was checked against SEC filings and a list of dual-class IPOs available on Jay Ritter's home page. The likelihood-ratio chi-square statistic of 18.89 for this table is significant at the 1% marginal significance level and so indicates heterogeneity in the distribution of single and dual class IPOs across time.

Year	Single-Class IPO	Dual-Class IPO
1990	84	9
1991	209	24
1992	285	18
1993	387	26
1994	303	32
1995	354	30
1996	534	62
1997	357	48
1998	214	31
1999	386	48
Total	3,113	328

differences. Two points arise from examining these data. First, a likelihood-ratio chi-square statistic of 130.53 rejects the null hypothesis that single-class and dual-class IPOs are distributed equivalently over these industrial groupings at the 1% level. Second, the incidence of dual-class IPOs is greatest (>39%) in the transportation, communication, and utilities industries. This second result is consistent with arguments that managers issue dual-class stock in order to pursue the private benefits of control, as this grouping of SICs includes

Table II
Breakdown by Industry and Offer Type

Industry groupings are based on each sample firm's 4-digit SIC (COMPUSTAT) and the Department of Commerce's classification of industries according to SICs. The likelihood-ratio chi-square statistic of 130.53 for this table is significant at the 1% marginal significance level and so indicates heterogeneity in the distribution of dual-class IPOs across industries.

Industrial Grouping	Single-Class	Dual-Class	Total
Agriculture, forestry, and fisheries (01–09)	8	4	12
Mineral industries (10–14)	74	5	79
Construction industries (15–17)	33	4	37
Manufacturing industries (20–39)	1,216	101	1,317
Transportation, communication, and utilities (41–49)	228	91	319
Wholesale and retail trade (50–59)	370	49	419
Service industries (70–89)	1,175	71	1,248

Table III

Descriptive Sample Statistics

The variable *Initial Return* is the ratio of the closing price of the stock on its first trading day less the offer price to its offer price. The variable *Offer Size* represents the global proceeds of the IPO. The variable *Sales* represents an IPO's net sales for the fiscal year not later than its offering date. The variable *Offer Revision* is the revision of an IPO's offer price (i.e., the ratio of the offer price less the expected price to the expected price, where the expected price represents the midpoint of the initial filing range). The percentage of total shares held by all institutional shareholders and the largest institutional shareholder are from the CDA/Spectrum database, and are based upon the first available data after a firm's IPO. The variable *Acquisitions* is identified from CRSP codes. The *p*-values associated with each statistical test (nonparametric test for medians, and homogeneity test for proportions) are reported within parentheses.

Variable	Single-Class IPOs	Dual-Class IPOs	Chi-Square Statistic
Initial Return (%)—median	9.48	6.25	5.34
			(0.02)
Offer Size ($ millions)	32.5	59.95	82.31
			(0.00)
Sales ($ million)—median	65.547	191.99	75.87
			(0.00)
Offer Revision—median	0	0	0.12
			(0.72)
Total Institutional Shareholdings (%)—median	18.61	23.06	7.91
			(0.00)
Largest Institutional Shareholding (%)—median	4.10	4.94	13.51
			(0.00)
Acquisitions (%)	10.89	8.66	1.30
			(0.24)

those that Demsetz and Lehn (1985) identified as providing the greatest scope for the pursuit of such private benefits. Together, these two points suggest the need to control for industry in subsequent analyses.[5]

We now turn to a discussion of the variables that will figure prominently in our subsequent statistical analyses. To begin, we compute the initial return of each sample IPO using its offer price and first trading day closing price. As reported in Table III, the median return of single-class firms is 9.48% while the median return of dual-class firms is 6.25%. These medians are significantly different at the 5% level according to a chi-square test statistic of 5.34. Thus, the unconditional distribution of initial returns of dual class IPOs does indicate that

[5] It is important to note that the incidence of IPOs across industries by year is not homogeneous, as such a distribution is associated with a likelihood ratio chi-square statistic of 369.77, which is significant at the 1% marginal level. In subsequent analyses, we allowed for heterogeneity across time and industry by including time and industry dummies. However, we derived inferences that were similar to our results when we just used industry dummies. Consequently, we just report regressions allowing for heterogeneity across industry, since any effects associated with heterogeneity across time appear to be captured in their industrial variation.

they are underpriced less than single-class IPOs, evidence that is consistent with Brennan and Franks' (1997) premise.

