

IPOs or Acquisitions?
A Theory of the Choice of Exit Strategy by
Entrepreneurs and Venture Capitalists

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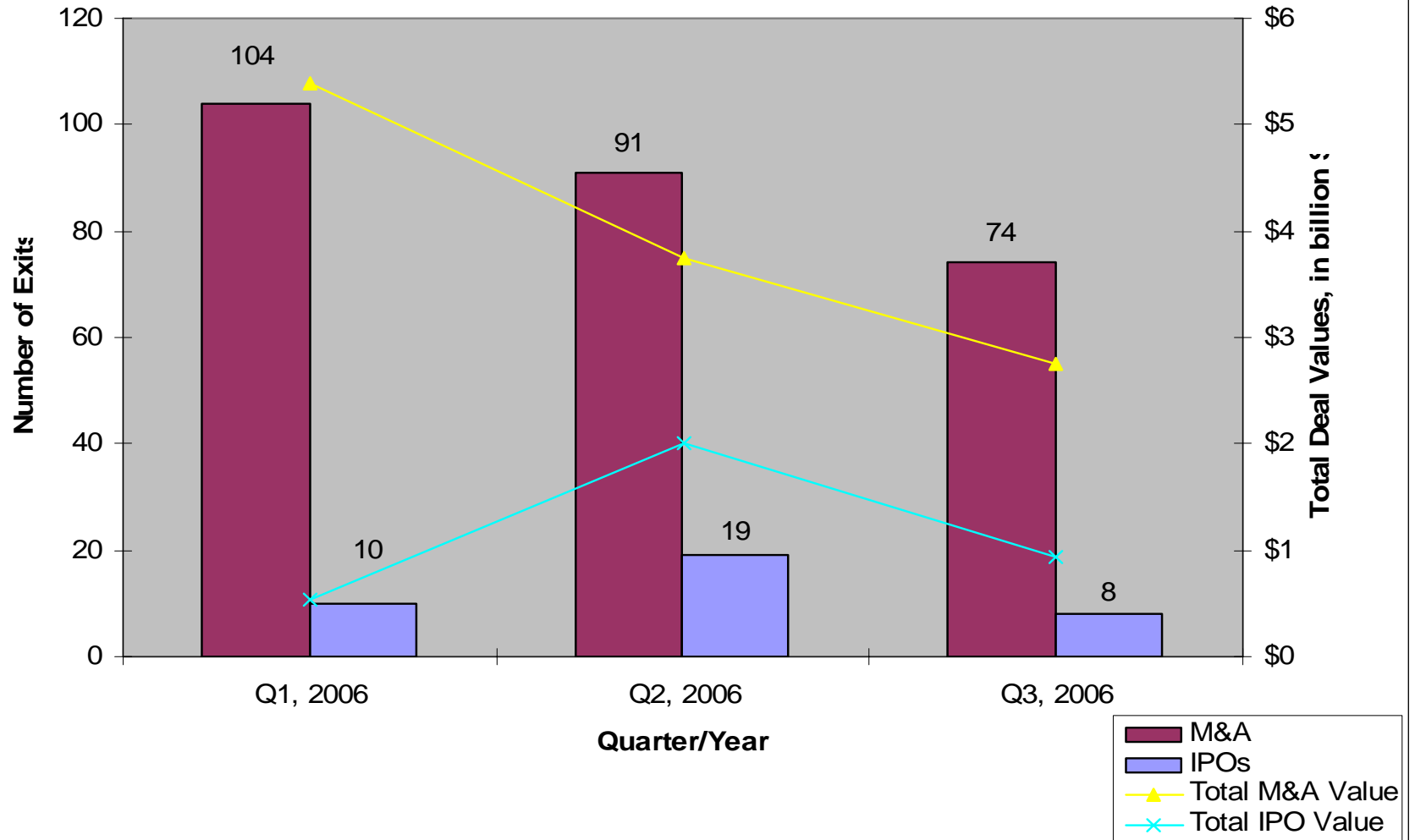
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Motivation

- The “exit decision” is one of the most important decisions in the life of a private firm, since it typically allows the firm to access the public capital markets for the first time.
- Further, it is the first significant opportunity for the entrepreneur and venture capitalist (as well as other private investors) to liquidate some of their holdings in the firm.
- The existing literature has focused almost exclusively on the decision of a firm whether to remain private or go public through an IPO:
 - **Theory:** Chemmanur and Fulghieri (1999), Maksimovic and Pichler (2001), Stoughton, Wong, and Zechner (2001).
 - **Empirical:** Pagano, Panetta, Zingales (1998), Helwege and Packer (2003), Chemmanur, He, and Nandy (2003).
- However, an equally important exit option for private firm insiders to accomplish the same objectives is agreeing to be acquired by a publicly traded firm.

