The bonding hypothesis of takeover defenses: Evidence from IPO firms*

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Abstract We propose and test an efficiency explanation for why firms deploy takeover defenses using initial public offering (IPO) firm data. We hypothesize that takeover defenses bond the firm's commitments by reducing the likelihood that an outside takeover will change the firm's operating strategy and impose costs on its business partners. Consistent with this hypothesis, we find that IPO firms deploy more takeover defenses when they have important business relationships to protect. An IPO firm's use of takeover defenses is positively related to the longevity of its business relationships. IPO firms' large customers experience spillover effects that are positively related to IPO firms' use of takeover defenses. And IPO firms' valuation and subsequent operating performance are positively related to their use of takeover defenses when they have important business relationships.

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1. Introduction

Takeover defenses remain one of the most controversial aspects of corporate governance. Conventional wisdom holds that takeover defenses serve primarily to entrench managers at shareholders' expense.[1] Reflecting this view, shareholder advisory groups frequently advise their clients to vote against the adoption of new defenses and for the repeal of existing defenses.[2] Researchers frequently use the Gompers, Ishii, and Metrick (2003) G-index and the Bebchuk, Cohen, and Ferrell (2009) E-index as measures of governance quality, with higher numbers of takeover defenses indicating poorer governance (see, e.g., Masulis, Wang, and Xie, 2007; Giroud and Mueller, 2011; and Duchin and Sosyura, 2013).

A contrasting view is that takeover defenses benefit shareholders. DeAngelo and Rice (1983) and Stulz (1988) argue that defenses can increase managers' ability to extract higher premiums in the event of takeover. Stein (1988) and Chemmanur and Jiao (2012) argue that defenses can protect valuable firm projects that uninformed or myopic investors undervalue in financial markets. These views are espoused by leading practitioners (e.g., Lipton 2002), and are consistent with some empirical findings (e.g., Cen, Dasgupta, and Sen, 2013; Smith, 2013; Humphery-Jenner, 2014).

In this paper, we examine a different path by which takeover defenses create value. Knoeber (1986) and Shleifer and Summers (1988) propose that takeover defenses increase firm value by committing the firm to a business strategy that cannot easily be reversed via outside takeover.[3] This decreases the probability that the firm will act opportunistically toward its large customers and other stakeholders, encouraging them to invest in the business relationship. By bonding its contractual performance with counterparties, the firm gains favorable contracting terms that increase firm value. We call this the bonding hypothesis of takeover defenses.

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[1] For examples, see Easterbrook and Fischel (1991), Bebchuk, Coates, and Subramanian (2002), and Gompers, Ishii, and Metrick (2003).

[2] See, for example, "The Shareholder Rights Project Report for the 2012 and 2013 Proxy Seasons," Harvard Law School, October 20, 2013, available at http://srp.law.harvard.edu/releases/2012-13-Annual-Report.pdf; and "Institutional Shareholder Services Releases 2014 Proxy Voting Policies," November 21, 2013, available at http://www.issgovernance.com/iss-releases-2014-proxy-voting-policies/.

[3] See also Agrawal and Knoeber (1998), Coates (2001), Pontiff, Shleifer, and Weisbach (1990), Cremers, Nair, and Peyer (2008), Cen, Dasgupta, and Sen (2013), and Cremers, Litov, and Sepe (2014).

The bonding hypothesis can be illustrated with an example. Pemstar Inc. was a provider of engineering, design, and manufacturing services for equipment manufacturers. Pemstar's largest customer, accounting for 37% of sales in the year it went public (2000), was International Business Machines (IBM). IBM, in turn, invested heavily in its business relationship with Pemstar, even teaming with Pemstar to open a manufacturing operation in Brazil in 2000 and sharing knowledge of its products and manufacturing processes. IBM's investment in and reliance upon its partnership with Pemstar exposed it to what Klein, Crawford, and Alchian (1978) call a hold-up problem: Pemstar could have opportunistically abrogated its contracts with IBM and demanded higher payments, which in the short run IBM could have been willing to pay. That is, IBM's investment in its business relationship with Pemstar created a quasi-rent that potentially was appropriable by Pemstar.

What kept Pemstar from breaking the contract and holding IBM up for a higher price? One deterrent was that Pemstar's short-term gain would come at the expense of its long-term sales to IBM and other customers, or what Shapiro (1983) calls a reputational loss. But, as Klein and Leffler (1981) show, under some conditions the reputational loss is insufficient to deter opportunistic behavior. Another deterrent is that Pemstar's managers had personal connections and reputations that would be sullied if they held IBM up for a short-term gain. However, as Shleifer and Summers (1988) point out, such personal commitments have little value if the managers are removed in a takeover and replaced by different managers who have no commitment to the business relationship. This is how takeover defenses can be valuable. When it went public in 2000, Pemstar had five takeover defenses. The bonding hypothesis holds that these defenses worked to insulate Pemstar's managers from the threat of outside takeover, thereby bonding Pemstar's commitment to its IBM relationship and encouraging IBM to continue to invest in the relationship. (Pemstar's business relationship with IBM lasted until 2006. In 2007, Pemstar was acquired by Benchmark Electronics, Inc.)

This paper tests the bonding hypothesis of takeover defenses using data from firms that went public between 1997 and 2005. In principle, the bonding hypothesis applies to both initial public offering (IPO) and seasoned firms and could be tested using data from either type of firm. An advantage to examining IPO firm data is that evidence of bonding is more likely to be apparent in the IPO setting, for two reasons. First, the IPO event substantially increases the probability that the (formerly private) company eventually could be acquired without the managers' consent. This increases the risk of appropriation for the firm's counterparties and, according to the bonding hypothesis, increases the value of a takeover defense more than for a firm that has been publicly traded for some time. Second, IPO firms tend to be small and are more likely to have values that depend heavily upon their relationships with specific business partners. For example, Johnson, Kang, and Yi (2010) report that 65% of IPO firms disclose a large customer, whereas Cen, Dasgupta, and Cen (2013) report that 41% of Compustat-listed industrial firms rely on such large customers. This implies that the benefits of any bonding from takeover defenses are likely to be larger and more apparent among IPO firms than among seasoned firms. Yet another advantage of using IPO firm data is that IPO prospectuses contain information that we use to construct reasonable instrumental variables based on the identity of the IPO firm's law firm.

An additional benefit of using IPO firm data is that the bonding hypothesis offers a resolution to an IPO puzzle: Why do so many firms adopt takeover defenses when they go public? Identifying this puzzle, Daines and Klausner (2001) note that, if takeover defenses lower share values as is widely presumed, it would be irrational for pre-IPO shareholders to implement them and suffer the resulting loss when shares are sold to outside investors. The bonding hypothesis implies that many IPO firms adopt takeover defenses because, contrary to common belief, they increase these firms' values.

To implement tests of the bonding hypothesis, we use three measures of the quasi-rents that potentially are appropriable by the IPO firm. The first, *Large customer*, indicates the presence of a large customer on whom the IPO firm relies for a significant portion of its sales, as in the Pemstar-

IBM example. The second measure, *Dependent supplier*, is an indicator that the IPO firm is a large and dominant customer for one or more of its suppliers. This measure recognizes that the hold-up problem can go both ways, as a large customer can hold-up its supplier. The third measure, *Strategic alliance*, is an indicator of an alliance between the IPO firm and another firm. For each measure, the presence of a large customer, dependent supplier, or strategic alliance partner indicates that the IPO firm's trading partner has made relationship-specific investments that give rise to appropriable quasi-rents. The bonding hypothesis implies that IPO firms with significant trading partners are more likely to deploy takeover defenses than other IPO firms and that takeover defenses are more likely to create value when the IPO firms have such trading partners.

We use these three measures of appropriable quasi-rents to test five primary and several subsidiary implications of the bonding hypothesis. First, an IPO firm's number of takeover defenses is positively related to all three measures of appropriable quasi-rents. In univariate comparisons, firms with important counterparties deploy between 6% and 21% more defenses than firms without such counterparties, depending on the specific measures. We also examine a subsample of IPO firms that have a large customer that itself is publicly traded. Among these firms, the number of takeover defenses is positively related to four additional measures of the business relationship's value to the large customer: (1) whether a social link exists between the IPO firm's Chief Executive Officer (CEO) and the customer firm's CEO, (2) the pre-IPO length of the business relationship, (3) whether the two firms have a long-term contract, and (4) the fraction of the customer's purchases that come from the IPO firm. These results further support the hypothesis that takeover defenses help to bond the firm's commitment when it has important trading relationships that create appropriable quasi-rents.

Second, the IPO firm's use of takeover defenses is positively related to the duration of the business relationship with its important counterparty. In univariate tests, the average business relationship lasts 3.3 years when the IPO firm has more than the median number of defenses, compared with 2.2 years when the IPO firm has fewer than the median number. This result is

consistent with the hypothesis that takeover defenses do in fact bond the IPO firm's commitment to the relationship.

Third, the IPO firm's announcement to go public has a spillover effect on its large customers' values that is positively related to the IPO firm's use of takeover defenses. The average spillover effect is negative (-0.75%) when the IPO firm has fewer than the median number of defenses and positive (4.66%) when the IPO firm has more than the median number of defenses. The marginal impact of a takeover defense also is positively related to our four additional measures of the value of the trading relationship, implying that positive spillover of the IPO firm's takeover defenses occurs particularly when the business relationship is valuable.

Fourth, IPO firm valuation is positively related to the use of takeover defenses, but only when the IPO firm has a large customer, dependent supplier, or strategic partner. This result is inconsistent with the conventional view that takeover defenses generally decrease firm value, and it indicates that IPO firms benefit from their use of defenses when they have important business relationships.

Fifth, takeover defenses are associated with higher operating performance after the IPO. Once again, the positive relation arises only among IPO firms that have important business relationships. These results indicate that the higher valuations observed when IPO firms deploy takeover defenses are consistent with these firms' subsequent operating performance. They also show how IPO firms benefit from their takeover defenses, as they also earn quasi-rents from their ongoing relationships with their counterparties that manifest as high accounting rates of return.

The deployment of takeover defenses and other firm characteristics–particularly relationship duration, firm value, and operating performance–are most likely endogenous, so the positive relation between relationship duration and takeover defenses, or firm value and takeover defenses, need not be causal. To explore causality, we use instrumental variables that rely on the identity or characteristics of the IPO company's law firm. As discussed by Coates (2001), an IPO firm's law firm can help to explain the number of takeover defenses it deploys. In addition, IPO firms tend to

choose their lawyers well before the IPO. This implies that law firm identity and characteristics meet both relevance and exclusion criteria as instruments for the number of takeover defenses. Using these instruments, we continue to find that relationship duration, firm value at the IPO, and subsequent changes in operating performance all are positively related to the use of takeover defenses and that the positive relations appear primarily when important counterparty quasi-rents are at stake. These results support the inference that takeover defenses not only are correlated with higher value and performance, but also are a cause of the higher value and performance.

In Section 5, we report on supplementary and robustness tests of the bonding hypothesis. Consistent with the hypothesis, we find that the IPO firm's important counterparties experience a negative spillover effect when the IPO firm is acquired, that takeover defenses are associated with a lower incidence of forced CEO turnover, and that defenses are associated with higher long-term sales to the firm's large customers. We consider alternate measures of a firm's takeover defenses and find that our results hold if we consider only classified boards and ignore other defenses. In Section 6, we test five possible alternative explanations for some of our findings based on toehold investments, supply chain spillovers, bargaining power, firm quality, and industry spillover effects. The results from these supplementary tests are consistent with the bonding hypothesis of takeover defenses and do not support the alternative explanations.

Overall, we present a broad and diverse set of results that are consistent with the bonding hypothesis and that are not readily explained by alternate hypotheses. We infer that takeover defenses frequently help to bond the IPO firm's guarantees to its counterparties by decreasing the probability that current management will be replaced, and company policy changed, through a hostile takeover. The company's bond, in turn, encourages its counterparties, including large customers, dependent suppliers, and strategic partners, to make long-term relationship-specific investments. Some of the benefits of these long-term relationships accrue to the IPO firm in the form of higher IPO valuation and improved long-run operating performance. Thus, many IPO firms adopt takeover defenses precisely because pre-IPO shareholders benefit from them.

2. The bonding hypothesis of takeover defenses

This section presents the bonding hypothesis and the three primary empirical measures we use to test the hypothesis.

2.1. The main idea

The main idea of the bonding hypothesis is that takeover defenses support a firm's commitment not to act opportunistically to appropriate its counterparties' quasi-rents. Quasi-rents arise when a counterparty makes a relationship-specific investment that would lose value if the firm changes its operating strategy. Quasi-rents are important for understanding a wide range of economic phenomena, including employment contracts for Chief Executive Officers (CEOs) (Gillan, Hartzell, and Parrino, 2009), contract enforcement (Klein and Leffler, 1981), and rent-seeking (Posner, 1975). The archetypal example described by Klein, Crawford, and Alchian (1978) involves Fisher Body and General Motors (GM). In this example, GM entered into a long-term contract to buy exterior shells for its closed body automobiles from Fisher Body at a price set on a cost-plus basis. The contract and GM's specific investments in the trading relationship made GM vulnerable to appropriation by Fisher Body. Once GM was locked into the contract, Fisher Body refused to locate its plants close to GM and increased its price, claiming higher costs.[4]

Williamson (1979) argues that one solution to such hold-up problems is vertical integration, and Klein, Crawford, and Alchian (1978) claim this is why GM eventually acquired Fisher Body. Vertical integration, however, is itself costly and not likely to be an optimal solution to all hold-up problems. For example, Grossman and Hart (1986) and Hart and Moore (1990) show that vertical integration can distort incentives in ways that destroy value. As a result, some otherwise efficient contracts between firms and their customers will not be made, as the risk of a hold-up undermines the customer's willingness to invest in the trading relationship.