Next, we focus on measures of firm size, since this firm attribute is important in any uncertainty/asymmetric information story for IPO underpricing. Smart and Zutter (2003) follow Beatty and Ritter (1986) and use the global proceeds from an IPO, and specifically the logarithm of these proceeds, as their measure of firm size and/or proxy for the uncertainty associated with an IPO. As reported in Table III, the median proceeds of our sample dual-class firms are approximately \$59.95 million, while our median single-class proceeds are \$32.5 million. The median differences are significant at the 1% level according to a chi-square test statistic of 82.31. Thus, as in Smart and Zutter, our dual-class firms appear to raise more capital in their IPOs.

Unfortunately, this measure of the uncertainty/asymmetric information risk associated with an IPO is misleading for reasons given in Habib and Ljungqvist (1998). Rather than repeat their arguments, we will introduce additional concerns. Specifically, the dollar value of the global proceeds from an IPO is determined by how much stock the firm chooses to sell, not by how large the firm is: Two firms may be similar in sales and assets, but can differ according to this measure because of differences in how much stock they *choose* to sell initially. For similar reasons, market (stock) capitalization is also a poor firm size measure, as it is distorted by firms' capital structure choices.

We address these concerns by using a sample firm's net sales for the fiscal year not later than its offer date, specifically the logarithm of net sales, as our firm size measure. We should note that Ritter (1984) uses this as a measure of the asymmetric information risk associated with an IPO. Consequently, one finds this measure used as a proxy both for the uncertainty associated with an IPO as well as the asymmetric information risk associated with an IPO. As reported in Table III, this measure suggests that dual-class IPOs are significantly larger than single-class IPOs. This inference is important because under typical uncertainty/asymmetric information arguments, it implies that dual-class IPOs should have significantly lower initial returns than single-class IPOs. Consequently, our evidence that the unconditional median of dual-class initial returns is significantly less than the unconditional median of single-class initial returns may be explained by uncertainty/asymmetric information rather than by monitoring arguments.

Another factor that figures prominently in uncertainty/asymmetric information models, such as that in Benveniste and Spindt (1989), is the revision of an IPO's offer price subsequent to its road show. According to the Benveniste and Spindt model, this revision should be positively correlated with initial IPO returns if investment bankers reward institutional investors for the revelation of demand information prior to the issue's offer date. Following Hanley (1993), who provides evidence for such a relationship, we compute the offer price revision as the ratio of the difference between the offer price and the midpoint of the initial filing range to the midpoint of the initial filing range. The evidence reported in Table III suggests that there is no significant difference in the amount of offer price revision for either dual-class or single-class IPOs.

Next, addressing institutional investment in post-IPO firms, we use the CDA/Spectrum database to identify institutional shareholdings in each sample IPO for the date closest but subsequent to the IPO date, which is similar to the procedure of Brennan and Franks (1997) and Smart and Zutter (2003). We compute two measures of institutional ownership in our sample firms: the proportion of shares outstanding held by all institutional investors and the proportion of shares outstanding held by the largest institutional shareholder. We argue that these two measures of institutional ownership better capture all the relevant dimensions of such ownership, than say, average institutional ownership as used in Smart and Zutter.[6] Each of these measures captures a different dimension of institutional ownership: The first captures the collective ability of institutional shareholders to effect a change in management if desired, and the second captures the incentive of the largest institutional shareholder to monitor management. The likelihood ratio chi-square statistics reported in Table III suggest that there are significant differences between single-class and dual-class IPO in both the median largest and the median total institutional shareholdings. Such evidence is consistent with Brennan and Franks' arguments.

Finally, we consider how many of our sample firms were subsequently acquired within 3 years of their IPO. To conduct this analysis, we examine the CRSP (Center for Research in Security Prices) tapes for the deletion of a sample firm within 3 years of its IPO date and the reason for that deletion. Delisting codes in the range 200–242 represent companies that are acquired, whereas those in the range 551–585 belong to companies that are delisted by their exchanges for various other reasons.[7] As reported in Table III, 10.89% of our single-class firms and 8.66% of our dual-class firms were subsequently acquired. These differences, however, are not statistically significant.