Motivation

IPOs and Acquisitions of VC Backed Private Firms in 2006



Motivation

- The ratio of acquisitions to IPOs among private firm exits has increased dramatically in recent years. Over the last decade, a private firm was much more likely to have been acquired than to go public.
- According to the National Venture Capital Association (NVCA), there were more exits by venture capital backed firms through acquisitions than by IPOs in each of the last five years. Acquisitions constituted 78% of the value of exits of venture backed firms in 2005.
- In the first three quarters of 2006, there were only 37 venture-backed IPOs raising a total of \$3.486 billion according to the NVCA. On the other hand, the venture-backed M&A market continued to perform strongly in 2006 with 269 companies being acquired with a total value of \$11.890 billion, the highest total value in the last five years.

Motivation

- The objective of this paper is to provide the first theoretical analysis of a firm's choice between the two major exit strategies: going public, or selling the firm to a publicly traded acquirer.
- A theoretical analysis is very important to interpret the findings of the emerging empirical literature on a firm's choice between IPOs and acquisitions and to design better empirical tests.
- **Poulsen and Stegemoller (2006):** IPO firms are larger and more profitable firms; VC backed firms are more likely to go public rather than be acquired.
- See also: **Brau, Francis, and Kohers (2003).**

Motivation: IPO Valuation Premium Puzzle

- **Brau, Francis, and Kohers (2003)** and **Poulsen and Stegemoller (2006)** also imply that an “IPO valuation premium” exists by comparing the valuation multiples of IPOs and acquisitions.
- **IPO valuation premium puzzle:** If it is the case that her firm can command a valuation premium in an IPO compared to its value in an acquisition, why would an entrepreneur choose an acquisition over an IPO?
- Our analysis will be able to explain these and other empirical findings, and develop hypotheses for future empirical research.

This Paper

- We develop the first theoretical analysis of a firm's equilibrium choice between IPOs and acquisitions in the literature, and develop a number of testable predictions for this choice.
- We characterize how exit choices and firm valuations in venture backed firms will differ from those made by non-venture backed firms.
- Our theoretical analysis will also be able to explain the *IPO valuation premium puzzle*.
- We also analyze, explain, and develop testable predictions for, several related phenomena:
- **Post-IPO acquisitions:** Some firms are acquired within a short period after the IPO:
 - E.g., Netscape was acquired by AOL within a short period after IPO; Empirical study: **Dai 2005**
 - Given the large costs of going public, are these “double-exits” correcting a mistake, or are they equilibrium choices made by firms?

This Paper

- **Strategic acquisitions versus Financial acquisitions:** Given a decision to be acquired, how does a private firm choose between the two in equilibrium?
- **Post-acquisition IPOs:** Firms are taken public by acquirers (usually financial acquirers) within a short period after being acquired: Why couldn't insiders take them public directly?
- Our analysis has some implications for reform which may allow policy makers to reverse the recent trend away from IPOs and toward acquisitions.
 - Practitioners blame the Sarbanes-Oxley Act and recent scandals involving analysts for the increase in the number of firms that are acquired rather than go public.

Main Trade-Offs Driving the Model

- In our model, insiders (entrepreneurs and VCs) of a private firm want to sell some of their equity holdings in the firm and raise capital for a new project.
- Firm insiders have private information about the viability of their business model (and the firm itself) against future (post-exit) competition in the product market.
- A type H firm has a more viable and mature business model, and therefore has a better chance of succeeding as a stand-alone firm in product market competition than a type L firm.
- **Benefit of an acquisition over an IPO (Product Market Competition):**
The acquiring firm can provide synergy to the private firm and increase its probability of success against competition in the product market.
 - This benefit is clearly greater for type L firms.
- **Cerent vs. Cisco** in optical networking: Cerent decided to be acquired rather than go public, since it did not want to compete with Cisco.