[4] Although this anecdote is widely cited in the economics literature, it seems not to be supported by the facts of the matter (see Coase, 2000). We nonetheless cite it as the standard example of the hold-up problem.

Shleifer and Summers (1988), Coates (2001), and Stout (2002) suggest that an alternative solution is for managers to contract implicitly to not act opportunistically. For example, Fisher Body's managers could promise not to raise prices to appropriate GM's quasi-rents. By their nature, implicit contracts are enforced informally through personal connections and reputation (see, e.g., Klein and Leffler, 1981). The firm's managers tie their reputations to a business strategy that encourages their business partners to make relation-specific investments. Shleifer and Summers (1988, p. 40) argue that managers are selected for their personal commitment to the firm's counterparties: "It is probably most likely that prospective managers are trained or brought up to be committed to stakeholders … They find stakeholder welfare has now entered their preferences, thus making them credible upholders of implicit contracts."

A problem with such implicit commitments, even when managers make good-faith efforts to abide by them, is that the managers can be replaced in a hostile takeover. New owners would not have any personal or reputational commitment to the firm's former business strategy, increasing the likelihood that they would find it optimal to breach the former managers' commitments and appropriate the counterparty's quasi-rent. This is where takeover defenses become important. By decreasing the likelihood of outside takeover, takeover defenses bond the firm's guarantees to abide by its implicit agreements with its counterparties. This bond induces the counterparties to make relation-specific investments that benefit the firm. In the case of Pemstar and IBM, Pemstar had five takeover defenses when it went public, including a classified board and a restriction on shareholders' right to act by written consent. The bonding hypothesis holds that these defenses helped to encourage IBM to continue to invest in and rely upon its relationship with Pemstar as a supplier of specialty manufacturing services.

Another illustrative example is discussed by Arlen (2006) and Cremers, Nair, and Peyer (2008). PeopleSoft, Inc., produced complex software that required a large up-front investment by customers, who in turn relied on PeopleSoft's ongoing vendor support. When in 2003 Oracle made a hostile takeover bid for PeopleSoft, PeopleSoft's customers objected strongly, concerned that

PeopleSoft's software would no longer be supported by the merged company (New York Times, 2004). That is, PeopleSoft's customers had quasi-rents that would be lost if Oracle did not continue the previous level of customer support for PeopleSoft's products.

2.2. Measures of the existence and value of appropriable quasi-rents

The key insight of the bonding hypothesis is that takeover defenses can be valuable when the IPO firm's counterparties earn quasi-rents that can be appropriated if the IPO firm breaches its implicit contracts. To test this hypothesis we use three measures of the existence of a counterparty's appropriable quasi-rents. Our first measure, *Large customer*, is an indicator variable set equal to one if the IPO firm has at least one large customer that accounts for 10% or more of its sales.[5] Our rationale is that relationship-specific quasi-rents are more likely to arise when the IPO firm has a dominant trading relationship with a single customer. Fisher Body's relation with General Motors, as characterized by Klein, Crawford, and Alchian (1978), is an example, as is Pemstar-IBM. Consistent with these examples, Joskow (1987) and Klein (1988) argue that large customers frequently are exposed to hold-up problems. The potential for a hold-up arises as the customer invests in specialized employee training or builds distribution channels with its supplier. We hypothesize that the potential for a hold-up problem increases with the size of the trading relationship, and we use *Large customer* to measure the size of the trading relationship.

Not only can the seller (Fisher Body, Pemstar) hold up its large customer (GM, IBM), but the customer also can hold up the seller. Pemstar, for example, invested heavily in relationship-specific assets by locating its plants close to its customer's production facilities.[6] This created a quasi-rent

[5] Fee and Thomas (2004) and Hertzel, Li, Officer, and Rodgers (2008) use the Compustat segment customer database to identify large customers that account for 10% or more of a firm's sales. We find, however, that these data frequently report only on the existence of a large customer but not the sales amount. We therefore hand-collect the dollar amount of sales (or fraction of total sales) to the large customer from the IPO prospectus. The Internet Appendix (Table A.1) reports results when we use this fractional amount instead of the *Large customer* dummy variable, or when we include only customers with >15% of sales, >20% of sales, or >25% of sales. These results are similar to those reported in the paper.

[6] Pemstar made this intention explicit: "We intend to continue to expand our presence in strategic locations to provide our customers with services in close proximity to their own operations or their end customers."

arising from Pemstar's lower transportation costs, which IBM could have appropriated by offering to pay a price that covered only Pemstar's variable costs. If IBM were going public, the bonding hypothesis implies that it could adopt takeover defenses as a way of bonding its commitments to Pemstar. That is, the IPO firms in our sample could have important relationships not only with their customers, but also with their suppliers. Our second measure of appropriable quasi-rents therefore is *Dependent supplier*, which is an indicator taking a value of one if the IPO firm is a customer accounting for more than 10% of the sales of another firm.

Our third measure of appropriable quasi-rents is *Strategic alliance*, an indicator variable set equal to one if the firm has entered into a strategic alliance with another firm. Chan, Kensinger, Keown, and Martin (1997) argue that strategic alliances encourage partners to make irreversible alliance-specific investments. Williamson (1985) and Joskow (1987) argue that long-term contracts, such as occur in strategic alliances, involve investments in fixed assets that give rise to potentially appropriable quasi-rents. The bonding hypothesis implies that takeover defenses will be particularly valuable when the firm has entered into a strategic alliance.

In some tests, we emphasize the *Large customer* measure of appropriable quasi-rents. This is because we have good data to identify large customers, and *Large customer* = 1 for 60% of the sample IPO firms. In contrast, *Dependent supplier* = 1 for only 4% of the sample IPO firms, and *Strategic alliance* = 1 for 31% of the sample. For 209 of the 1,219 IPO firms in our sample, *Large customer* = 1 and the large customer is itself a publicly traded firm. (When an IPO firm has multiple large customers, we identify the customer that purchases the largest amount as our sample customer.) This allows us to collect data on four additional measures of the value of the business relationship: *Social links*, *Pre-IPO relationship length*, *Long-term contract*, and *Percent of customer COGS*. The bonding hypothesis implies that the value of a takeover defense is positively related to each measure of the value of the business relationship.

(Pemstar prospectus filing,
http://www.sec.gov/Archives/edgar/data/924829/000104596900000578/0001045969-00-000578.txt.)

Social links is set equal to one when a social link exists between the IPO firm's CEO and the large customer's CEO, as defined by Hwang and Kim (2009). Our rationale for this measure is that social connections both facilitate and represent investments in the business relationship. Research by Krackhardt (1992), Westphal (1999), and others shows that social links imply greater trust among business associates. Shleifer and Summers (1988) argue that managers are selected in part for their social connections to customers because they help to bond the business relationship. We therefore infer that the existence of a social link implies a relatively large quasi-rent at stake.

Pre-IPO relationship length is the number of years that the two trading partners have done business as of the time of the IPO prospectus. We hypothesize that longer duration contracts tend to involve greater investment in the business relationship and more quasi-rents at stake. In the case of Pemstar-IBM, for example, IBM is likely to invest more in its relationship with Pemstar (e.g., pooling engineering talent, disclosing specification tolerances) if it expects Pemstar to supply parts for many years as opposed to only a short time.

Long-term contract is set equal to one if, from the date of the IPO prospectus, the contractual relationship is maintained for longer than the median contract length in the sample, which equals two years. Our rationale for *Long-term contract* is similar to that for *Pre-IPO relationship length*. Ideally, we would like a measure of the firms' expected relationship length when the IPO prospectus is filed. In its place, we use *Long-term contract* as an ex post measure of this expectation. Again, longer duration contracts involve greater investment in the business relationship and more quasi-rents at stake.

Percent of customer COGS is the IPO firm's sales to the large customer divided by the large customer's cost of goods sold. *High % customer COGS* is a dummy variable that equals one for firms for which *Percent of customer COGS* is higher than the median value in the sample. We

hypothesize that the value of the customer's quasi-rents at stake will increase with the customer's reliance on the IPO firm for its inputs.[7]

3. Data and summary statistics

Our sample is generated from the Security Data Company (SDC) New Issues database from 1997 to 2005. We remove finance and utilities firms, firms making unit offerings, closed-end funds, Real Estate Investment Trusts (REITs), American Depositary Receipts (ADRs), IPO firms headquartered outside the US, and firms with an offer price below $5. We also restrict the sample to include firms with sales (Compustat data item SALE) and positive EBITDA (earnings before interest, taxes, depreciation, and amortization; Compustat data item OIBDP) in the fiscal year before the IPO. This yields a sample of 1,219 firms.[8]

Some of the variables used in our tests are available from the COMPUSTAT database. But much of the data were compiled manually from the IPO firms' prospectuses. The hand-collected data are all takeover defense measures; indications of strategic alliances; venture backing; CEO characteristics such as compensation, tenure, and age; firm governance characteristics such as inside ownership, board size, and independence; and underwriter characteristics.

Panel A of Table 1 reports summary statistics about the sample firms and their CEOs. In the empirical tests we control for a variety of managerial and firm characteristics. The control variables are the union of those examined by Field and Karpoff (2002) and Chemmanur, Paeglis, and Simonyan (2011), plus we add underwriter rank and the number of acquisitions in the IPO firm's

[7] The Internet Appendix (Tables A2–A5) reports results using several additional measures of counterparty quasi-rents, including overfunded pension assets (suggested by Pontiff, Shleifer, and Weisbach, 1990), low employee turnover (Titman and Wessels, 1988), high trademark industry (Gorecki, 1975), and high investment in sales, general, and administrative expenses (Titman, 1984). The results using these additional measures also are consistent with the bonding hypothesis, although several coefficients are not statistically significant.

[8] It is common to omit negative EBITDA firms when examining IPO valuation (see, e.g., Purnanadam and Swaminathan, 2004). The Internet Appendix (Tables A6–A7) reports supplemental results from a sample of IPO firms that had negative EBITDA in the year before the IPO and for which we have data on the use of classified boards (but not other types of defenses). In this supplementary sample, the use of a classified board is positively related to the presence of a large customer and is positively related to the duration of the business relationship. These results are similar to those reported in Tables 2 and 4.

industry in the previous three years. These latter variables serve as controls for the quality of the offering and the industry's takeover activity. Panel A reports on summary statistics for the control variables. Most summary measures are similar to those reported by others. For example, the average CEO is 47 years old and has been at the firm for 5.9 years, 56% of the CEOs are also chairman of the board, and the mean board size is 6.6. These averages are similar to those reported by Boone, Field, Karpoff, and Raheja (2007) for their sample of IPOs. One noteworthy difference is that the average CEO compensation is $430,000 in our sample, which is smaller than that reported by Coates and Kraakman (2011).

Insert Table 1 near here.

In our empirical tests, we use three measures of a firm's takeover defenses. The first is the FK-index of up to ten takeover defenses used by Field and Karpoff (2002) in their analysis of IPO firms, which is also used by Chemmanur, Paeglis, and Simonyan (2011). The second is the Gompers, Ishii, and Metrick (2003) G-index, which counts up to 24 takeover defenses. And the third is the Bebchuk, Cohen, and Ferrell (2009) E-index, which counts up to six takeover defenses. Each of these indices has advantages and drawbacks in what it counts as a takeover defense.[9] In our sample, the correlation between the FK-index and the G-index is 0.51. The correlation between the FK-index and the E-index is 0.60, and the correlation between the G-index and the E-index is 0.72. We find similar results using all three indices, although in two specific tests (out of dozens) the results are not significant using the G-index while they are significant using the FK-index and the E-index. We point out these two exceptions below.

[9] For example, the G-index has an advantage of containing the largest number of defenses, including coverage by state antitakeover laws. However, it double counts some provisions that largely are redundant (director indemnification, indemnification contracts, and indemnification insurance) and groups together other defenses that most likely are distinct (e.g., counting control share acquisition laws as similar to supermajority vote requirements). The E-index was constructed to count only the defenses that its creators judge to be most important, but Karpoff, Schonlau, and Wehrly (2015) show that the defenses it omits also deter takeovers. The FK-index includes several additional provisions that the E-index does not, but it also combines certain provisions (e.g., restrictions on shareholders' right to act by written consent or to call special shareholder meetings) that could be distinct and does not include state antitakeover laws. Details of how each index is constructed are reported in the Appendix.

As reported in Panel B of Table 1, the mean value of the FK-index is 3.16. This is higher than the mean of 2.56 reported by Field and Karpoff (2002), but closer to that of Chemmanur, Paeglis, and Simonyan (2011) for the same index. This is because our sample period of 1997–2005 postdates that of Field and Karpoff (2002), and there is a secular increase in the number takeover defenses at IPO firms over this time period. The mean G-index value of 9.59 is similar to that reported by Gompers, Ishii, and Metrick (2003). Our E-index mean, however, is below the mean reported by Bebchuk, Cohen, and Ferrell (2009). This is because few IPO firms adopt poison pills. Field and Karpoff (2002) report a poison pill adoption rate of 2.3% in IPO firms, compared with a rate of 62.1% among the mature firms in the Bebchuk, Cohen, and Farrell (2009) sample.

Panel C of Table 1 reports summary measures of the three measures of appropriable quasi-rents. A total of 60% of the IPO firms have a large customer, 4% have a dependent supplier, and 31% have entered a strategic alliance. We also create a composite measure, *Any important relationship*, that equals one if a firm has any one or more of the three types of relationship. A total of 69.4% of the sample firms have at least one of these relationships. Panel D reports on summary statistics for each of the four additional measures of the value of the quasi-rents at stake that are available for the IPO firms whose large customers are themselves publicly traded corporations.

4. Empirical tests of the bonding hypothesis

This section reports on empirical tests that examine whether IPO firms with important counterparties deploy more takeover defenses, and whether the use of more defenses is associated with longer business relationships, positive spillover effects on the IPO firms' counterparties, higher IPO firm value, and improved IPO firm operating performance. Each subsection reports on a different implication of the bonding hypothesis with univariate comparisons, multivariate tests, and, where appropriate, treatments for endogeneity.