The obvious question raised by the above analysis is which of these characteristics help discriminate between dual-class and single-class IPOs when such characteristics are jointly accounted for in the analysis. To address this question, we use logistic regression analysis and report the results in Table IV. Although not shown in the table, industry dummies are included for all but the manufacturing industries in these logistic regressions to control for potential industry-related influences on their incidence. Several important inferences can be drawn from these results. First, dual-class IPOs are not distinguished by significantly lower initial returns than single-class firms once other firm characteristics are accounted for in the analysis. Second, dual-class IPOs are significantly larger firms than single-class firms, whether measured by offer size or sales. Third, institutional shareholdings are significantly larger, both in aggregate and for the largest institutional shareholder, in dual-class than in single-class IPOs. While the first inference is inconsistent with Brennan and

[6] It is worth noting, however, that using average institutional shareholdings does not change our subsequent inferences, and that total institutional shareholding dominates average institutional shareholdings as an explanatory variable in subsequent regressions when both are included.

[7] Some of the reasons listed are "insufficient number of shareholders," "price fell below acceptable level," "bankruptcy," and "protection of investors and the public interest."

Table IV

Comparison of Single-Class and Dual-Class IPOs

This table reports results from a logistic discriminant analysis to determine which selected characteristics differentiate dual-class and single-class IPOs. The dependent variable takes on 1 for dual class firms and 0 for single class firms. The variable *Initial Return* represents the ratio of the closing price of the stock on its first trading day less the offer price to its offer price. The variable *Ln (Offer Size)* represents the logarithm of the global proceeds of an IPO. The variable *Ln (Sales)* represents the logarithm of an IPO's net sales for the fiscal year not later than its offer date. The variable *Offer Revision* represents the revision of an IPO's offer price (i.e., the ratio of the offer price less the expected price to the expected price, where the expected price represents the midpoint of the initial filing range). The fraction of total shares held by all institutional shareholders and the largest institutional shareholder are from the CDA/Spectrum database, and are based upon the first available data after a firm's IPO. The *p*-values associated with the null hypothesis that the coefficient equals zero are reported within parentheses. Standard errors for these tests are computed using robust standard error estimates. Note that each reported logistic regression includes industry dummy variables, not reported below.

	Dual-Class vs. Single-Class IPOs	Dual-Class vs. Single-Class IPOs
Intercept	–5.493	–5.288
	(0.00)	(0.00)
Initial Return	–0.422	–0.512
	(0.32)	(0.23)
Ln (Offer Size)	0.493	0.533
	(0.00)	(0.00)
Ln (Sales)	0.184	0.191
	(0.00)	(0.00)
Offer Revision	0.001	0.002
	(0.76)	(0.64)
Total Institutional Shareholdings	2.101	–
	(0.00)	
Largest Institutional Shareholding	–	2.434
		(0.01)
Likelihood ratio	106.53	94.50
	(0.00)	(0.00)
Pseudo R^2	0.10	0.08

Frank's arguments, the third inference is consistent with their arguments. Before we can draw conclusions from this evidence, however, we must account for the effect of firm size on both of these factors (initial returns and institutional shareholdings) since prior evidence shows that both factors are correlated with firm size.

II. Analysis of the Initial Returns of IPOs

According to Brennan and Franks' argument, firms underprice their IPOs in order to insure a wide distribution of their stock and thereby reduce the monitoring of management by outsiders, particularly institutional investors. Consequently, issuing dual-class stock, which enhances managerial control,

reduces this motivation and so should be associated with lesser underpricing. The above logistic regression results, however, suggest that dual-class IPOs may be underpriced less than single-class IPOs due to the fact that they tend to be larger firms, and therefore should be underpriced less under typical uncertainty/asymmetric information arguments. To address these contrasting conjectures, we examine what factors significantly influence the initial returns of our sample IPOs.