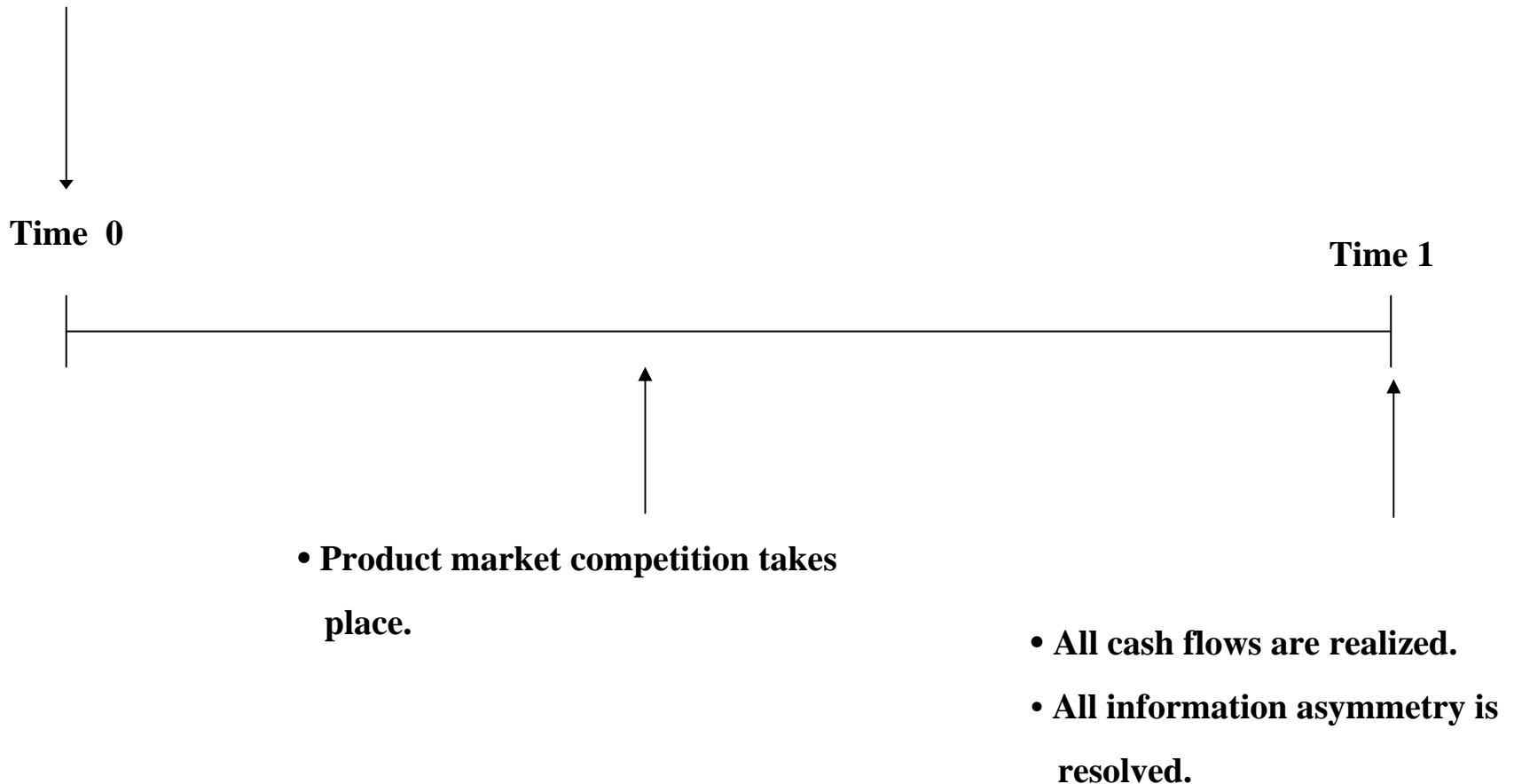
Main Trade-Offs Driving the Model

Three Costs of an Acquisition over an IPO:

- **Acquirer Bargaining Power:** While the IPO market prices firm equity competitively, acquirers may have considerable bargaining power, allowing them to extract some of the project's net present value from firm insiders.
- **Private Benefits of Control:** After their firm is acquired, the insiders of a private firm will lose control of their firm. After an IPO, however, they can continue to enjoy private benefits from being in control of their stand-alone firm.
- **No Asymmetric Information:** Potential acquirers have industry expertise and can value the private firm much better than the IPO market. Thus, private firm insiders have no information advantage against acquiring firms.
 - Hence, the type L firms will be correctly valued in an acquisition. In contrast, given that IPO market investors have less information than firm insiders, type L firms can potentially get higher valuations in the IPO market by pooling with type H firms.