4.1. The use of takeover defenses at the IPO

4.1.1. Univariate comparisons of the use of takeover defenses

Our first set of tests examines a direct implication of the bonding hypothesis, that IPO firms use more takeover defenses when their counterparties have potentially appropriable quasi-rents. Table 2 reports on univariate comparisons of the use of takeover defenses by IPO firms partitioned by the presence of appropriable quasi-rents. We have a total of nine such comparisons, as we have three measures of appropriable quasi-rents and three measures of takeover defenses. In all comparisons, IPO firms with relatively large counterparty quasi-rents deploy more takeover defenses. The top row in the table, for example, reports results using *Large customer* as our indicator of counterparty quasi-rents. The mean value of the Field and Karpoff (2002) index is 3.24 for firms with large customers and 3.05 for firms without large customers, a difference that is significant at the 5% level. Results are similar using the G-index or E-index to measure takeover defenses. Panels B–D report that the results also are similar for our other indicators of important quasi-rents, *Dependent supplier* and *Strategic alliance*, as well as for our composite measure, *Any important relationship*.

Insert Table 2 near here.

The Internet Appendix (Tables A8–A10) reports on tests that examine whether the results in Table 2 are affected by any particular takeover defenses. We re-tabulate the Table 2 results after alternately omitting miscellaneous defenses, blank check preferred stock, supermajority vote

requirements, and classified boards from the takeover defense indices or by treating classified boards as the only relevant defense. In all cases, the results are qualitatively the same as in Table 2. Overall, the data indicate that IPO firms with important counterparties use more takeover defenses than other IPO firms and deploy a broad mix of takeover defenses instead of relying on any one type of defense.

4.1.2. Multivariate tests of the use of takeover defenses

Table 3, Panel A, reports the results from four specifications of a Poisson maximum likelihood regression in which the dependent variable is the firm's FK-index measured at the time of the IPO. Internet Appendix Table A11A reports parallel tests in which the G-index and the E-index are used to measure firms' takeover defenses, and Table A11B reports results using an ordinary least squares model in place of a Poisson model. The results are similar both in statistical significance and economic magnitudes. Each regression contains all of the control variables examined by Field and Karpoff (2002) and Chemmanur, Paeglis, and Simonyan (2011) in their tests for takeover defenses at IPO firms, plus two additional control variables that measure the underwriter's rank and the number of pre-IPO takeovers in the IPO firm's industry. Evidence shows industry clustering, as an analysis of variance on industry effects yields a value of F = 8.72 (*p*-value = 0.00), so we include industry controls as well.

Insert Table 3 near here.

In Model 1, the coefficient for *Large customer* is 0.095 and is statistically significant at the 1% level. In Model 2, the coefficient for *Dependent supplier* is 0.155; in Model 3, the coefficient for *Strategic alliance* is 0.073; and in Model 4, the coefficient for *Any important relationship* is 0.110 (all are significant at the 1% level). These results indicate that the univariate results reported in Table 2 maintain, even controlling for other possible determinants of a firm's use of takeover defenses. The point estimates from these models imply that having an important business relationship corresponds to having roughly 10% more defenses. For example, the coefficient for

Large customer in Model 1 implies that firms with large customers have, on average, 0.3 more takeover defenses than firms without large customers. At the median number of takeover defenses (three), this represents a 10% difference.[10]

4.1.3. Additional measures of the importance of the trading relationship

Panel B of Table 3 reports the results of tests using the four additional measures of the importance of the trading relationship, which are available for the subset of 209 IPO firms that have a large customer that itself is a publicly traded firm. Each regression includes all of the control variables reported in Panel A of Table 3, although to save space the control variable results are not reported in Panel B. Using any of the four additional measures, the number of takeover defenses is positively related to the importance of the trading relationship with the IPO firm's large customer. These results further support the bonding hypothesis, which holds that IPO firms are more likely to adopt takeover defenses when they have important trading relationships that give rise to appropriable quasi-rents.

4.2. The impact of takeover defenses on the duration of the post-IPO relationship

The bonding hypothesis holds that takeover defenses guarantee the IPO firm's contractual performance with its counterparties and that the IPO firm will not act opportunistically to abrogate the relationship. This implies that the use of defenses should correspond to business relationships that do, in fact, persist over time. To examine this implication of the bonding hypothesis, we examine the association between the deployment of takeover defenses and the longevity of the business relationship using data from the subsample of 209 IPO firms that have a large customer that is itself a publicly traded firm. This pairing of publicly traded companies allows us to observe and report the length of the business relationship.

[10] This value of 0.3 is calculated as follows: A Poisson regression uses as a dependent variable the log of the count variable, in this case the number of takeover defenses. Therefore, increasing the log(number of takeover defenses) from the median number of defenses (three) by 0.095 results in the number of defenses being increased by 0.3 (=exp(log(3)+0.095)).

4.2.1. Univariate comparisons of relationship duration

Table 4 reports on univariate comparisons of relationship length partitioned by the number of the defenses deployed by the IPO firm. We determine the length of the relationship by examining the IPO firm's annual report in the years after the IPO. For each year in which the IPO firm discloses the customer as accounting for at least 10% of its sales, we count the relationship as continuing. We code the relationship as stopping when the IPO firm no longer discloses the customer as accounting for 10% of its sales. This measure is affected by the IPO firm's growth, which by itself could cause a 10% customer to fall below the 10% reporting threshold. Press reports, however, indicate that falling below the 10% reporting threshold frequently corresponds to a complete termination of the business relationship. We again report results using the FK-index of takeover defenses, but the results are similar using the G-index or the E-index measure (see Internet Appendix Table A12). On average, the business relationship survives 2.73 years after that IPO. Among the 64 cases in which the IPO firm has fewer than three defenses, the relationship lasts an average of 2.17 years. Among the 68 cases in which the IPO firm has more than three defenses, the relationship lasts an average of 3.32 years. The difference is significant at the 1% level and is consistent with the notion that takeover defenses are associated with longer business relationships. Moving from fewer than three to more than three defenses is associated with an increase in the average duration of the business relationship by 1.15 years, or more than 50%.[11]

Insert Table 4 near here.

4.2.2. Multivariate tests of relationship duration

Table 5 reports on multivariate tests of the relation between the IPO firm's use of takeover defenses and relationship duration. Following Fee, Hadlock, and Thomas (2006), we estimate a nonparametric Cox hazard model in which the dependent variable is the length of the relationship

[11] These results are based on the sample of 209 IPO firms whose large customers are themselves publicly traded. In our sample, 523 additional IPO firms have large customers that are privately held. The results from this larger sample are in Internet Appendix Table A13 and are similar to those in Table 4. The multivariate tests of relationship duration require data from the large customers, which are not available for the 523 firms with private large customers.

after the IPO, in years. Coefficients above one indicate a higher hazard rate and shorter relationship, and coefficients below one indicate a lower hazard rate and longer relationship. The control variables are the same as used by Fee, Hadlock, and Thomas (2006) and Johnson, Kang, Masulis, and Yi (2014), and they include research and development (R&D) divided by assets, IPO firm percent of sales to the large customer, the square of the IPO firm's percent of sales to the large customer, log (IPO firm assets), and an indicator for negative free cash flows. To conserve space, we do not report the coefficients for the control variables. Again, we report the results using the FK-index of takeover defenses, although the results are similar using the G-index and E-index (see Internet Appendix Table A14).

Insert Table 5 near here.

In all models estimated, the business relationship lasts longer when the firm adopts more takeover defenses. In Model 1, the coefficient on the number of takeover defenses is 0.797 and is significantly different from one at the 1% level. Models 2–5 include interaction terms using our additional variables that measure the importance of the business relationship. In Model 2, the presence of a social link between the IPO firm and large customer's CEOs is, by itself, associated with a shorter business relationship, as the coefficient in the hazard model is greater than one. The coefficient on the interaction of a social link with the number of takeover defenses, however, is significantly less than one (0.690). This implies that the social links by themselves are not associated with longer-lasting business relationships. Business relationships that involve social links and are bonded with takeover defenses, however, tend to persist for longer periods. Model 5 reports similar results showing that the marginal impact of a takeover defense is particularly strong when the large customer relies heavily on the IPO firm for its inputs. The results in Model 6 indicate that the marginal effect of a takeover defense also is larger when the IPO firm and its important customer have entered a strategic alliance. The coefficients for the interaction terms in Models 3 and 4 are insignificant, but even in these models the relationship length is positively related to the use of takeover defenses.

4.2.3. Instrumental variable tests of relationship duration

The results in Tables 4 and 5 indicate that takeover defenses are positively associated with the duration of the IPO firm's relationship with its large customers. However, the adoption of takeover defenses and relationship duration could be endogenous to the firm's competitive environment. Suppose, for example, that successful business relationships tend to survive and the resulting success provides self-serving CEOs the latitude to adopt self-entrenching takeover defenses. Defenses would be associated with longer relationships with important customers, but the causality would be the opposite of that implied by the bonding hypothesis.

In Section 6, we examine several such alternative explanations for our results. None of the alternatives we have considered, or that have been suggested to us, can explain our full suite of empirical results, a conclusion that lends further support to the bonding hypothesis. Nonetheless, to examine the possibility that the results of this specific test reflect endogeneity in the determination of takeover defenses and relationship strength, we conduct instrumental variable tests using three different instruments for takeover defenses. Coates (2001) demonstrates that law firms have different tendencies to recommend takeover defenses to their client firms and that takeover defenses are heavily influenced by the IPO firm's law firm. It is important also to note that IPO firms typically choose their attorneys long before their decision to go public and for reasons that appear to be unrelated to the use of takeover defenses at a future IPO. Our first instrument uses this regularity by using dummy variables for the firms' law firms in a first stage regression.

Coates (2001) identifies another regularity that motivates our second instrument. Some law firms encourage their IPO clients to adopt defense-related corporate charter provisions that work at odds with one another. For example, a firm can adopt a staggered board takeover defense and simultaneously include a charter provision that allows shareholders to remove directors by written consent, thus partially offsetting the effect of the staggered board. Coates (2001) argues that the number of takeover defenses tends to be higher in IPO firms that have such offsetting provisions.

We therefore include as an instrument an indicator variable, *Law firm gaffe*, that equals one if the firm has at least one pair of defense-related charter provisions that offset or contradict each other.

Our third instrument, *Law firm acquisition experience*, equals the number of takeovers the IPO firm's law firm advised in the two years before the IPO. Model 7 in Table 5 presents evidence that law firms' acquisition-related experience affects their clients' use of takeover defenses. So such experience meets the relevance criterion. But this experience is unlikely to be directly related to the IPO firm's business relationships. Even if there were a general relation between the law firm's identity and the IPO firm's relationships (i.e., our first instrument does not meet the exclusion criterion), it is unlikely that such a relation would arise from the law firm's recent experience in the acquisitions market. This is particularly likely because we measure acquisition experience over the previous two years, whereas many IPO firms choose their law firms more than two years before their IPOs.

Fee, Hadlock, and Thomas (2006) note that the standard two-stage least squares (2SLS) procedure encounters estimation problems in nonlinear models such as our hazard model. Following their lead, we therefore use a linear probability model for our second stage regression, in which the dependent variable equals one in a given firm-year if the relationship terminates and equals zero if the relationship continues. For each supplier-customer relationship, there are as many observations as the length of the relationship, increasing our number of observations to 577.

The results from this two-stage procedure are reported in Models 7 and 8 in Table 5. The first stage results, reported as Model 7, show that all three law firm-related instruments meet the relevance criterion for a good instrument. The F-statistic on the joint significance of the law firm indicator variables, *Law firm gaffe*, and *Law firm acquisition experience* is 9479.36, indicating that our instruments jointly are significant. In addition, the coefficients for *Law firm gaffe*, *Law firm acquisition experience*, and many of the individual law firm dummy variables are statistically significant in the first stage regression. We also conduct a weak instruments test and find a Cragg-

Wald F-statistic of 11.42, which is above the 10% critical level discussed by Stock and Yogo (2005) and allows us to reject the hypothesis that we have weak instruments.

Again, a firm's lawyers typically are chosen long before the firm goes public, so it is unlikely that the IPO valuation is directly related to these instruments. This implies that the instruments also meet the exclusion restriction. Consistent with this argument, a Sargan test for overidentified restrictions yields a *p*-value of 0.64, consistent with our argument that the instruments meet the exclusion restriction.[12]

Model 8 in Table 5 reports the results of the second stage regression. The coefficient on the instrumented number of takeover defenses is -0.032 and is significant at the 5% level. This implies that adding one takeover defense at the IPO decreases the likelihood of relationship termination in any given firm-year by 3.2%. Internet Appendix Table A15 reports the results of several additional tests in which we use only one or two of the three law firm-related instruments, as well as a geography-based instrument. The findings are similar to those in Table 5. These results indicate that takeover defenses are positively related to the duration of the IPO's business relationship with its large customer. This is consistent with the implication of the bonding hypothesis that takeover defenses do, in fact, credibly commit the IPO firm to maintain its important business relationships.

4.3. Spillover effects of takeover defenses on the IPO firm's large customers

If takeover defenses help to bond an IPO firm's commitments to its trading partners and protect their quasi-rents, the defenses should have value consequences for the IPO firm's trading partners. In this section we examine the spillover effect on the IPO firm's large customers, using data on the 209 large customers that are themselves publicly traded.