We conduct this examination in two stages. First, we follow the dominant practice in prior literature and assume that all initial IPO returns are drawn from a common distribution. We call this the homogeneity hypothesis. Next, we drop this assumption and recognize that some IPOs are stabilized by their underwriters in aftermarket trading. We call this the heterogeneity hypothesis.[8] Since the work of Hanley, Kumar, and Seguin (1993), it has been established that a significant number of IPOs are stabilized in aftermarket trading. Consequently, the initial return generating process must differ for stabilized and nonstabilized IPOs. Using a special data set, Aggarwal (2000) demonstrates that the mixture distribution proposed in Asquith et al. (1998) is a valid statistical characterization of the distribution of initial IPO returns. Therefore, we also use their mixture regression model to analyze the initial IPO returns in our sample.

Table V reports the results of regressing initial IPO returns on various factors under assumed homogeneity in initial IPO returns.[9] Because of our earlier logistic regression results, we incorporate terms for the interaction between firm size (net sales) and offer size and whether an IPO was a dual-class IPO. Doing so allows us to separate out the direct effect of being a dual-class firm from the indirect effect of firm size or offer size, since dual-class firms are larger firms making larger offerings. We include both offer size and firm sales in the regression to determine which dominates. The results reported in Table V imply several important inferences. First, offer size is an insignificant influence on initial returns when a better firm size proxy is incorporated into the analysis. Second, consistent with prior evidence and uncertainty/asymmetric information stories, firm size is a determinant of initial IPO returns. Third, while not significant, the positive coefficient on the dual-class dummy variable and the negative coefficient on the interaction between this dummy variable and firm size suggests that it was the larger size of dual-class IPOs' that likely accounts for their lower initial returns, as would be expected under uncertainty/asymmetric information stories. Finally, reinforcing the relevance of uncertainty/asymmetric

[8] Since Tukey (1960), it has been understood in the statistics literature that standard statistical methods are inappropriate for what Tukey called "contaminated normals." Unfortunately, much of the IPO literature continues to apply OLS to initial return data and so provides questionable statistical evidence.

[9] Like Smart and Zutter, we include dummy variables for indicating whether an IPO was a spin-off or backed by a venture capitalist. However, we do not report these results because the inclusion of these variables introduces severe multicollinearity when the industry dummies are also included. Further analysis suggests that this is due to the fact that most spin-offs and venture capitalist-backed IPOs are dominantly from only a couple of our industrial groupings.

Table V

Initial Returns Analysis—Homogeneity Assumed

This table represents OLS results. The dependent variable, *Initial Return*, is the ratio of the closing price of the stock on its first trading day less the offer price to its offer price. The variable *Ln (Offer Size)* represents the logarithm of the global proceeds of an IPO. The variable *Ln (Sales)* represents the logarithm of an IPO's net sales for the fiscal year not later than its offer date. The variable *Offer Revision* represents the revision of an IPO's offer price (i.e., the ratio of the offer price less the expected price to the expected price, where the expected price represents the midpoint of the initial filing range). The fraction of total shares held by all institutional shareholders and the largest institutional shareholder are from the CDA/Spectrum database, and are based upon the first available data after a firm's IPO. The variables *Dual-Class* and *Prior LBO* represent dummy variables that take on the value 1 if an IPO was a dual-class IPO or a prior LBO. The *p*-values associated with a null hypothesis that the coefficient is 0 are provided within parentheses. Standard errors for these tests are computed using robust standard error estimates. Note that each reported regression includes industry dummy variables, not reported below.

	Initial Return
Constant	0.156
	(0.00)
Ln (Offer Size)	0.005
	(0.66)
Ln (Sales)	–0.004
	(0.08)
Offer Revision	0.616
	(0.00)
Prior LBO	–0.056
	(0.00)
Dual-Class	0.035
	(0.55)
Dual-Class × *Ln (Offer Size)*	0.007
	(0.62)
Dual-Class × *Ln (Sales)*	–0.004
	(0.60)
	15.14
F statistic	(0.00)
Adjusted R^2	0.19

information stories is the result that initial returns are significantly correlated with offer price revisions and that prior LBOs have significantly lower initial returns. The first result is consistent with Benveniste and Spindt's (1989) model, and the second result is consistent with the importance of firm transparency as shown in Ang and Brau (2002).