Figure 1: Sequence of Events in the Basic Model

- VC and/or entrepreneur choose between going public or selling the firm to an acquirer.



Model Setup

- There are four kinds of risk-neutral agents: the entrepreneur, the VC, the acquiring firm, and atomistic outside investors.
- Prior to time 0, fractions of equity of a private firm are held by the entrepreneur (δ_E), the VC (δ_V), and other private equity investors (δ_O).
- At time 0, the entrepreneur and the VC wish to exit partially from the firm either by selling equity to outsiders in an IPO, or by selling the entire firm to an acquirer.
- Both the entrepreneur and the VC sell a fraction of their shares (α_E and α_V) in the IPO to satisfy (at least) their (respective) liquidity demands.
- The choice of exit mechanism (IPO versus acquisition) may be made either by the entrepreneur alone (“entrepreneur control”), or by the VC alone (“VC control”) or jointly through negotiation and side payments between the two (“joint control”). We analyze each of these three cases separately.
- The firm also wishes to raise an investment amount I from its exit to implement its project.

Model Setup

- In the case of an IPO, the firm may issue both “primary shares” equal to an amount I ; and “secondary” shares, whose proceeds go to selling shareholders (the entrepreneur and VC). The fraction of new equity issued in the IPO will be γ .
- In the case of an acquisition, the acquirer will buy out the entire equity stake of the entrepreneur and the VC, and invest the amount I in the firm to implement its project.
- The entrepreneur derives private benefits of control, B , from running the firm. While he can retain these in the event of an IPO, he will lose these after an acquisition.
- The VC derives no private benefits of control; his preferred exit choice is solely determined by the value of his expected cash flows (“security benefits”).
- After an IPO, both the entrepreneur and the VC retain a significant fraction of their shares in the firm (though the VC may retain only a smaller fraction than the entrepreneur).
 - Hence, if the firm goes public, the entrepreneur and the VC not only care about the IPO valuation of the firm, but also about the long-term consequences of product market competition after the IPO.

Information and Market Structure

- Firms are of two types: type H and type L. A type H firm has a more viable and mature business model, and therefore has a higher probability of success p_H as a stand-alone firm in product market competition than a type L firm p_L .
- The IPO market is characterized by asymmetric information: While firm insiders (entrepreneur and venture capitalist) know the type $q \in \{H, L\}$ of their own firm, IPO investors only observe a prior probability θ that the firm is of type H.
- IPO valuations may therefore fluctuate over time, depending on the extent of asymmetric information in the IPO market.
- Because of its expertise in the industry, the acquiring firm can correctly value the private firm. In other words, there is no information asymmetry between the acquirer and a target firm.

Information and Market Structure

- Acquiring firms can help the private firm compete better in the product market: i.e., increase its probability of success to p_A compared to that of a stand-alone post-IPO firm p_H for a type H firm or p_L for a type L firm.
- An acquisition helps a type L firm much more relative to a type H firm in the product market, since the type H firm has a higher stand-alone success probability p_H to begin with.
- While the IPO market is competitive, the acquirer has significant bargaining power with the entrepreneur.
- This means that, while private firm insiders are able to obtain the entire project NPV if they take the firm public, the acquirer is able to extract a fraction $(1-\rho)$ of the project NPV (pays only the remaining fraction ρ to private firm insiders).
- Product market competition takes place between time 0 and time 1, and all information asymmetry is resolved at time 1.
- The risk-free rate is normalized to zero.