Table 6 reports the abnormal return for the IPO firms' large customers over several time periods centered on the IPO firms' prospectus filing dates. We use a market model with parameters

[12] We also conduct an additional test of the exclusion restriction. We eliminate all IPOs that go public within four years of founding, the median time. By eliminating IPO firms that go public soon after founding, we most likely eliminate any IPO firms that strategically selected their law firms with the IPO in mind. The results using the remaining firms are similar to those reported here.

estimated from the market model over days -255 to -46 relative to the filing date with the equally weighted Center for Research in Security Prices (CRSP) index as the market proxy. Measured over all 209 firms, the mean CAR(-3, 3) is 1.17%.[13] This is similar to the finding by Johnson, Kang, and Yi (2010).

At first glance, this result could seem inconsistent with the bonding hypothesis, because it implies that news of the IPO increases the likelihood that the IPO firm can be taken over and have a negative spillover on the large customers. However, news that a firm will go public conveys benefits to the large customer as well as potential costs, as the IPO can reduce the IPO firm's financial constraints and increase its investment in the business relationship (Balakrishnan and Fox, 1993).[14] The net spillover effect of an IPO on a large customer cannot be signed, a priori. Also, news that a firm will go public typically precedes the prospectus filing date. Thus, news of the IPO affects the large customer's stock price some time before the prospectus filing date, while news about whether the IPO firm has takeover defenses becomes available only when the prospectus is filed. The bonding hypothesis, therefore, does not have a prediction about the average spillover effect on the large customer of the IPO. But it does predict that the spillover effect is increasing with the IPO firm's use of takeover defenses when news about the firm's use of takeover defenses is released.

Table 6, Panel B, reports a test of this prediction. When the IPO firm has fewer than three defenses, the mean abnormal stock return for large customers around the release of the IPO firm's prospectus is –0.75%. When the IPO firm has more than three defenses, the mean abnormal stock return for large customers is 4.66%. The difference is statistically significant and implies that the spillover effect on large customers' increases with the IPO firm's use of takeover defenses.

[13] We follow Johnson, Kang, and Yi (2010) in using a seven day event window, but the results are similar using CAR(-1, 1). We also repeat our analysis using industry adjusted returns from Ken French's website (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html) and obtain similar results.

[14] Hsu, Reed, and Rocholl (2010) find that IPOs have negative spillovers on the IPO firms' competitors, indicating that the IPO enhances the IPO firm's competitiveness. This suggests positive spillover effects for the IPO firm's large customers, which can benefit from the IPO firm's enhanced operations.

Table 7 reports the results of multivariate tests of the spillover effect on the IPO firm's large customers. The dependent variable is the large customer's abnormal return CAR(-3, +3) centered on the IPO firm's preliminary prospectus filing date. All regressions contain the following control variables: customer market capitalization, customer leverage, an indicator for the customer having a credit rating as reported in Compustat, the underwriter rank of the IPO offering; the size of the IPO firm, and IPO firm leverage.

Model 1 shows that CAR(-3,3) for the IPO firm's large customer is positively related to the number of takeover defenses at the IPO firm, even conditioning on the control variables. The coefficient of 1.940 indicates that the announcement day return for the IPO firm's large customer is 1.94 percentage points higher for each additional takeover defense deployed by the IPO firm. Models 2–6 include interactions with our additional measures of the importance of the business relationship. In Model 2, the effect of a social connection between the two firms' CEOs on the customer's stock return is –8.454% with a *t*-statistic of 3.5. When a social connection exists, however, the marginal impact of an additional takeover defense at the IPO firm is positive (2.561% + 1.633% = 4.194%). These results indicate that social connections are associated with decreases in the customer's share values when the IPO firm uses two or fewer defenses, but with increases in the customer's share values when the IPO firm uses three or more defenses.

Similar results obtain in Models 3–6. In each case, the news that the IPO firm has filed a prospectus and plans to go public is, by itself, value-decreasing for the IPO firm's large customer when the firms' business relationship is particularly valuable, although this result is not significant in Model 3. These results imply that the IPO is, by itself, bad news for the IPO firm's trading partner, as it puts the business relationship at greater risk. This is consistent with our finding reported in Table 5 that particularly valuable business relationships tend to end more quickly when the IPO firm does not have takeover defenses. Takeover defenses at the IPO firm, however, partially or fully offset this negative effect. We infer that they do so by helping to bond the IPO firm's commitment to the relationship. The takeover defenses have positive spillover effects on the

IPO firm's customers because they secure the IPO firm's explicit and implicit commitments to its important customers and protect the customers' quasi-rents.

4.4. Takeover defenses and IPO firm valuation

The bonding hypothesis implies that takeover defenses are adopted because they increase the IPO firm's value, at least among firms with important business relationships. The conventional view, in contrast, holds that takeover defenses decrease firm value because they increase the firm's agency costs. In this subsection, we test these competing views using a difference-in-difference test, multiple regression, and instrumental variable tests. To measure IPO firm value, we report several different measures used in prior research: the ratio of firm value to EBITDA, firm value divided by sales, and earnings per share divided by share price (Smart, Thirumalai, and Zutter, 2008). To calculate firm value, we add the market capitalization of equity at the end of the first trading day to the book value of debt. We use different measures because, as Chemmanur and Loutskina (2006) point out, each measure is subject to unique criticism about whether it accurately reflects fundamental firm value.

We follow Purnanadam and Swamanathan (2004) and compute relative valuation measures by comparing the IPO firm's value with that of a control firm matched by industry, sales, and EBITDA/sales. To select a control firm, we group all firms in the IPO firm's Fama and French industry, and that have been public for at least three years, into a 3x3 matrix by sorting by sales and EBITDA/sales. Within its matching 3x3 cell, the firm with sales closest to that of the IPO firm is selected as its control firm.[15]

Using the FK-index, the median number of takeover defenses among our IPO firms is three, so we sort the sample into firms with fewer than three defenses (N = 384), exactly three defenses (N = 371), and more than three defenses (N = 464). (The results are qualitatively similar using different

[15] Following Kim and Ritter (1999), Purnanadam and Swaminathan (2004), Smart et al. (2008), and Chemmanur and Loutskina (2009), we also compute firm value using only the value of equity, and using the IPO offer price rather than the aftermarket share price to calculate the value of equity. We also replicated the tests using the raw valuation measures, i.e., not relative to control firms. The results using these alternate measures are similar to those reported here (see Internet Appendix Table A.35).

sorts, for example, splitting the IPO firms into quintiles.) Panel A of Table 8 reports on the mean and median ratios of value/EBITDA for the IPO firm to value/EBITDA for its matched control firm. If the IPO firm and its matched control have identical pricing relative to their cash flows, this ratio equals one. The conventional agency view of takeover defenses implies that defenses decrease firm value, implying that the ratio should be negatively related to the firm's use of takeover defenses. The bonding hypothesis, in contrast, implies that takeover defenses increase firm value when the firm has counterparties with appropriable quasi-rents, implying that the ratio should be positively related to the use of takeover defenses for this subset of firms.

Insert Table 8 near here.

As reported in Table 8, the median ratio for firms with fewer than three defenses is 1.99. The distribution of value/EBITDA is skewed, so the mean ratio is much larger, 16.22. The median ratio for firms with more than three defenses is 3.19 (mean = 30.89). The difference between firms with fewer than three defenses and more than three defenses is statistically significant using both a t-test and the Mann-Whitney nonparametric test.

The association between takeover defenses and firm value, however, is not apparent in all IPO firms. Instead, it appears only among firms with large customers. Among such firms that have fewer than three defenses, the median valuation ratio is 1.98 (mean = 8.88). Among firms with large customers that have more than three defenses, the median ratio is 3.51 (mean = 35.52). This difference is significant at the 5% level using a paired *t*-test and at the 1% level using the Mann-Whitney test. Among firms without a large customer, in contrast, no significant difference exists in the valuation ratios among firms with few or many takeover defenses.

Panel B reports the results of similar comparisons using firm value divided by sales as the measure of valuation, and Panel C uses earnings per share divided by share price. The results are similar to those in Panel A. Firms with more than three takeover defenses have relatively high valuations, but this effect appears only among the subsample of IPO firms with large customers.

Internet Appendix Table A16 also reports that similar results obtain when we use *Dependent supplier* or *Strategic alliance* to indicate the existence of appropriable quasi-rents.

In some comparisons, the valuation measures for IPO firms with exactly three takeover defenses are slightly larger than those for firms with more than three defenses. This difference, however, is not statistically significant. In terms of their valuation effects, firms with exactly three defenses appear similar to firms with more than three defenses. In fact, if we partition the IPO firms into two groups, those with zero to two defenses versus those with three or more defenses, the empirical results are even stronger than those reported in Table 8. More important, the multivariate tests reported below do not suggest evidence of a structural break at three defenses. We infer that the occasionally high valuation ratios for firms with exactly three defenses are due to other firm characteristics that are controlled for in the multivariate tests.

Table 9 reports the results of multivariate tests that examine the effect of takeover defenses on IPO firm valuation. To control for skewness, the dependent variable is the log of the relative valuation ratio reported in Panel A of Table 8. Each test includes the same control variables reported in Table 3, with the addition of *log(IPO proceeds)*, the percent of the shares that are primary shares, and *IPO firm R&D/assets*. For brevity, we do not report the control variable results in the table. The regressions also include year and industry fixed effects. Model 1 shows that, including the control variables, IPO valuation remains positively related to the IPO firm's use of takeover defenses. The coefficient of 0.084 implies that moving from the median number of takeover defenses (three) to 1 standard deviation above the median (4.4 takeover defenses) increases relative firm value by 12.44%. Internet Appendix Table A17 reports results that are qualitatively similar in both statistical and economic significance if we use the G-index or E-index to measure takeover defenses.

Insert Table 9 near here.

Models 2–5 report results in which we interact our measures of appropriable quasi-rents with the FK-index of takeover defenses. In Model 2, the coefficient for the FK-index is insignificant, as

is the coefficient for *Large customer*. But the coefficient on the interaction of the two variables is positive and significant at the 5% level. Similarly, in Model 3 the interaction of the FK-index with *Dependent supplier* is positively and significantly related to the IPO firm's valuation. The interaction between the F-K index and the *Strategic alliance* variable is statistically insignificant, but the interaction of the F-K index and *Any important relationship* is positive and significant. Overall, these results indicate that IPO valuation is not mechanically or universally related to the use of takeover defenses. Instead, takeover defenses are associated with an increase in value only when the IPO firm's counterparties have large appropriable quasi-rents.

4.4.1. Instrumental variable tests for the effects on IPO firm valuation

The results in Tables 8 and 9 indicate that takeover defenses are positively related to IPO firm value when the firm has important counterparties. As with most empirical tests in which firm value is the dependent variable, however, we cannot make a strong argument that the relation is causal because firm value, counterparty quasi-rents, and the use of defenses all could reflect the firm's underlying economic environment.

To examine this possibility, we conduct instrumental variables tests using the three instruments described in Subsection 4.2 that are based on the characteristics of the IPO firm's law firm. The first stage regression, reported in Model 5 in Table 9, shows that the use of takeover defenses is positively related to *Law firm gaffe* and negatively related to *Law firm acquisition experience*. The F-statistic on the joint significance of the law firm indicator variables also is statistically significant.[16]

Model 6 in Table 9 reports the results of the second stage regression for IPO firm value, using fitted values from Model 5 to instrument for the number of takeover defenses. The coefficient on

[16] In drawing inferences from instrumental variable tests in which firm value is the dependent variable, we must make an additional assumption that IPO firms historically have used too few takeover defenses when they have important business relationships, compared with the optimum number, and that firms adopt additional defenses when encouraged by their law firms. This is consistent with the historical pattern of IPO firms' adoption of takeover defenses. As shown by Coates (2000), Daines and Klausner (2001), and Field and Karpoff (2002), IPO firms have responded to their law firms' encouragement by substantially increasing their use of takeover defenses over time.

the instrument is 0.100 and is significant at the 10% level. This result implies that takeover defenses are not only correlated with higher IPO firm value, but are also a cause of the higher value. Internet Appendix Table A18 reports the results of additional instrumental variable tests in which we use only one or two of the three law firm-related instruments, as well as an instrument that relies on the IPO firm's geographic location. All of the instrumental variable test results are qualitatively similar to the results in Model 6. We also find that instruments for the interaction of takeover defenses and the importance of the business relationship are significantly related to IPO firm value.

Bhojraj and Lee (2002) discuss problems with firm valuation measures, including skewness and measurement error. To investigate whether our results are affected by our choice of valuation measure, we repeated our tests using the other valuation measures reported in Table 8. As in our main tests, firm valuation using these alternate measures is positively related to the use of takeover defenses; furthermore, the positive relation is significant only among the subsets of firms with large customers, dependent suppliers, or strategic alliances.

4.5. IPO firm operating performance

If the conventional agency cost view of takeover defenses is correct, then IPO firms that adopt takeover defenses should experience poorer operating performance after they go public. This is because the defenses presumably entrench managers who run the firm inefficiently or consume large private benefits. Field and Karpoff (2002) examine this issue and find that, contrary to expectations, IPO firms with takeover defenses subsequently had better long term operating performance than IPO firms without defenses. They acknowledge that this result is inconsistent with the conventional view of takeover defenses but otherwise leave the result unexplained.

The bonding hypothesis provides an explanation for this result because it implies that takeover defenses improve firm value by bonding the firm's commitments to its counterparties. The higher valuations shown in Tables 8 and 9 plausibly should manifest as superior operating performance after the IPO. As the Pemstar-IBM example illustrates, both IBM (the customer) and

Pemstar (the IPO firm) earn quasi-rents from the trading relationship. Higher quasi-rents at the IPO firm typically will appear as a higher level of measured operating performance because the value of the quasi-rent is not reflected in the book value of assets. Thus, the bonding hypothesis implies that IPO firms that have significant trading relationships and deploy takeover defenses will earn higher (measured) operating profits than other IPO firms.