Continuing our analysis, we now drop the homogeneity assumption and report the results of a mixture regression in Table VI. Another virtue of this approach is that Cook, Jarrell, and Kieschnick (2003) show that regime shifts in the U.S. IPO market are correlated with changes in the mix of supported and unsupported IPOs. Thus, this approach also adjusts for regime shifts during our study horizon. Like the results reported in Table V, no evidence is shown that dual-class IPOs are underpriced less than single-class IPOs once

Table VI

Initial Returns Analysis—Heterogeneity Assumed

Following Asquith, Jones, and Kieschnick (1998), this table reports the results of a mixture linear regression that accounts for underwriter stabilization of some IPOs. The dependent variable is the initial return of the IPOs in the respective groups, where the initial return is computed as the return from the offer price to the first trading day closing price. The variable *Ln (Sales)* represents the logarithm of an IPO's net sales for the fiscal year not later than its offering date. The variable *Offer Revision* is the revision of an IPO's offer price (i.e., the ratio of the offer price less the expected price to the expected price, where the expected price represents the midpoint of the initial filing range). The variables *Dual-Class* and *Prior LBO* are dummy variables that take on the value 1 if an IPO is a dual-class IPO or a prior LBO. The *p*-values associated with the null hypothesis that the coefficient equals 0 are reported within parentheses below coefficient estimates. Note that the reported mixture linear regression includes industry dummy variables, not reported below.

	Initial Returns of Nonstabilized IPOs	Initial Returns of Stabilized IPOs
Intercept	0.549	0.107
	(0.00)	(0.00)
Ln (Sales)	–0.002	0.001
	(0.05)	(0.50)
Offer Revision	0.397	0.417
	(0.00)	(0.00)
Prior LBO	–0.440	–0.015
	(0.21)	(0.17)
Dual-Class	0.149	0.005
	(0.21)	(0.84)
Dual-Class ×*Ln (Sales)*	–0.025	–0.005
	(0.19)	(0.31)
Chi-square statistic (Wald)		216.8
		(0.00)

the direct and indirect effects of firm size are accounted for in the analysis.[10] Further, like the results reported in Table V, the results reported in Table VI are consistent with uncertainty/asymmetric information stories for IPO underpricing.

Altogether, the above analyses imply that the lower median unconditional initial return of dual-class IPOs relative to single-class IPOs observed earlier is due to the fact that dual-class IPOs are larger firms than single-class IPOs and so should be underpriced less under typical uncertainty/asymmetric information stories.[11]

[10] We do not include offer size in this analysis, because our prior analysis shows that it is dominated by our net sales measure, and because of Habib and Ljungqvist's (1998) criticism of the offer size measure.

[11] It is important to note that our evidence is consistent with a gamut of uncertainty/asymmetric information stories, from Miller (1977) to Benveniste and Spindt (1989). Consequently, we are not advocating any particular story, but rather finding that monitoring does not help explain IPO underpricing.

III. Analysis of Institutional Shareholdings in Post-IPO Firms

The crucial link in monitoring stories for IPO underpricing is between underpricing and institutional shareholdings in the post-IPO firm. Brennan and Franks' arguments assume a significantly negative correlation between IPO underpricing and post-IPO institutional shareholdings. Stoughton and Zechner's arguments assume a significantly positive correlation between IPO underpricing and post-IPO institutional shareholdings.

To test these critical implications, we examine the influence of selected factors on the proportion of a post-IPO firm's outstanding stock held by all institutional shareholders and the proportion of a post-IPO firm's outstanding stock held by the largest institutional shareholder. Each of these measures captures a different dimension of institutional ownership: The first captures the collective ability of institutional shareholders to effect a change in management if desired, and the second captures the incentive of the largest institutional shareholder to monitor management. Like Smart and Zutter, we conduct our analysis in two stages: first focusing on the effect of dual-class status on institutional shareholdings using all sample firms and then on the effect of underpricing on institutional shareholdings using just single-class IPO firms.