Equilibrium in an Entrepreneur Controlled Firm: The Choice between IPOs and Acquisitions

Equilibrium Concept: Perfect Bayesian Equilibrium (PBE)

- A type H firm chooses to go public with probability 1. A type L firm chooses to be acquired with positive probability $(1-\beta_E)$, but go public with the remaining probability β_E .
- The type H firm has already a viable business model, so it can succeed in the product market with a high probability $(1-p_H)$ even as a stand-alone firm.
- The probability $(1-\beta_E)$ of an acquisition of a type L firm and the acquisition price P_{acq} increase with the synergy generated by an acquisition. The greater the increase in success probability (p_A-p_L) , the greater the probability $(1-\beta_E)$ of a type L firm being acquired.

Equilibrium in an Entrepreneur Controlled Firm: The Choice between IPOs and Acquisitions

- The probability β_E of a type L firm going public is also increasing in:
 - the fraction of shares α_E the entrepreneur sells in the IPO
 - the level of investment I required for the project
 - the private benefits B of the entrepreneur
 - the bargaining power $(1-\rho)$ of the acquirer.

Equilibrium in an Entrepreneur Controlled Firm: Firm Valuation in IPOs versus Acquisitions

- If the private benefits \mathbf{B} of the entrepreneur are not too large, the average IPO valuation across firms will be higher than the average acquisition value across firms since the average quality of firms going public will be higher.
- Even though IPO valuation is higher, an entrepreneur owning a type L firm will choose to be acquired with a positive probability $(1-\beta_E)$ rather than go public (β_E) , because he can only sell a small fraction α_E of his shares in the IPO and the IPO price V_{ipo} of a stand-alone type L firm is much less sustainable in the face of product market competition.
- The entrepreneur of the type L firm weighs the long-term benefits given by an acquisition in product market competition against the short-term valuation benefits of the IPO market (due to information asymmetry, and also because IPO market valuation is competitive) and the added advantage of retaining his benefits of control.

Equilibrium in an Entrepreneur Controlled Firm: Firm Valuation in IPOs versus Acquisitions

- The information asymmetry in the IPO market may fluctuate over time depending on market conditions so that the IPO valuation of firms may also fluctuate.
 - The entrepreneur will be more likely to choose to go public at times when IPO valuations are higher.

Equilibrium in a VC Controlled Firm versus that in an Entrepreneur Controlled Firm

- The venture capitalist differs from the entrepreneur in two important respects:
 - Shorter horizon for VC (may sell more in IPO) since they may need to exit their investments in a private firm earlier than entrepreneurs
 - No private benefits of control
- **Effect of Investment Horizon:**
 - If the VC has a much shorter investment horizon than the entrepreneur, so that the horizon effect dominates the private benefits of control effect, then type L firms that are VC controlled will go public with a higher probability in equilibrium compared to the case where they are entrepreneur controlled.
- **Effect of Private Benefits of Control:**
 - If the difference in horizon between the VC and entrepreneur is small, so that the private benefits of control effect dominates the horizon effect, then type L firms that are VC controlled are more likely to be acquired than in the case where they are entrepreneur controlled.

Equilibrium in a Jointly Controlled Firm (the VC has veto power over the exit decision)

- When the “automatic conversion” provision of the financial contract between the entrepreneur and the VC is sufficiently strong, any exit decision (IPO or acquisition) can proceed only with the agreement of the VC.
- In a jointly controlled firm, the entrepreneur negotiates any exit decision with the VC, including any side payments to be made by the entrepreneur to the VC in the event of disagreement over exit choice.
- In practice, such side payments are made by giving the VC more equity in the firm going public (i.e., by suitably adjusting the conversion ratio to equity of the VC’s stake in the firm prior to going public).
- In our model, in case the VC disagrees with a particular exit choice of the entrepreneur, the entrepreneur makes a side payment T to the VC, so that the IPO or the acquisition goes through.
- Because of the above cost associated with making side payments to the VC, the probability of going public of a jointly controlled firm is in between that of an entrepreneur controlled firm and that of a VC controlled firm.