Table 10 reports on univariate difference-in-differences tests of the bonding hypothesis. Following Kaplan (1989), Jain and Kini (1994), Field and Karpoff (2002), and others, we measure the change in each IPO firm's return on assets (ROA) from the year of the IPO to the following year, adjusted for the contemporaneous change in ROA for the IPO firm's control firm. (Our results are qualitatively similar using ROA changes of up to four years after the IPO.) Focusing on the change in ROA instead of its level allows our tests to conform to prior literature and to partially control for unobserved firm-specific influences on ROA. It also reflects the intuition of the bonding hypothesis, which implies that takeover defenses encourage the firms' counterparties to make additional investments in the business relationship, thereby creating additional quasi-rents that should manifest as higher operating performance. As before, we partition the sample into three groups: firms with fewer than three takeover defenses (N = 384), those with exactly three takeover defenses (N = 371), and those with more than three takeover defenses (N = 464). Again, we use the FK-index in the results reported in the tables, but the results are similar using the G-index and E-index.

Insert Table 10 near here.

In the overall sample, the median adjusted change in ROA is –0.0074 for IPO firms with fewer than three defenses and 0.0091 for firms with more than three defenses. The difference in medians is not statistically significant. In the subset of IPO firms for which *Large customer* = 1, the difference in medians is larger (1.62), and the difference in mean ROA changes is statistically significant (p = 0.02). For firms without a large customer, the differences in the median and mean ROA changes are smaller and not significant. These results suggest that the general pattern in

operating performance observed by Field and Karpoff (2002) is attributable to the subgroup of firms with large customers. Results are similar using *Dependent supplier* or *Strategic alliance* as the indicator of an important business relationship.

Table 11 reports on multivariate tests of the relation between operating performance and the use of takeover defenses. The tests include the same control variables as in Table 3, but the control variable coefficients are suppressed in the table. In Model 1, the adjusted change in ROA is positively related to the FK-index. The coefficient of 0.005 implies that an increase of 1 standard deviation in the number of takeover defenses from the median of 3 to 4.4 corresponds to an increase in industry-adjusted ROA by 0.007, an increase of 50% in the median firm ROA. Models 2–5 report results when we include interactions with indicators of an important business relationship. In each regression the interaction term is positive and statistically significant. This indicates that takeover defenses are associated with operating performance improvements when the IPO firm's counterparty has a relatively large quasi-rent at stake. The presence of appropriable quasi-rents by itself is negatively associated with changes in ROA. The coefficient on *Large customer* in Model 2, for example, is –0.044 and is significant at the 5% level. Combined with the point estimate of 0.010 for the interaction term, this implies that the adjusted change in ROA among firms with large customers is negative, on average, when the firm has four or fewer takeover defenses and is positive for firms with five or more defenses. These results indicate that the IPO firms' change in ROA does not increase with the presence of a large customer, dependent supplier, or strategic partner per se. Instead, ROA is higher when the trading relationship with the important counterparty is protected by takeover defenses.

Insert Table 11 near here.

As with our valuation tests, we estimate instrumental variable models to examine whether the results in Models 1–5 are affected by endogeneity. Model 6 in Table 11 reports on the first stage regression using the three law firm-related instruments first examined in Table 5, and Model 7 reports the second stage results. The coefficient on the instrumented number of takeover defenses is

positive and significant at the 10% level. This result is consistent with the view that takeover defenses contribute to operating performance improvements. In general, however, the instrumental variable tests for operating performance are not as robust as the other results we report in this paper. In particular, the coefficient on the instrumented number of takeover defenses becomes insignificant when we include year fixed effects. Others note similar effects of year fixed effects in instrumental variables tests and suggest that annual dummy variables introduce severe multicollinearity issues in two-stage tests that limit the test's power (see Cliff and Denis, 2004).

5. Additional supporting evidence for the bonding hypothesis

The Internet Appendix reports on a large number of tests that examine the robustness of the results reported in Tables 2–11. These tests examine alternate measures of the value of the IPO firm (Table A19–A20), alternate measures of firms' takeover defenses (Tables A8–A11), the influence of venture backing (Tables A21–A24), and whether the bonding hypothesis applies for IPO firms with a small public float (Table A25). The results of all of these tests are consistent with the proposition that the bonding hypothesis is at work, at least among IPO firms with important counterparties. In this section, we report on tests that examine other implications of the bonding hypothesis.

5.1. Negative spillovers on large customers when the IPO firm is acquired

If the bonding hypothesis is correct, we should observe a spillover effect on the IPO firm's counterparties if the IPO firm opportunistically takes action to abrogate the business relationship. Furthermore, the spillover effect should be larger when the IPO firm previously bonded its commitment to the business relationship by adopting takeover defenses. We do not have direct indications of opportunism by the IPO firms, but an indirect indicator is whether an IPO firm subsequently is acquired. It is plausible that, at least in some acquisitions, the commitments to the firm's counterparties were abrogated.

Consistent with this assumption, we find that business relationships are in fact shortened when the IPO firms are acquired. In our sample, 43 of the IPO firms with large public customers were acquired within three years of the IPO. For these 43 firms, the business relationship with their large customers lasts 2.6 years. For the 176 IPO firms with large public customers that were not acquired, the average duration of the business relationship is 3.2 years. The t-statistic for the difference in means is 1.81. This finding indicates that IPO firm takeovers are associated with shorter business relationships.

Ten of the 43 acquired IPO firms had fewer than three takeover defenses. Cumulated over days -1, +1 relative to the acquisition announcement, the mean abnormal return for these firms' large customers is –0.37%. Fifteen of these firms had more than three takeover defenses, and the mean three-day abnormal return is –1.41% for the large customers of these firms. The difference between these two abnormal returns is statistically significant at the 10% level (t-statistic = –1.88). These results are consistent with the bonding hypothesis of takeover defenses, because they indicate that the negative spillover effects are largest when the IPO firm previously had made a significant commitment (via the use of takeover defenses) not to change the business relationship with its large customer.

Among the 209 IPO firms with large customers, the use of takeover defenses is not significantly related to acquisition likelihood. At first glance, this result appears to be inconsistent with our main hypothesis that takeover defenses bond the firm's relationships because they deter takeovers. A closer look, however, indicates that none of the firms with more than three defenses were acquired in hostile bids, suggesting that these firms' defenses did work to preclude the kind of takeovers that are most likely to disrupt prior business commitments. As reported in the Internet Appendix (Table A26), we also find that takeover defenses are negatively related to forced CEO turnover, indicating that defenses are associated with CEO tenure, as implied by the bonding hypothesis. To further probe this issue, in the Internet Appendix (Table A27) we report on tests of the ex ante acquisition likelihood based on the approach in Billett and Xue (2007). We find that the

use of takeover defenses is positively related to ex ante takeover likelihood, even though they are not significantly related to ex post acquisition likelihood. This implies that CEOs respond to the threat of outside takeover by adopting defenses. We infer that the ex post insignificant relation between the use of defenses and acquisition likelihood within our sample reflects the endogenous nature of acquisitions and defenses, not that defenses are ineffective takeover deterrents.

5.2. Classified boards as the most important takeover defense

Daines and Klausner (2001) and Bebchuk, Coates, and Subramanian (2002) argue that staggered boards and dual-class shares are much more important than other types of takeover defenses. Consistent with this view, Core, Guay, and Rusticus (2006) find that acquisition likelihood is not related to the G-index or E-index. Bates, Becher, and Lemmon (2008) also find that acquisition likelihood is not related to most takeover defenses, but it is negatively related to the existence of a classified board. An extreme view based on these findings is that the Field-Karpoff index, G-index, and E-index of takeover defenses are not good measures of a firm's takeover defenses and that the only good measure is whether the firm has a classified board. To examine this issue we repeat our tests replacing the indices of takeover defenses with a dummy variable that indicates the presence or absence of a classified board. (Dual class shares are uncommon in our sample, and the results are not affected if we include them.)

The results, which are tabulated in Internet Appendix Tables A9–A10, are similar to those reported in our main tests, although some *p*-values are larger. For example, 65.6% of IPO firms with large customers adopt classified boards, compared with 60.6% of IPO firms without a large customer (the difference is significant at the 10% level) and 68.9% of IPO firms with strategic alliances adopt classified boards, compared with 61.4% of IPO firms without large customers (the difference is significant at the 5% level). IPO firms with classified boards have an average relative valuation of 44.55 and IPO firms without classified boards have a valuation of 14.59, a difference that is significant at the 5% level. The valuation difference also is significant for firms with large

customers (52.15 versus 15.47), dependent suppliers (69.59 versus 7.63), and strategic alliances (83.93 versus 13.62). In multivariate tests measuring IPO valuation, the coefficient on the classified board indicator is positive and significant at the 1% level. The coefficients on the interaction between a classified board and the presence of a dependent supplier or strategic alliance are positive and statistically significant. The interaction between a classified board and large customer is positive but statistically insignificant. This latter result is an exception, but most of these results provide support for the bonding hypothesis even if only the presence or absence of a classified board is used to measure a firm's takeover defenses.

6. Possible alternate explanations for our results

Our results are consistent with a wide range of implications of the bonding hypothesis. Several results, however, also are consistent with alternate explanations. This section discusses and tests several such alternate explanations. Throughout, the evidence supports the bonding hypothesis and does not support the alternate explanations.

6.1. Takeovers and toeholds by the IPO firm's large customer

Conceivably, IPO firms acquire takeover defenses not to bond their relationships with large customers, but to guard against acquisitions by their large customers. However, we find no evidence to support this conjecture. Of the 43 IPO firms in our sample that were acquired within three years of the IPO, none was acquired by its large customer.

The positive spillover effect on large customers reflects could reflect an increase in the value of the large customer's stockholding in the IPO firm rather than bonding. However, we find no evidence to support this conjecture either. Large customers own equity shares of 2% or larger in only 49 of our sample firms. As reported in Internet Appendix Table A28, the results are nearly identical to those reported in the paper when we eliminate these 49 firms from the sample.

6.2. Anticipation and supply chain spillovers

Another possibility is that takeover defenses signal that the IPO firm is likely to be acquired with a takeover premium. This could explain our finding that IPO firm value is positively related to the use of takeover defenses and that IPO firms' large customers have positive share price reactions when the IPO firm has a large number of defenses. As Ahern and Harford (2012) report, an increased likelihood of takeover could signal increases in the acquisition likelihoods at the IPO firm's suppliers and customers.

While this anticipation hypothesis is consistent with these two findings, it does not explain the full complement of our empirical results. For example, it does not explain why takeover defenses are particularly common when the IPO firm has counterparties with large quasi-rents at stake. It also does not explain our results regarding operating performance or the duration of the IPO firm's business relationships with important customers.

We nonetheless test one variation of the anticipation hypothesis, which is that the IPO firm's use of takeover defenses reveals that both it and its large customer are in an industry in which acquisitions are likely. We examine this hypothesis by measuring the effect of the IPO announcement on the values of the IPO firm's large customers if the large customers are in the same industry as the IPO firm. The results, which are reported in Internet Appendix Section 33, show that the mean three-day announcement period abnormal return for customers in the same industry as the IPO is not significantly different from those of large customers in different industries from the IPO firm. These results are inconsistent with the hypothesis that takeover defenses at the IPO firm have a positive spillover on its large customer because they signal that both the IPO firm and its large customer are in an acquisitive industry.

6.3. Bargaining power

Yet another possibility is that takeover defenses increase managers' bargaining power in the event of a takeover bid, as proposed by DeAngelo and Rice (1983). Kadyrzhanova and Rhodes-Kropf (2011) argue that bargaining enhancements, such as takeover defenses, are particularly

valuable when more value is at stake, and they use industry concentration to proxy for the importance of bargaining power. The presence of a large customer, supplier, or strategic partner could indicate that the IPO firm has a high value that makes increased bargaining power more important. This bargaining power hypothesis could explain our findings that takeover defenses are more common when the IPO firm has an important counterparty and that defenses are positively related to the IPO firm's valuation.

The bargaining power hypothesis has three drawbacks. First, it does not explain the full range of our findings, including the evidence regarding IPO firm operating performance, spillover effects on the IPO firm's important counterparty, or the duration of the trading relationship. Second, Cremers, Nair, and Peyer (2008) find that takeover defenses are more common in competitive than concentrated industries, a result that is inconsistent with the argument that they will be used for increased bargaining in concentrated industries. Third, Field and Karpoff (2002) find no relation between takeover premiums and the use of takeover defenses in their sample of IPO firms, a result that is inconsistent with the bargaining power hypothesis for IPO firms in general.

Nonetheless, we investigate the bargaining power hypothesis with two tests. First, we include a measure of industry concentration, the Herfindahl Index, as an additional control variable in all of our primary tests. In some specifications the use of takeover defenses is more common in competitive industries, similar to the findings by Cremers, Nair, and Peyer (2008). In none of the tests, however, does the inclusion of the Herfindahl Index have a noticeable impact on our main findings. These results are tabulated in Internet Appendix Table A29.

In a second test, we examine whether any direct evidence exists that takeover defenses at IPO firms are associated with higher takeover premiums for the 43 IPO firms with large customers that were acquired within three years of their IPOs. We consistently find that takeover premiums are not significantly related to an IPO firm's use of takeover defenses. In the majority of specifications, the point estimates of the relation are negative. These results are inconsistent with a bargaining power interpretation of our results.

6.4. Managerial quality, firm quality, and firm growth

Some of the results in Table 3 suggest that higher quality firms use more takeover defenses, as the coefficients on venture backing and underwriter quality are positive, while the coefficient on leverage is negative. Such an association also is implied by Chemmanur, Paeglis, and Simonyan (2011), who argue that firms with higher quality managers are more likely to have takeover defenses. The positive relation between takeover defenses and firm value, therefore, could reflect not any bonding effect, but rather, the tendency for high-quality or high-growth firms to have defenses.