Table VII reports the results of examining the effect of dual-class status on institutional shareholdings in post-IPO firms using our full sample. Because our dependent variables are proportional variables, we use Papke and Wooldridge's

Table VII
Institutional Shareholdings: Full Sample

This table reports regressions that test the determinants of institutional shareholdings for all IPOs after the public offering. The fraction of total shares held by all institutional shareholders and the largest institutional shareholder are from the CDA/Spectrum database, and are based upon the first available data after a firm's IPO. The variable *Dual-Class* is a dummy variable that takes on the value 1 if a firm has dual class stock, zero otherwise. The variable *Ln (Sales)* equals the logarithm of an IPO's net sales for the fiscal year not later than its offer date. We estimate all regressions using the quasi-likelihood method developed by Papke and Wooldridge (1996). The p-values associated with a z-test that the coefficient equals zero are within parentheses below the coefficient estimates. Standard errors for these tests are computed using robust standard error estimates. Note that the reported regressions include industry dummy variables, though not reported below.

	Largest Institutional Shareholding	Total Institutional Shareholdings
Constant	–2.973	–1.674
	(0.00)	(0.00)
Dual-Class	0.167	0.488
	(0.58)	(0.19)
Ln (Sales)	0.034	0.086
	(0.08)	(0.00)
Dual-Class ×*Ln (Sales)*	0.007	–0.026
	(0.91)	(0.63)
Chi-square(likelihood ratio)	1,517.99	520.74
	(0.00)	(0.00)

Table VIII
Institutional Shareholdings: Single-Class IPOs Only

This table reports regressions that test the determinants of institutional shareholdings for single-class IPOs after the public offering. The fraction of total shares held by all institutional shareholders and the largest institutional shareholder are from the CDA/Spectrum database, and are based upon the first available data after a firm's IPO. The variable *Initial Return* is an IPO's first day return. The variable *Ln (Sales)* equals the logarithm of an IPO's net sales for the fiscal year not later than its offer date. We estimate all regressions using the quasi-likelihood method developed by Papke and Wooldridge (1996). The *p*-values associated with a *z*-test that the coefficient equals zero are within parentheses below the coefficient estimate. Standard errors for these tests are computed using robust standard error estimates. Note that the reported regressions include industry dummy variables, though not reported below.

	Largest Institutional Shareholding	Total Institutional Shareholdings
Constant	–3.01	–1.697
	(0.00)	(0.00)
Initial Return	0.383	0.296
	(0.18)	(0.16)
Ln (Sales)	0.048	0.099
	(0.04)	(0.00)
Initial Return × *Ln (Sales)*	–0.139	–0.128
	(0.07)	(0.02)
Chi-square (likelihood ratio)	1,374.03	492.93
	(0.00)	(0.00)

(1996) quasi-likelihood model to examine the effect of select factors on the conditional expectation of the proportion in question.[12] Again, we include a term for the interaction between firm size and dual-class status to separate out the direct effect of dual-class status from the indirect effect of firm size. The results reported in Table VII suggest that it is firm size rather than dual-class status that is the important determinant of institutional shareholdings in post-IPO firms. This evidence is consistent with the finding of Gompers and Metrick (2000) that firm size is the most important determinant of institutional shareholdings in publicly traded companies. It is, however, not consistent with Brennan and Franks' monitoring/control story for IPO underpricing.

Nevertheless, to address the monitoring explanations more directly, we now focus on the effect of IPO underpricing on institutional shareholdings in post-IPO firms by examining this relationship in our subsample of single-class firms. Table VIII reports these regressions, which again use Papke and Wooldridge's quasi-likelihood regression model. The results reported in Table VIII suggest that firm size is the primary determinant of both the aggregate level of institutional ownership as well as the largest institutional shares in single-class firms. Further, these results imply that it is the indirect effect of firm size on

[12] See Papke and Wooldridge (1996) for a discussion of the specification errors associated with estimating the parameters of a linear conditional expectation function using OLS for proportional data.

IPO underpricing rather than the direct effect of underpricing that influences institutional shareholdings.

Altogether, the above evidence on institutional shareholdings in post-IPO firms rejects the critical link identified under either the reduced monitoring or the increased monitoring hypotheses.[13]

IV. Analysis of Post-IPO Control Changes

While the above evidence is sufficient to reject both Brennan and Franks' (1997) and Stoughton and Zechner's (1998) monitoring stories for IPO underpricing, we think it is worthwhile to examine whether an IPO's dual-class status or degree of underpricing relate to its likelihood of subsequent acquisition. One reason that these questions are interesting is because Smart and Zutter cite evidence that dual-class IPOs are significantly less likely to be subsequently acquired, and Field and Karpoff (2002) use evidence that antitakeover provisions in IPOs are significant deterrents to subsequent acquisition to argue that Brennan and Franks' control story is valid. While these linkages are consistent with Brennan and Franks' story, they are also consistent with any argument that managers will act to protect their positions (e.g., Bebchuk (2002)).