Empirical and Policy Implications: The Choice between IPOs and Acquisitions

- The likelihood of a firm *going public* rather than being acquired is *decreasing in the concentration of the firm's industry*.
 - **Bayar (2006):** Firms in industries with a higher concentration (Herfindahl index) are more likely to be acquired rather than go public. Similarly, firms in industries with a big player (large market share) are more likely to be acquired than go public.
- Later stage, higher quality firms are more likely to go public; earlier stage, lower quality firms are more likely to be acquired.
 - **Poulsen and Stegemoller (2006), Bayar (2006):** Firms characterized by higher *pre-exit sales growth* are more likely to go public rather than be acquired.
 - **Nahata (2003):** Earlier stage venture backed firms are more likely to be acquired than later stage venture backed firms.
 - **Brau, Francis, and Kohers (2003), Bayar (2006):** IPO firms tend to be larger on average. Size may be correlated with product market viability.

Empirical and Policy Implications: The Choice between IPOs and Acquisitions

- The likelihood of a firm going public rather than being acquired is increasing in the private benefits enjoyed by management.
 - **Bayar (2006)**

- The likelihood of a firm going public rather than being acquired is higher during periods of high market valuations in the IPO market.
 - **Brau, Francis and Kohers (2003):** The probability of going public is increasing in the relative "hotness" of the IPO market relative to the takeover market.

- The likelihood of a firm going public rather than being acquired is increasing in the investment amount required (capital intensity)
 - **Bayar (2006):** Greater the capital intensity of a firm, more likely to go public.

Empirical and Policy Implications: Resolution to “IPO Valuation Premium Puzzle”

- If the entrepreneur's control benefits are not too large, the average valuation of firms going public will be higher than the average valuation of acquired firms.
 - **Brau, Francis, and Kohers (2003):** Sellers in acquisitions receive payoffs equal to only 78% of those in IPOs.
 - **Poulsen and Stegemoller (2006):** IPO firms have higher valuation multiples relative to those that are acquired.
- **IPO valuation premium puzzle:** If it is the case that her firm can command a valuation premium in an IPO compared to its value in an acquisition, why would an entrepreneur choose an acquisition over an IPO?
- First, the average quality of firms going public will be higher than that of firms being acquired.
 - Firms choosing an IPO consist of a mix of type H and type L firms, while only type L firms are acquired.
 - Also, a larger proportion of firms go public during periods of high IPO market valuations.
 - **Poulsen and Stegemoller (2006), Bayar (2006):** Firms characterized by higher pre-exit sales growth are more likely to go public rather than be acquired.

Empirical and Policy Implications: Resolution to “IPO Valuation Premium Puzzle”

- Therefore, analyzing whether an IPO valuation premium exists or not requires controlling for various factors affecting a firm’s choice between IPOs and acquisitions.
- Controlling for industry, time of transaction, and other characteristics affecting the choice between IPOs and acquisitions, there exists no IPO valuation premium, i. e., the valuation at which an acquired firm could have gone public is not higher than its acquisition value.
- **Bayar (2006) :**
 - After controlling for firm- and industry-specific factors determining the choice of IPO versus acquisition (propensity score matching), IPO valuation premia disappear for larger firms with a deal value above \$50 million.
 - An IPO valuation premium still exists for smaller firms.

Empirical and Policy Implications: Resolution to “IPO Valuation Premium Puzzle”

- Second, in many situations, entrepreneurs would prefer their firm to be acquired at lower valuations rather than go public at higher valuations, which may explain the empirical findings of **Poulsen and Stegemoller (2006)** and others.
- The entrepreneur and VC may have private information that their firm’s business model is not viable in the face of aggressive competition in the product market so that the firm’s high IPO valuation may not translate into sustainable long run market value.
- Entrepreneurs and VCs are able to liquidate only a small fraction of their equity holdings in the firm in the IPO or immediately thereafter; whereas they are able to liquidate most of their equity position in the event of an acquisition.
- Even though IPO firm valuation is higher than its acquisition value, the value of *insiders’ long-term expected payoff* (weighted average of their IPO proceeds and long-term stock market value) may be *lower* than its value when the firm is acquired.
 - **Bayar (2006)** also provides empirical support on this.

Empirical and Policy Implications: VC backed vs. Non-VC backed Firms

- If VC investment horizon is short, firms which are venture backed are more likely to choose to go public (rather than be acquired) relative to those which are non-venture backed.
 - **Poulsen and Stegemoller (2006), Bayar (2006).**

- If the VC has a similar investment horizon as the entrepreneur, then VC backed private firms are more likely to be acquired.
 - **Cumming (2003):** Financial contracts which give the venture capitalist greater control over the governance of the firm increase the likelihood of the firm being acquired rather than going public.