We investigate this possibility in several ways. First, we include control variables that correlate with firm quality, including venture backing, a development stage indicator, and underwriter rank. In tests that are detailed in Internet Appendix Tables A30 and A31, we also include all variables used by Chemmanur, Paeglis, and Simonyan (2011) to measure managerial quality, along with measures of firm growth. In general, these additional measures are not statistically significant in the valuation tests, and the main results reported in Tables 8 and 9 are largely unaffected. (One exception involves a replication of one of the valuation tests in Table 9, in which the coefficient on *Large customer x FK-index* becomes statistically insignificant.)

Another possibility is that our instrumental variables reflect firm quality. For example, high-quality firms could hire high-quality law firms and adopt more takeover defenses. This argument runs counter to the first stage regression results in Table 9, which show that *Law firm gaffe* is positively related to a firm's number of defenses and *Law firm acquisition experience* is negatively related to the number of defenses. These results suggest that higher quality law firms are associated with fewer defenses, not more. Nonetheless, we further explored this possibility by constructing additional instrumental variable tests based on the IPO firm's location. As Coates (2001) observes, firms headquartered in California are less likely to deploy takeover defenses than other firms. Many of these are technology firms, and it is unlikely that these also are low-quality firms. (In fact, these same firms are more likely to have venture capital backing.) As reported in Internet Appendix

Table A15 models 5–6 and Table A18 models 5–6, the 2SLS results using California headquarters as an instrument are similar to those reported in the paper, as the coefficient on the instrumented number of takeover defenses is significant at the 1% level.

6.5. IPO firm-specific or industry-wide spillover effects

An alternate interpretation of our tests that examine spillover effects on the IPO firm's large customer (Subsection 4.3 and Tables 6–7) is that the apparent spillover effect is spurious. For example, suppose the IPO is timed to exploit a simultaneous increase in demand for the large customer's products and that, for some unobserved reason, the number of takeover defenses increases with the size of the demand shock. This could account for the finding that the spillover effect on the IPO firms' large customers increases with the number of takeover defenses at the IPO firm. To test this possibility we examine spillover effects on other firms with the same CRSP four-digit Standard Industrial Classification code as the IPO firm's large customer. The bonding hypothesis implies that the spillover effects should be specific to the large customer, whereas the industry-wide shock story implies that spillover effects also will be observed among other firms in the same industry.

We calculate the market model abnormal returns of portfolios of competitors of each IPO large customer. There are 192 IPO customer competitor portfolios with sufficient data to calculate abnormal returns using a market model. The customer competitor CAR(-1, 1) is 0.01% and CAR(-3, 3) is 0.78%, both of which are statistically insignificant. More important, the relation between the industry portfolio return and the number of takeover defenses at the IPO firm is statistically insignificant. These results indicate that the takeover defenses at the IPO firm positively impact the firms that have a direct trading relationship with the IPO firm, but not firms in the same industry as the large customer but with no trading relationship with the IPO firm. That is, we are not observing a general industry spillover but, rather, the impact of the IPO firm's takeover defenses on firms with an actual trading relationship with the IPO firm.

7. Conclusions

In this paper, we propose and test an efficiency explanation for takeover defenses using data from IPO firms. Borrowing from Knoeber (1986), Shleifer and Summers (1988), Pontiff, Shleifer, and Weisbach (1990), and Coates (2001), we argue that takeover defenses can help to bond the IPO firm's explicit and implicit commitments to its stakeholders, including customers, suppliers, and strategic partners. By insulating current managers from the threat of ouster, takeover defenses increase the value of managers' commitments to maintain their promised operating strategy and not to opportunistically exploit their counterparties' investments in the IPO firm. This bond, in turn, encourages the firm's counterparties to invest in the business relationship, yielding benefits for the IPO firm. We call this the bonding hypothesis of takeover defenses.

We test five main implications of the bonding hypothesis using data on IPO firms. The tests rely on three measures of the importance of the quasi-rents earned by the IPO firm's counterparties. Such quasi-rents arise from the counterparties' investments in the business relationship, and would be at risk if the IPO firm abrogates its commitments. Our measures include indicators for the presence of a large customer, dependent supplier, or strategic alliance. In summary, our results indicate that

(1) IPO firms deploy more takeover defenses when they have large customers, dependent suppliers, or strategic partners;

(2) After the IPO, the longevity of the IPO firm's business relationship with its large customer is positively related to its use of takeover defenses;

(3) When the IPO firm announces its intention to go public, its large customers experience a change in share values that is positively related to the IPO firm's use of takeover defenses;

(4) The IPO firm's value is positively related to its use of takeover defenses when it has large customers, dependent suppliers, or strategic partners; and

(5) The IPO firm's subsequent operating performance is positively related to its use of takeover defenses when it has large customers, dependent suppliers, or strategic partners.

The results of several supplementary tests also are consistent with the bonding hypothesis. In total, these tests indicate that IPO firms are more likely to deploy takeover defenses particularly when their bonding value is high. The results are not sensitive to how takeover defenses are counted, as we examine three different indices of takeover defenses and consider various subsets of these indices (e.g, including only staggered boards). The results also persist when we use alternate measures of the IPO firm's counterparties' appropriable quasi-rents.

At first glance, these results are surprising because they run counter to the profession's view–and our own prior view–of takeover defenses. Upon reflection, however, the bonding hypothesis and its empirical support are consistent with a broader view of the contracting problem discussed by Akerlof (1970), Klein, Crawford, and Alchian (1978), Williamson (1979), Grossman and Hart (1986), and others. Explicit contracts are costly to specify and enforce, creating the potential for opportunism by both buyers and sellers in most trading relationships. Coase (1960) argues that market transactions and contracts tend to arise when the costs of executing such contracts are less than the gain from trade. Viewed this way, takeover defenses help to economize on the cost of building and maintaining value-increasing trading relationships between the IPO firm and its counterparties. The bonding hypothesis differs from previous theories about how takeover defenses can improve firm values, which depend on transfers (i.e., increased bargaining power as in DeAngelo and Rice, 1983) or market inefficiencies (as in Stein, 1988). Instead, the bonding hypothesis implies that takeover defenses increase value because they economize on contracting costs.

Our results do not address whether takeover defenses entrench managers and decrease firm values at seasoned firms, where agency problems are more severe. Due to firm life-cycle effects, the benefits of relationship bonding could decrease and the cost of entrenchment could increase as a firm matures. This would explain findings that seasoned firm values are negatively related to the insulating effect of takeover defenses, as summarized by Bebchuk (2013). However, at IPO firms whose values depend heavily on their relationships with customers, suppliers, and strategic partners,

takeover defenses appear to increase value by bonding the IPO firm's commitment to these relationships.

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Appendix: Takeover defense indices

We use three indices of takeover defenses, or antitakeover provisions. Each index is a count of the number of specified defenses the firm has at the time of its IPO. See the original sources for definitions of each defense listed.

The FK-index from Field and Karpoff (2002) includes the following ten defenses:

Takeover defenses in the FK-index

1. Antigreenmail provision
2. Blank check preferred stock
3. Classified board
4. Fair price provision
5. Poison pill
6. Stakeholder clause
7. Shareholder meeting restrictions
Meetings called only by directors or executives
Advance notice requirement
Restrictions on action by written consent
8. Supermajority voter requirements
Supermajority required to approve mergers
Supermajority required to replace directors
9. Unequal voting rights
10. Miscellaneous antitakeover provisions
Board can be removed only for cause
Merger must be approved by an inside director
Restrictions on transfer of common stock
Merger must be approved by separate class of stock
Restrictions on how many IPO shares may be purchased
Restrictions on votes each shareholder may cast

The G-index from Gompers, Ishii, and Metrick (2003) includes the following 24 defenses:

Takeover defenses in the G-index

1. Blank check preferred stock
2. Classified board
3. Restrictions on calling a special meeting
4. Restrictions on written consent
5. Compensation plans with change in control provisions
6. Director indemnification contracts
7. CEO golden parachute
8. Director indemnification in the charter or bylaws
9. Charter amendments limiting director liability
10. Severance packages for management
11. Bylaw amendment restrictions
12. Charter amendment restrictions
13. Does not have cumulative voting
14. Does not have secret ballots
15. Supermajority to approve mergers
Control-share acquisition laws (state)
16. Unequal voting rights
17. Antigreenmail
Antigreenmail law (state)

18. Directors duties to other stakeholders
Directors duties law (state)
19.Fair price provision
Fair price law (state)
20. Pension parachutes
21. Poison pill
22. Silver parachutes
23. Business combination law (state)
24. Cash-out law (state)

The E-index from Bebchuk, Cohen, and Ferrell (2009) contains the following six defenses:

Takeover defenses in the E-index

1. Classified board
2. Bylaw amendment restrictions
3. Charter amendment restrictions
4. Supermajority to approve mergers
5. Golden parachutes(requires change in control)
Severance package (no change in control)
6. Poison pill

Appendix (continued): Variable definitions

This table provides detailed descriptions of the variables used in the tables.

Variable Name	Definition
Takeover defense indices	
FK-index	An index adding up the total number of ten takeover defenses as in Field and Karpoff (2002) based on their presence in the firm charter and bylaws as disclosed in the IPO firm prospectus.
G-index	An index adding up the total number of 24 takeover defenses present as in Gompers, Ishii, and Metrick (2003) based on their presence in the firm charter and bylaws as disclosed in the IPO firm prospectus.
E-index	An index adding up the total number of 6 takeover defenses present as in Bebchuck, Cohen, and Ferrell (2009) based on their presence in the firm charter and bylaws as disclosed in the IPO firm prospectus.
Appropriable quasi-rent measures	
Large customer (indicator)	An indicator taking a value of one if the IPO firm has a large customer based on the COMPUSTAT segment level database. All observations are hand-checked using the IPO firm prospectuses.
Dependent supplier (indicator)	An indicator taking a value of one if the IPO firm is disclosed by another firm as a large customer based on the COMPUSTAT segment level database. All observations are hand-checked using firm annual reports.
Strategic alliance (indicator)	An indicator taking a value of one if the IPO firm has a strategic alliance with another firm as disclosed in the IPO firm prospectus.
Managerial characteristics	
CEO salary ($ thousands)	The dollar value of total cash compensation as disclosure in the IPO firm prospectus.
CEO tenure (years)	The number of years the CEO has been with the firm as disclosed in the IPO firm prospectus.
CEO age (years)	The age of the CEO as disclosed in the IPO firm prospectus.
Other IPO firm characteristics	
Inside ownership	The percent of shares held by inside managers of the firm as collected from the IPO prospectus.
Venture capital backed (indicator)	An indicator variable taking a value of one if the IPO firm has a venture capital investor as a pre-IPO shareholder.
Development firm (indicator)	An indicator variable taking a value of one if the IPO firm has zero sales at the time of the IPO based on COMPUSTAT data.
Board independence	The percent of the board that is made up of outsiders as collected from the IPO firm prospectus.
Board size	The total size of the IPO firm board as collected from the IPO prospectus.
Dual CEO/chair	An indicator variable taking a value of one if the CEO is also the chairman of the board and zero otherwise.
Total assets	COMPUSTAT data item AT.
Leverage	COMPUSTAT data item (DLTT+DLC)/AT
Market capitalization	Number of shares outstanding after the IPO times (CRSP shrout) the first available closing price of the IPO firm (CRPS prc).
Sales	COMPUSTAT data item SALE.
State antitakeover provisions	An indicator variable taking a value of one if the state of IPO firm incorporate has a state level antitakeover provision.
Delaware incorporation	An indicator taking a value of one if the IPO firm is incorporated in Delaware
Number of acquisitions	The number of acquisitions in the IPO firm Fama and French (1997) industry in the three years leading up to the IPO year measured in hundreds.
Underwriter rank	The rank of the lead underwriter of the offering as provided by Jay Ritter (http://bear.warrington.ufl.edu/ritter/ipodata.htm)
IPO firm-customer relationship characteristics	
CEO with social links to customer (indicator)	An indicator variable taking a value of one if the CEO has social links to the large customer CEO as defined by Hwang and Kim (2009).
Percent of IPO firm sales	The dollar value of sales to the large customer in the IPO year divided by COMPUSTAT data item SALE.
Long term contract	An indicator variable taking a value of one if the IPO firm discloses a long term contract with the large public customer and zero otherwise.
Pre-IPO relationship length	The number of years the relationship has existed as disclosed in the IPO firm prospectus.
Percent of customer COGS	The dollar sales to the large customer divided by the customer's total cost of goods sold.

Table 1. Summary statistics on important test and control variables

The sample consists of 1,219 IPOs reported in the Securities Data Corporation (SDC) New Issues database from 1997-2005. All REITs, unit offerings, closed end funds, ADRs, firms not covered by CRSP, firms that belong to either the financial services or utilities industries, and IPOs with an offer price below $5 are excluded from the sample. We use the COMPUSTAT Customer Segment database to identify whether the IPO firms have large customers. Variables are defined in the Appendix. Panel A reports on IPO CEO and firm characteristics, which are our main control variables. Panel B reports on our three main measures of takeover defenses, including the FK-index (Field-Karpoff 2002), G-Index (Gompers, Ishii, and Metrick 2003), E-Index (Bebchuk et al. 2007). Panel C reports on our four measures of the IPO firms' counterparties' appropriable quasi-rents. The bonding hypothesis implies that takeover defenses help to secure such quasi-rents. And Panel D reports on four additional measures of the importance of the business relationship. Data for these four additional measures are available for the 209 firms in the sample that have a large customer that is itself publicly traded.