We begin our examination of these issues by reporting in Table IX basic information on the IPOs that were acquired or not acquired in our sample. One thing to note about these data is that we dropped from our sample any IPO that was subsequently delisted for other reasons within a 3-year period after its IPO date. Panel A of Table IX reports information on the incidence of our sample IPOs in these two groups by industry. The most important point of this table is that most of our acquired sample firms came from two of the industrial groupings. Thus, once again, controlling for industry-membership may be important. Turning to other characteristics of these sample firms, Panel B of Table IX suggests that the most important distinguishing feature of our acquired sample firms is the proportion of stock held by institutions. Interestingly, there is no statistically significant difference in the post-IPO acquisition rates of dual-class and single-class IPOs for this filtered subsample.

With this background, we now compare sample firms that were acquired within 3 years after their IPO with those that were not. Given our prior evidence, we incorporate interaction terms to account for the potential interaction between firm size and an IPO dual-class status, its degree of underpricing, and its institutional shareholdings. Our first comparison, column 2 of Table X, uses the full sample (less firms delisted from CRSP for other reasons) to determine whether an IPO's dual-class status reduces its odds of being acquired. The reported results imply that firm size, institutional shareholdings, and the interaction between firm size and institutional shareholdings are significant influences on whether an IPO is acquired within 3 years after going public.

[13] We should note that a working paper by Field and Sheehan (2000) examines board composition and other post-IPO governance characteristics of their sample IPOs and finds conflicting evidence for both Stoughton and Zechner's arguments as well as for Brennan and Franks' arguments.

Table IX

Descriptive Information on Sample Firms Acquired after IPO

Based upon CRSP deletion codes, sample IPOs that were acquired within 3 years after their offer date are identified. Below is information on the incidence of such IPOs by year and industry group. Industry groupings reflect the Department of Commerce's classification of industries according to SICs. The variable *Sales* represents an IPO's net sales for the fiscal year not later than its offer date. The measure *Total Institutional Shareholdings* is the percentage of a firm's stock that is owned by institutional investors as revealed in the earliest reporting after the firm's IPO. Note that firms delisted for "other reasons" are excluded from the analysis. The variable *Initial Return* represents an IPO's first-day return.

Panel A: Breakdown by Industry and Acquisition Status

Industrial Grouping	Nonacquired	Acquired	Total
Agriculture, forestry, and fisheries (01–09)	9	2	11
Mineral industries (10–14)	58	13	71
Construction industries (15–17)	30	3	33
Manufacturing industries (20–39)	1,046	112	1,158
Transportation, communication, and utilities (41–49)	234	29	263
Wholesale and retail trade (50–59)	332	37	369
Service industries (70–89)	965	140	1,105

Panel B: Characteristics by IPO Type

Variable	Nonacquired	Acquired	Chi-square statistic
Initial Return (%)—median	9.57	8.33	1.305 (0.25)
Sales ($ million)—median	71.71	68.878	0.663 (0.41)
Total Institutional Shareholdings (%)—median	18.51	22.30	12.295 (0.00)
Dual-class firms	246	24	1.545 (0.21)

Consistent with our univariate analysis, dual-class IPO firms are not less likely to be acquired than single-class IPO firms when the interaction between firm size and dual class status is accounted for in the analysis. Altogether, this evidence is consistent with Palepu's (1986) evidence on the role of firm size in the likelihood of a public corporation being acquired.

We next compare single-class sample firms that were acquired within 3 years after their IPO to those that were not. This analysis, reported in column 3 of Table X, directly tests the relationship between IPO underpricing and an IPO's likelihood of being subsequently acquired, which is a linkage implied by Brennan and Franks' control explanation. This regression implies that IPO underpricing is not significantly related to an IPO's likelihood of being subsequently acquired. Again, it is firm size, institutional shareholdings, and the interaction between firm size and institutional shareholdings that are significant determinants of the likelihood that a single-class IPO will be acquired within 3 years after its offer date.