Empirical and Policy Implications: Post-IPO Acquisitions

- Post-IPO acquisitions are more likely to occur in more competitive industries. Further, firms, which are subject to post-IPO acquisitions, will be those which are less successful in the product market.

- Venture backed firms are more likely to undergo post-IPO acquisitions (rather than remain as stand-alone firms) compared to non-venture backed (i.e., purely entrepreneur controlled) firms.

- Firms in which venture capitalists have greater control are significantly more likely to undergo post-IPO acquisitions.
 - **Dai (2005):** Venture backed firms are significantly more likely to be acquired within three years following their IPO compared to non-venture backed firms.

 - **Dai (2005):** Further, firms in which venture capitalists have greater control in governance were about three times more likely to be acquired immediately following their IPO.

Empirical and Policy Implications: Strategic versus Financial Acquisitions

- Firms in more concentrated industries and thus with greater potential synergies with acquirers are more likely to be acquired by strategic acquirers.
- Firms in industries yielding greater benefits of control are more likely to be acquired by financial acquirers.
- Firm valuations in strategic acquisitions are higher than those in financial acquisitions (but lower than those in IPOs).
 - **Anecdotal evidence:** “A *strategic buyer might pay our client (seller) a higher multiple*...However with private equity groups we find that there is more flexibility than with strategic buyers. They can tailor something a little more to the current owner's liking in terms of how much he will get to participate in the firm going forward, and what freedom he will have.” (**Mergers and Acquisitions Magazine 2003 Roundtable, August 4, 2003, p.8-10**)

Conclusion

- We develop the first theoretical analysis of a firm's equilibrium choice between IPOs and acquisitions in the literature, and develop a number of new testable predictions for this choice.
- We characterize how exit choices and firm valuations in venture backed firms will differ from those made by non-venture backed firms.
- Our theoretical analysis is also able to explain the *IPO valuation premium puzzle*.
- We also analyze, explain, and develop testable predictions for, several related phenomena like
 - Post-IPO acquisitions
 - Strategic acquisitions vs. financial acquisitions
 - Post-acquisition IPOs

Extension to the Basic Model

Post-IPO Acquisitions

- In our extended model, we allow for an entrepreneur controlled firm to be acquired in the second period (time 1) after going public in the first period (time 0).
- As in the basic model, the firm continues to choose between an IPO and an acquisition at time 0.
- If the firm goes public at time 0, they might then decide to either keep the firm stand-alone or be acquired at time 1 depending on the dynamic evolution of product market competition between time 0 and time 1.
- We assume that an acquisition at time 1 can still help the firm and increase its probability of success.
- However, waiting for a post-IPO acquisition (rather than being acquired at time 0) can be costly for the firm. If the competition establishes a strong toehold in the product market, the expected synergy (increase in success probability) from a post-IPO acquisition will be lower than that of an early acquisition.

Extension to the Basic Model

Equilibrium with Post-IPO Acquisitions

- **Example: Netscape's competition with Microsoft's Internet Explorer (IE) web browser:** Netscape went public, and was trying to compete against Microsoft as a stand-alone firm. By the time Netscape was acquired by AOL, Internet Explorer had already established dominance in the browser market.
- **Equilibrium:** At time 0, the entrepreneur of a type H firm chooses to go public with probability 1. The entrepreneur of a type L firm chooses to go public with a positive probability β_p or be acquired with the remaining probability $(1-\beta_p)$.
- At time 1, if competitors have not already established a significant toehold in the product market, both type H and type L firms remain stand-alone.
- If the competition has established a toehold in the product market by time 1, a type L firm chooses to be acquired with some positive probability $(1-\eta)$, and remains stand-alone with the remaining probability η . A type H firm remains stand-alone with probability 1.
- The type L firm needs the help and expertise of an acquirer to survive against the stronger product market competition that arose after the IPO. The type H firm has a better business model, and is always viable in the product market even in the face of tough competition.