Panel A. IPO firm characteristics				
	N	Mean	Median	Standard deviation
IPO firm CEO characteristics				
CEO compensation ($ thousands)	1,219	429.60	252.00	1,133.47
CEO tenure (years)	1,219	5.88	4.00	6.23
CEO age (years)	1,219	47.38	47.00	8.58
IPO firm characteristics				
Inside ownership	1,219	0.58	0.60	0.29
Venture capital backed (indicator)	1,219	0.52	1.00	0.50
Development firm (indicator)	1,219	0.03	0.00	0.18
Board independence	1,219	0.28	0.25	0.17
Board size	1,219	6.60	7.00	2.02
Dual CEO/chair (indicator)	1,219	0.56	1.00	0.49
Total assets ($ millions)	1,219	362.29	99.45	1,874.31
Leverage	1,219	0.37	0.25	0.36
Market capitalization ($ millions)	1,219	714.32	292.53	1,685.43
Sales ($ millions)	1,219	116.18	80.84	97.84
State antitakeover provisions (indicator)	1,219	0.95	1.00	0.22
Delaware incorporation (indicator)	1,219	0.78	1.00	0.41
Number of acquisitions	1,219	255	201	200
Underwriter rank	1,219	7.87	9.00	1.71

Panel B. Measures of takeover defenses at IPO firms				
FK-index	1,219	3.16	3.00	1.40
G-index	1,219	9.59	10.00	2.50
E-index	1,219	1.50	1.00	1.19

Panel C. Measures of IPO firms' counterparties' appropriable quasi-rents				
Large customer (indicator)	1,219	0.6005	1.0000	0.4899
Dependent supplier (indicator)	1,219	0.0443	0.0000	0.2058
Strategic alliance (indicator)	1,219	0.3068	0.0000	0.4614
Any important relationship (indicator)	1,219	0.6940	1.0000	0.4610

Panel D. Additional measures of the importance of the business relationship				
Social Links between IPO CEO and customer CEO (indicator)	209	0.1388	0.0000	0.3465
Long term contract (indicator)	209	0.2584	0.0000	0.4388
Pre-IPO relationship length (years)	209	2.2249	1.0000	3.8421
Percent of customer COGS	209	0.97%	0.06%	3.02%

Table 2. IPO firm takeover defenses and appropriable quasi-rents

The sample consists of 1,219 IPOs reported in the Securities Data Corporation (SDC) New Issues database from 1997-2005. All REITs, unit offerings, closed end funds, ADRs, firms not covered by CRSP, firms that belong to either the financial services or utilities industries, and IPOs with an offer price below $5 are excluded from the sample. We use the COMPUSTAT Customer Segment database to identify whether the IPO firms have large customers or are dependent suppliers. We hand collect data on strategic alliances from the IPO firm prospectus. p-values for tests of difference are reported in parentheses, and ***, **, and * denote two-tailed significance levels of the parameter estimates at the 0.01, 0.05, and 0.10 levels.

Panel A: Number of takeover defenses partitioned by the presence of a large customer						
	IPO firms without large customers (N=487)		IPO firms with large customers (N=732)		Test of Difference	
	Mean	Median	Mean	Median	t-statistic	Mann-Whitney z-test
IPO firm F-K Index	3.05	3.00	3.24	3.00	2.33**	2.87***
					(0.02)	(0.00)
IPO firm G-Index	9.27	9.00	9.81	10.00	3.71***	3.43***
					(0.00)	(0.00)
IPO firm E-Index	1.42	1.00	1.56	1.00	2.10**	2.35**
					(0.04)	(0.02)
Panel B: Number of takeover defenses partitioned by the presence of a dependent supplier						
	IPO firms without a large supplier (N=1,165)		IPO firms with a large supplier (N=54)		Test of Difference	
	Mean	Median	Mean	Median	t-statistic	Mann-Whitney z-test
IPO firm Field-Karpoff Index	3.13	3.00	3.76	4.00	3.22***	2.84***
					(0.00)	(0.00)
IPO firm G-Index	9.57	10.00	10.19	10.00	1.78*	1.72*
					(0.08)	(0.09)
IPO firm E-Index	1.49	1.00	1.81	1.00	1.96**	1.48
					(0.05)	(0.14)
Panel C: Number of takeover defenses partitioned by the presence of a strategic alliance						
	IPO firms without strategic alliance (N=865)		IPO firms with strategic alliance (N=354)		Test of Difference	
	Mean	Median	Mean	Median	t-statistic	Mann-Whitney z-test
IPO firm Field-Karpoff Index	3.06	3.00	3.40	3.00	3.86***	4.30***
					(0.00)	(0.00)
IPO firm G-Index	9.43	9.00	9.99	10.00	3.61***	4.03***
					(0.00)	(0.00)
IPO firm E-Index	1.42	1.00	1.70	1.00	3.65***	3.89***
					(0.00)	(0.00)
Panel D: Number of takeover defenses partitioned by the presence of a large customer or a dependent supplier or a strategic alliance						
	IPO firms without important relationship (N=373)		IPO firms with important relationship (N=846)		Test of Difference	
	Mean	Median	Mean	Median	t-statistic	Mann-Whitney z-test
IPO firm Field-Karpoff Index	2.94	3.00	3.26	3.00	3.59***	4.08***
					(0.00)	(0.00)
IPO firm G-Index	9.17	9.00	9.78	10.00	4.08***	3.92***
					(0.00)	(0.00)
IPO firm E-Index	1.33	1.00	1.58	1.00	3.32***	3.37***
					(0.00)	(0.00)

Table 3. Determinants of IPO firms' takeover defenses

This table reports the results of Poisson maximum-likelihood models in which the dependent variable is the number of takeover defenses as measured by the Field and Karpoff (2002) takeover defense index. *Large customer*, *Dependent supplier*, and *Strategic alliance* are indicator variables that reflect the existence of an important business relationship with the IPO firm. *Any important relationship* is an indicator variable taking a value of one if the firm has a large customer, a dependent supplier, or a strategic alliance and zero otherwise. The regressors are defined in the Appendix. The sample consists of 1,219 IPOs reported in the Securities Data Corporation (SDC) New Issues database between 1997 and 2005. Panel A reports results from nine regressions using the full sample, and Panel B reports results using a sub-sample in which the IPO firm has a large (10% of sales or greater) customer and the large customer is itself a publicly traded firm. All regressions include fixed effects for year and Fama and French (1997) industry. Standard errors clustered by industry are reported below the regression coefficients. ***, **, and * denote two-tailed significance levels of the parameter estimates at the 0.01, 0.05, and 0.10 levels.

Panel A. Determinants of IPO firm takeover defenses, total sample (N=1,219)	(1)	(2)	(3)	(4)
Measures of appropriable quasi-rents:				
Large customer (indicator)	0.095***			
	(0.026)			
Dependent supplier (indicator)		0.155***		
		(0.060)		
Strategic alliance (indicator)			0.073***	
			(0.027)	
Any important relationship (indicator)				0.110***
				(0.030)
Control Variables:				
Log(1+CEOsalary)	0.008*	0.010*	0.009*	0.009*
	(0.005)	(0.005)	(0.005)	(0.005)
CEO tenure (years)	0.001	0.001	0.001	0.001
	(0.002)	(0.002	(0.002)	(0.002)
CEO age (years)	0.000	0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Inside ownership	-0.048	-0.045	-0.046	-0.043
	(0.031)	(0.029)	(0.030)	(0.030)
Venture capital backed (indicator)	0.070***	0.063**	0.069**	0.071***
	(0.027)	(0.027)	(0.027)	(0.027)
Development firm (indicator)	-0.072	-0.048	-0.079	-0.065
	(0.067)	(0.069)	(0.068)	(0.065)
Board independence	0.124	0.114	0.112	0.107
	(0.114)	(0.108)	(0.110)	(0.113)
Board size	0.018**	0.018**	0.015**	0.016**
	(0.007)	(0.007)	(0.007)	(0.008)
Dual CEO/chair	0.026	0.035	0.032	0.029
	(0.030)	(0.029)	(0.030)	(0.030)
Log (total assets)	0.029***	0.023**	0.028***	0.029***
	(0.011)	(0.012)	(0.011)	(0.011)
Leverage	-0.036	-0.030	-0.017	-0.029
	(0.040)	(0.040)	(0.040)	(0.040)
State antitakeover law (indicator)	0.096	0.094	0.100	0.097
	(0.085)	(0.081)	(0.085)	(0.083)
Delaware incorporation (indicator)	-0.059*	-0.059*	-0.060*	-0.060*
	(0.033)	(0.032)	(0.034)	(0.032)
Number of acquisitions	0.010	0.017	0.014	0.011
	(0.013)	(0.014)	(0.013)	(0.012)
Underwriter Rank	0.034***	0.037***	0.036***	0.034***
	(0.009)	(0.009)	(0.009)	(0.009)
Year indicators	Yes	Yes	Yes	Yes
Industry indicators	Yes	Yes	Yes	Yes
Sample size	1,219	1,219	1,219	1,219
Log pseudo-likelihood	-2145.261	-2146.632	-2146.807	-2144.555

Table 3, continued

Panel B. Additional measures of the importance of the trading relationship with a large customer (N=209)

	FK-index as dependent variable			
	(1)	(2)	(3)	(4)
Social Links between IPO CEO and customer CEO (indicator)	0.215 ***			
	(0.054)			
Pre-IPO relationship length (years)		0.015*		
		(0.009)		
Long term contract (indicator)			0.197***	
			(0.073)	
Percent of customer COGS				1.644***
				(0.606)
Control Variables	Yes	Yes	Yes	Yes
Year indicators	Yes	Yes	Yes	Yes
Industry indicators	Yes	Yes	Yes	Yes
Sample size	209	209	209	209
Log pseudo-likelihood	-337.164	-337.832	-336.785	-337.871

Table 4. Takeover defenses and relationship duration, univariate comparisons

This table reports the mean and median length, in years, of the post-IPO business relationship between the IPO firm and its large publicly traded customer. Panel A reports on the total subsample of 209 IPOs reported in the Securities Data Corporation (SDC) New Issues database between 1997 and 2005 that had large customers at the time of their IPO, in which the large customers were themselves publicly traded. Panel B reports on subsamples partitioned by the IPO firm's number of takeover defenses at the time of the IPO, using the Field-Karpoff (2002) index as described in the Appendix. Results using the G-index and E-index are tabulated in the Internet Appendix. ***, **, and * denote the significance of the parameter estimates at the 0.01, 0.05, and 0.10 levels.

Panel A. Post-IPO relationship length for IPO firms with large public customers

	Post-IPO relationship length (years)	
N	Mean	Median
209	2.73	2.00

Panel B. Post-IPO relationship length by the number of takeover defenses

Number of IPO firm takeover defenses	Post-IPO relationship length (years)		
	N	Mean	Median
<3 takeover defenses (a:)	64	2.17	2.00
3 takeover defenses	77	2.68	2.00
>3 takeover defenses (b:)	68	3.32	3.00
Test of difference (b – a) using *t*-test / Mann-Whitney (p-value)		3.59*** (0.00)	3.27*** (0.00)

Table 5. Takeover defenses and relationship duration, multivariate tests

Models 1-6 report on non-parametric (Cox) survival analysis tests in which the dependent variable is the post-IPO length of the business relationship between the IPO firm and its large publicly traded customer. Models 7-8 report the results of a 2SLS instrumental variable test that seeks to control for the endogeneity of the firm's takeover defenses. The second stage regression dependent variable is an indicator for the year the relationship terminates where there is the same number of year observations for each firm as the length of the business relationship. The sample consists of 209 IPOs reported in the Securities Data Corporation (SDC) New Issues database between 1997 and 2005 that have large public customers at the time of their IPO. All REITs, unit offerings, closed-end funds, ADRs, firms not covered by CRSP, firms that belong to either the financial services or utilities industries, IPOs with an offer price below $5, and IPOs without earning or sales data in the year before the IPO are excluded from the sample. We use the COMPUSTAT Segment Customer database to identify whether the IPO firms have large corporate customers. A large corporate customer is defined as a customer whose sales account for more than 10% of the IPO firm's total sales. When there are multiple large corporate customers for each IPO firm, the customer that purchases the largest amount is identified as the sample customer. To determine whether a corporate customer is publicly traded or privately held, we match the names of large corporate customers in the COMPUSTAT Segment Customer database with those of all firms in COMPUSTAT. The Field and Karpoff (2002) FK-index is used to measure the IPO firm's use of takeover defenses, and results using the G-index and E-index are tabulated in the Internet Appendix. Standard errors clustered by industry are reported below the regression coefficients, and ***, **, and * denote the significance of the parameter estimates at the 0.01, 0.05, and 0.10 levels.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent variable = Post-IPO length of business relationship						1st stage: Dep var = number of takeover defenses	2nd stage: Dep var = Relationship termination
FK-index (a):	0.797***	0.829***	0.780***	0.813***	0.866***	0.858**		
	(0.044)	(0.045)	(0.046)	(0.043)	(0.052)	(0.057)		
Measures of the value of the quasi-rents:								
Social Links between IPO CEO and customer CEO indicator (b):		3.526***						
		(1.668)						
a x b		0.690***						
		(0.084)						
Long pre-IPO relationship length indicator (c):			1.017					
			(0.319)					
a x c			0.975					
			(0.108)					
Long term contract indicator (d):				0.767				
				(0.372)				
a x d				1.100				
				(0.139)				
High percent of customer COGS indicator (e):					2.038***			
					(0.505)			
a x e					0.827**			
					(0.073)			
Strategic alliance with customer indicator (f):						1.619*		
						(0.439)		
a x f						0.864*		
						(0.067)		
Instrumental variables:								
Law firm indicator variables							Included	
Law firm gaffe (indicator)							0.697***	
							(0.128)	
Law firm acquisition experience							-0.021***	
							(0.003)	
Instrumented number of takeover defenses								-0.032**
								(0.016)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year indicators	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry indicators	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample size	209	209	209	209	209	209	577	577
Log pseudo-likelihood/Adjusted R^2	-907.749	-906.129	-907.704	-907.612	-906.648	-907.161	0.80	0.19

Table 6. Cumulative abnormal returns (CARs) for large public corporate customers around the IPO preliminary filing date

This table reports mean and median values of the impacts on the IPO firms' large customers' share values when the IPO firms' preliminary prospectus is filed. The sample consists of 209 IPOs reported in the Securities Data Corporation (SDC) New Issues database from 1997-2005 that have a large customer that itself is a publicly traded corporation. We use the COMPUSTAT Customer Segment database to identify whether the IPO firms have large public corporate customers. A large public corporate customer is defined as a customer whose sales account for more than 10% of the IPO firm's total sales. To determine whether a corporate customer is publicly traded or privately held, we match the names of large corporate customers in the COMPUSTAT Segment Customer database with those of firms in COMPUSTAT. Cumulative abnormal returns are calculated using a market model regression with parameters estimated from day -255 to day -46. p-values are reported in parentheses, and ***, **, and * denote significance of the parameter estimates at the 0.01, 0.05, and 0.10 levels.