Table X
Comparison of Acquired and Nonacquired IPOs

This table uses logistic regression analysis to compare IPOs that were subsequently acquired or merged with another company to IPOs that continued as publicly listed concerns (firms delisted for "other reasons" are excluded from the analysis). The dependent variable takes on 1 for IPOs that are acquired within 3 years of their going public and 0 for IPOs that are not acquired. The measure *Initial Return* represents an IPO's first day return. The measure *Ln (Sales)* represents the logarithm of an IPO's net sales for the fiscal year not later than its offer date. The measure *Dual-Class* represents a dummy variable that takes on the value 1 if the IPO was a dual class IPO. The measure *Total Institutional Shareholdings* represents the fraction of a firm's stock that is owned by institutional investors as revealed in the earliest reporting after the firm's IPO. The *p*-values associated with a *z*-test that the coefficient equals zero are reported within parentheses below coefficient estimates. Standard errors for these tests are computed using robust standard error estimates. Note that the reported regressions included industry dummies, which are not reported below, and that each continuous variable is mean (sample) adjusted.

	Full Sample	Single-Class IPOs Only
Constant	–3.409	–3.603
	(0.00)	(0.00)
Ln (Sales)	–0.198	–0.210
	(0.02)	(0.02)
Initial Return	0.840	0.610
	(0.86)	(0.57)
Initial Return × *Ln (Sales)*	–0.317	–0.242
	(0.24)	(0.43)
Dual-Class	1.054	–
	(0.28)	
Dual-Class × *Ln (Sales)*	–0.246	–
	(0.20)	
Total InstitutionalShareholdings	3.727	4.738
	(0.02)	(0.00)
Total InstitutionalShareholdings ×*Ln (Sales)*	–0.557	–0.665
	(0.07)	(0.03)
Chi-square (Likelihood ratio)	17.00	14.03
	(0.01)	(0.01)

Altogether the above analyses lead to three conclusions. First, dual-class IPOs are not less likely to be acquired within 3 years after their IPOs than other types of IPOs when their larger size is accounted for in the analysis.[14] Second, there is no significant link between the degree of an IPO's underpricing and its likelihood of being subsequently acquired within 3 years after its IPO offer date. And finally, the larger the proportion of a firm's stock held by institutional investors, the more likely it is to be acquired. This last result suggests that institutional investors do play some role in monitoring and disciplining managers as both Brennan and Franks (1997) and Stoughton and Zechner (1998) assumed in their models. However, it is firm size, rather than IPO underpricing, that mediates this relationship.

[14] Interestingly, this result mirrors the evidence reported in Crutchley, Garner, and Marshall (2002) that dual-class IPOs are no more likely to have less board turnover than single-class firms.

V. Summary and Conclusions

Prior research on the determinants of the initial returns of IPOs has tended to emphasize uncertainty/asymmetric information stories. Recent research has suggested that monitoring considerations create incentives for managers to underprice their firm's stock in its first public offering. Brennan and Franks (1997), for example, argue that insiders have an incentive to underprice the IPOs of their firm's stock in order to ensure its wide distribution, thereby reducing the likelihood of their being monitored or removed by large institutional shareholders. They call their hypothesis the reduced monitoring hypothesis. In contrast, in what might be called the increased monitoring hypothesis, Stoughton and Zechner (1998) suggest that management has incentives to ration stock so as to increase large investor monitoring of management. Thus, according to their model, there should be a positive correlation between IPO underpricing and institutional shareholdings in the post-IPO firm.

We address these arguments using a sample of U.S. IPOs from January 1990 through December 1999 and find evidence for the following inferences. First, we find that dual-class IPOs are underpriced less than single-class IPOs because they are significantly larger, and therefore should be underpriced less under typical uncertainty/asymmetric information arguments. Second, institutional shareholdings in firms immediately after their IPOs are driven by firm size and not by their underpricing or dual-class status. Third, firm size and total institutional shareholdings, rather than dual class status or IPO underpricing, are significant influences on the likelihood of a firm being acquired within 3 years after its IPO. Thus, our evidence rejects the monitoring explanations in either Brennan and Franks (1997) or Stoughton and Zechner (1998) for IPO underpricing.

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