Extension to the Basic Model

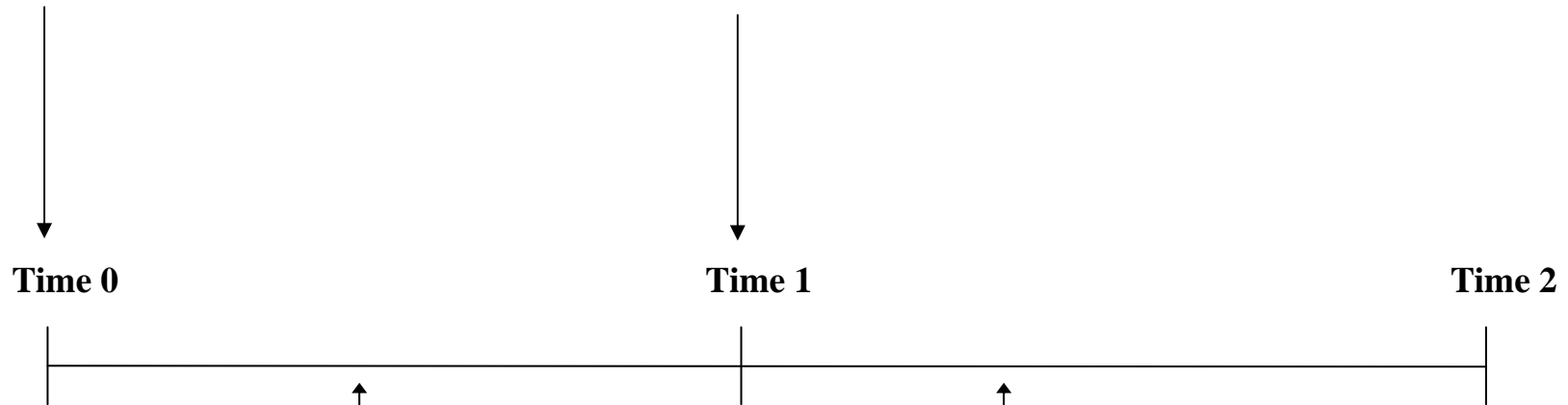
Equilibrium with Post-IPO Acquisitions

- We also study the equilibrium with post-IPO acquisitions for a firm which is VC controlled.
- The equilibrium in a VC controlled firm is qualitatively similar to that in an entrepreneur controlled firm.
- However, given that the firm has gone public at time 0, a type L firm that is VC controlled *is more likely to undergo a post-IPO acquisition* than a similar entrepreneur controlled firm.
- Since the VC has no private benefits of control, the VC has a less strong preference for his firm remaining stand-alone compared to the entrepreneur. A VC is therefore driven only by cash flow benefits, unlike an entrepreneur (who considers his control benefits arising from remaining stand-alone as well).

Figure 2: Sequence of Events in the Extended Model

- **The entrepreneur chooses between going public or selling the firm to an acquirer.**

- **If the firm goes public at time 0, the entrepreneur decides whether to sell the firm to an acquirer or keep it as a stand-alone firm.**



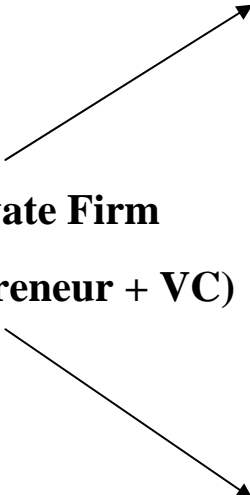
- **Competing firms establish a toehold or not.**

- **Product market competition takes place.**

- **All cash flows are realized.**
- **All asymmetric information is resolved.**

IPOs vs. Acquisitions

Summary of Costs and Benefits

<p>Private Firm (Entrepreneur + VC)</p> 	<p>IPO</p>	<p><u>Costs</u></p> <ol style="list-style-type: none">1. Lower probability of success in the product market2. Undervaluation due to information asymmetry (type H firm)	<p><u>Benefits</u></p> <ol style="list-style-type: none">1. Competitive valuation2. Private benefits for the entrepreneur3. Overvaluation due to information asymmetry (type L firm)
	<p>Acquisition</p>	<ol style="list-style-type: none">1. Bargaining power (Insiders get only a fraction of the project NPV)2. No overvaluation due to information asymmetry (type L firm)3. No private benefits for the entrepreneur	<ol style="list-style-type: none">1. Higher probability of success (synergy)2. No undervaluation due to information asymmetry (type H firm)