Panel A. Abnormal returns in event window around IPO filing date (N=209)

Event window	Mean	Median	t-test	Mann-Whitney z-test
-1	0.17%	-0.13%	0.54	0.53
			(0.59)	(0.60)
0	0.50%	0.15%	2.64**	2.27**
			(0.01)	(0.03)
+1	0.19%	-0.25%	0.91	0.29
			(0.36)	(0.77)
-1 to 1	0.86%	0.09%	2.13**	1.10
			(0.03)	(0.27)
-3 to 3	1.17%	0.30%	2.35**	1.96**
			(0.02)	(0.05)

Panel B. Abnormal returns by the number of takeover defenses

Number of IPO firm takeover defenses	Preliminary prospectus filing date CAR(-3, 3)		
	N	Mean	Median
<3 takeover defenses (a:)	64	-0.75%	-0.11%
3 takeover defenses	77	-0.33%	-0.63%
>3 takeover defenses (b:)	68	4.66%	1.69%
Test of difference (b – a) using *t*-test / Mann-Whitney (p-value)		4.39*** (0.00)	3.61*** (0.00)

Table 7. Multivariate regressions of cumulative abnormal returns (CARs) for large public corporate customers

This table reports results from six OLS regressions in which the dependent variable is the cumulative abnormal return over days (-3, +3) relative to the IPO firm's preliminary prospectus filing date for the IPO firms' large public customers. The sample consists of 209 IPOs reported in the Securities Data Corporation (SDC) New Issues database from 1997-2005 that have a large customer that is itself publicly traded. We use the COMPUSTAT Customer Segment database to identify whether the IPO firms have large customers. A large customer is defined as a customer whose sales account for more than 10% of the IPO firm's total sales. When there are multiple large customers for each IPO firm, the customer that purchases the largest amount is identified as the sample customer. To determine whether a corporate customer is publicly traded, we match the names of large corporate customers in the COMPUSTAT Segment Customer database with those of firms in COMPUSTAT. Cumulative abnormal returns are calculated using a market model regression with parameters estimated from day -255 to day -46 relative to the IPO firm's preliminary prospectus filing date. Standard errors clustered by industry are reported below the regression coefficients, and ***, **, and * denote significance of the parameter estimates at the 0.01, 0.05, and 0.10 levels.

	(1)	(2)	(3)	(4)	(5)	(6)
FK-index (a):	1.940***	1.633***	1.524***	0.820**	0.779	0.093
	(0.451)	(0.548)	(0.442)	(0.340)	(0.637)	(0.609)
Interfirm characteristics						
Social Links between IPO CEO and customer CEO indicator (b):		-8.454**				
		(3.528)				
a x b		2.561**				
		(1.217)				
Long pre-IPO relationship length indicator (c):			-1.845			
			(2.642)			
a x c			1.518*			
			(0.830)			
Long term contract indicator (d):				-6.460**		
				(2.699)		
a x d				1.945***		
				(0.664)		
High percent of customer COGS indicator					-6.827*	
					(3.983)	
a x e					2.047	
					(1.281)	
Strategic alliance with customer indicator (f):						-6.918*
						(3.939)
a x f						3.030**
						(1.285)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Year indicators	Yes	Yes	Yes	Yes	Yes	Yes
Industry indicators	Yes	Yes	Yes	Yes	Yes	Yes
Sample size	209	209	209	209	209	209
Adjusted R^2	0.22	0.24	0.26	0.26	0.25	0.28

Table 8. IPO firm valuation, univariate comparisons

Mean and median ratios of the IPO firm's relative valuation. In Panel A, relative valuation is calculated as the IPO firm's value at the IPO (market capitalization of equity at the end of trading on the IPO day plus the book value of debt) divided by EBITDA, divided by the ratio of firm value to EBITDA for the matched control firm. In Panel B, relative valuation is calculated as the IPO firm's value the IPO divided by sales, divided by the ratio of firm value to sales for the matched control firm. The matched firms are selected by sorting the Fama and French (1997) industry into three portfolios based on sales in the year before the IPO. Each of these portfolios is then sorted into three additional portfolios based on EBITDA/sales, producing a matrix of 3x3 portfolios for each industry. Then, within each portfolio, the firm with sales closest to the IPO firm is selected as the matched firm. A large customer is defined as a customer whose sales account for more than 10% of the IPO firm's total sales. ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

Panel A: IPO firm value/matching firm value (using EBITDA) partitioned by the number of takeover defenses and by large customer

Number of IPO firm takeover defenses	Total sample (N=1,219)			IPO firms without a large customer (N=487)			IPO firms with a large customer (N=732)		
	N	Mean	Median	N	Mean	Median	N	Mean	Median
< 3 takeover defenses (a)	384	16.22	1.99	187	23.95	1.99	197	8.88	1.98
3 takeover defenses	371	55.11	3.63	130	28.54	3.88	241	69.44	3.57
> 3 takeover defenses (b)	464	30.89	3.19	170	22.87	2.14	294	35.52	3.51
Difference (b – a)		1.74*	2.97**		0.08	0.21		2.53**	3.40***
t-test / Mann-Whitney p-value		(0.08)	(0.00)		(0.94)	(0.84)		(0.01)	(0.00)

Panel B: IPO firm value/matching firm value (using sales) partitioned by the number of takeover defenses and by large customer

Number of IPO firm takeover defenses	Total sample (N=1,219)			IPO firms without a large customer (N=487)			IPO firms with a large customer (N=732)		
	N	Mean	Median	N	Mean	Median	N	Mean	Median
< 3 takeover defenses (a)	384	65.38[#]	2.29	187	93.12[#]	1.92	197	39.04	2.35
3 takeover defenses	371	53.94	4.12	130	44.34	3.79	241	59.12	4.32
> 3 takeover defenses (b)	464	50.94	3.55	170	51.09	3.04	294	50.86	4.04
Difference (b – a) using		0.41	3.11***		0.63	1.31		0.32	2.78**
t-test / Mann-Whitney p-value		(0.68)	(0.00)		(0.53)	(0.19)		(0.75)	(0.01)

Panel C: IPO firm earnings per share to share price ratio (E/P) by number of takeover defenses and by large customer

Number of IPO firm takeover defenses	Total sample (N=540)			IPO firms without a large customer (N=210)			IPO firms with a large customer (N=330)		
	N	Mean	Median	N	Mean	Median	N	Mean	Median
< 3 takeover defenses (a)	186	0.0506	0.0429	86	0.0539	0.0435	100	0.0478	0.0400
3 takeover defenses	134	0.0529	0.0333	40	0.0364	0.0302	94	0.0600	0.0337
> 3 takeover defenses (b)	220	0.0475	0.0326	84	0.0505	0.0388	136	0.0457	0.0313
Difference (b – a) using		0.62	1.85*		0.50	0.42		0.30	1.92*
t-test / Mann-Whitney p-value		(0.53)	(0.06)		(0.62)	(0.68)		(0.76)	(0.06)

[#] Omitting a large outlier value for IPO firm relative valuation using sales, the mean for the total sample is 37.66 and the mean for the subsample without large customers is 36.21.

Table 9. IPO firm valuation, multivariate tests

Ordinary least squares estimates in which the dependent variable is the natural log of the IPO firm's relative valuation. Relative valuation is calculated as the IPO firm's value at the IPO (market capitalization of equity at the end of trading on the IPO day plus the book value of debt) divided by EBITDA, divided by the ratio of firm value to EBITDA for the matched control firm. Control firms are selected by sorting the Fama and French (1997) industry into three portfolios based on sales in the year before the IPO. Each of these portfolios is then sorted into three additional portfolios based on EBITDA/sales, producing a matrix of 3x3 portfolios for each industry. Then, within each portfolio, the firm with sales closest to the IPO firm is selected as the matched control firm. *Large customer*, *Dependent supplier*, and *Strategic alliance* are indicator variables that reflect the existence of an important business relationship with the IPO firm. *Any important relationship* is an indicator variable taking a value of one if the firm has a large customer, a dependent supplier, or a strategic alliance. Control variables include IPO firm underwriter rank, log(IPO proceeds), an indicator taking a value of one if the IPO is venture backed, the percent of the shares that are primary shares, IPO firm leverage, and IPO firm R&D/assets. Standard errors clustered by industry are reported below the regression coefficients, and ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dependent variable = IPO firm valuation					First Stage Dependent variable = number of defenses	Second Stage Dependent variable = IPO firm valuation
Takeover defense measures:							
FK-index	0.084***	0.003	0.63**	0.056*	-0.029		
	(0.028)	(0.045)	(0.026)	(0.033)	(0.058)		
Measures of appropriable quasi-rents:							
Large customer (indicator)		-0.119					
		(0.177)					
Large customer x takeover defense index		0.140**					
		(0.057)					
Dependent supplier (indicator)			-0.893				
			(0.565)				
Dependent supplier x takeover defense index			0.289***				
			(0.106)				
Strategic alliance (indicator):							
				-0.048			
Strategic alliance x takeover defense index				(0.315)			
				0.083			
Any important relationship (indicator)				(0.083)			
					-0.051		
Any important relationship x takeover					(0.230)		
defense index					0.152*		
Instrumental variables:					(0.078)		
Law firm indicator variables						Included	
Law firm gaffe (indicator)						0.518***	
						(0.133)	
Law firm acquisition experience						-0.005*	
						(0.003)	
Instrumented number of takeover defenses							0.100*
							(0.057)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year indicators	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry indicators	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample size	1,219	1,219	1,219	1,219	1,219	1,219	1,219
Adjusted R^2	0.22	0.24	0.23	0.23	0.24	0.28	0.23

Table 10. Change in operating performance, univariate results

Summary measures of the change in ROA for each IPO firm in our sample minus the change in ROA for its matched control firm. Control firms are selected based on industry, year, and ROA values within 10% of the IPO firm's ROA in the year before its IPO. Takeover defenses are measured using the Karpoff-Field (2002) index. Results using the G-index and E-index are similar and are tabulated in the Internet Appendix. A large customer is defined as a customer whose sales account for more than 10% of the IPO firm's total sales. ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

Number of IPO firm takeover defenses	Total sample (N=1,219)			IPO firms without a large customer (N=487)			IPO firms with a large customer (N=732)		
	N	Mean	Median	N	Mean	Median	N	Mean	Median
< 3 takeover defenses (a:)	384	-0.0326	-0.0074	187	-0.0113	0.0146	197	-0.0504	-0.0151
3 takeover defenses	371	-0.0148	-0.0155	130	0.0371	-0.0163	241	-0.0401	-0.0147
> 3 takeover defenses (b:)	464	0.0076	0.0091	170	0.0118	0.0088	294	0.0053	0.0106
Difference (b – a) using		1.83*	0.87		0.57	0.43		2.25**	1.62
t-test / Mann-Whitney p-value		(0.07)	(0.39)		(0.57)	(0.66)		(0.02)	(0.11)

Table 11. Change in operating performance, multivariate regressions

Models 1-4 report ordinary least squares estimates in which the dependent variable is the change in IPO firm ROA from the year of the IPO to the year after the IPO minus the corresponding change in ROA at the IPO firm's matched firm. Models 5-6 report the results of an instrumental variable test that seeks to control for the endogeneity of the firm's takeover defenses. Matched firms are selected based on industry, year, and beginning ROA values within 10% of the IPO firm's ROA. *Large customer*, *Dependent supplier*, and *Strategic alliance* are indicator variables that reflect the existence of an important business relationship with the IPO firm. *Any important relationship* is an indicator variable taking a value of one if the firm has a large customer, a dependent supplier, or a strategic alliance. Control variables include IPO firm underwriter rank, log(IPO proceeds), an indicator taking a value of one if the IPO is venture backed, the percent of the shares that are primary shares, IPO firm leverage, and IPO firm R&D/assets. Standard errors clustered by industry are reported below the regression coefficients, and ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dependent variable = ΔAdjusted ROA					1st stage: Dep var = number of takeover defenses	2nd stage: Dep var = ΔAdjusted ROA
Takeover defense measures:							
FK-index	0.005*	0.000	0.005	0.002	-0.004		
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)		
Measures of appropriable quasi-rents:							
Large customer		-0.044**					
		(0.021)					
Large customer x takeover defense index		0.010*					
		(0.006)					
Dependent supplier			-0.285				
			(0.144)				
Dependent supplier x takeover defense index			0.024**				
			(0.012)				
Strategic alliance (indicator):				-0.094**			
				(0.033)			
Strategic alliance x takeover defense index				0.015*			
				(0.008)			
Any important relationship (indicator)					-0.061***		
					(0.018)		
Any important relationship x takeover defense index					0.015**		
					(0.005)		
Instrumental variables:							
Law firm indicator variables						Included	
Law firm gaffe (indicator)						0.762***	
						(0.124)	
Law firm acquisition experience						-0.006*	
						(0.003)	
Instrumented number of takeover defenses							0.016*
							(0.009)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year indicators	Yes	Yes	Yes	Yes	Yes	No	No
Industry indicators	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample size	1,219	1,219	1,219	1,219	1,219	1,219	1,219
Adjusted R^2	0.07	0.07	0.08	0.08	0.08	0.36	0.01