To wait or not to wait: When do announced Initial Public Offerings are completed?

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Abstract

This paper proposes a model that formalizes the optimal external timing for an initial public offering using real options concept and also presents empirical analysis. It is the first study to investigate the factors influencing the IPO waiting period. We find strong evidence of information production by waiting period. In line with the predictions of our model, the waiting period is more likely to be longer the larger syndicate size. We argue that the high competition risk among syndicate members (Corwin and Schultz, 2005) for larger syndicate size sets back the completion of the IPO. We provide evidence that the waiting period is also strongly related to leverage, investment and managerial incentives. Controlling for other potential determinants, we show that the probability of switching syndicate size in subsequent SEOs is strongly related to waiting periods and underwriter switches. We finally show that the longer the SEO waiting period the better the first-day market reaction on subsequent SEO date given that longer waiting periods are associated with less adverse selection risk.

Key words: IPO, subsequent SEO, real option, waiting period, syndicate size, syndicate size and underwriter switches, managerial incentives.
JEL code: G32, G24, G14, G30 and G 39.

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I- Introduction

Firms intent on going public face a timing issue. Substantial body of academic research on Initial Public Offerings (IPOs) documented the clustering of IPOs in a hot market called "Hot Issue market" (Ibbotson and Jaffe, 1975; Ritter, 1984; and Ibbotson, Sindelar, and Ritter, 1988, 1994 among others). However, few studies have investigated the external timing for an individual IPO[1]. This paper proposes a model that formalizes the optimal external timing of initial public offering using real options concept, derives underpricing and also presents empirical analysis. The external preparation delay is important since a long waiting period can alleviate concerns public investors may have about the financial health of the issuer and then reduce information asymmetry. The waiting period does not only reduce adverse selection risk for investors but it is also important for issuers or banks since they learn different types of information[2] during this period (e.g., Hanley, 1989; Edelen and Kadlec, 2005). Our empirical investigations tackle not only the determinants of the length of the waiting period- in particular its relationships with the syndicate size, leverage and post-IPO investment and managerial and directors incentives- but other rarely studied questions in the literature such as the probability of switching syndicate size (reduce or increase) in a subsequent seasoned equity offering (SEO) and how this probability is related to the switches in underwriters and underwriters prestige, among others.

Several studies (see Ritter, 1984 and Lowry, 2003 among others) suggest that firms tend to undertake IPOs when market conditions are favorable, which leads to fluctuations in IPOs volume over time (i.e., clustering of IPOs). IPOs are not only characterized by clustering in time but by industry concentration of IPO waves (e.g. Lowry and Schwert, 2002). Lowry (2003) suggests that when information asymmetry is high, firms are more likely to delay their IPOs and choose alternative types of financing. In the same way, Alti (2005) shows that high offer price, which is associated with low information asymmetry, triggers more IPOs.

Many reasons were advanced in the literature for going public. These reasons include diversification motive (Leland and Pyle, 1977), outside monitoring (Holmström and Tirole, 1993 and Bolton and Von Thadden, 1998), liquidity (Amihud and Mendelson, 1988) and private benefit of control (Zingales, 1995; Benninga, Helmantel and Sarig, 2005). Diversified investors value firm shares more than under-diversified owner

[1] External preparations delay or waiting period.
[2] Those information could be private, public or spillover.

(Leland and Pyle, 1977). Holmström and Tirole (1993) and Bolton and Von Thadden (1998) argue that going public could increase firm value because of the monitoring exercised by outsiders such as auditors, investment banks, analysts, investors. IPOs could also enhance the value of the firms because of the increase in liquidity that follows (Amihud and Mendelson, 1988). Subrahmanyam and Titman (1999) among others put forward the relation between stock price efficiency and the choice between private and public financing. IPOs have been looked as a stage in the sale of the company (Zingales, 1995). The author argues that going public offers the advantage of a dispersed ownership that yields a higher acquisition price. The going-public decision can also be taken as tradeoff between diversification gains and private benefit of control (Benninga, Helmantel and Sarig, 2005). According to Maug (2001), firms go public when they have lost comparative advantage over investors in gathering information to infer valuation of their firm. Other papers have linked the timing of IPOs with product market competition[3] (see Maksimovic and Pichler, 2001; Benveniste, Busaba, and Wilhelm, 2002, among others) and also the decision of going public with the outcomes of recent and current offerings (Benveniste, Ljungqvist, Wilhelm, and Yu 2003).

While substantial body of the literature has focused on market timing, IPOs motivations, links between asymmetry, uncertainty and underpricing (Beatty and Ritter, 1986 among others) little has been said on the external timing for an individual IPO (i.e. waiting period), it relationships with underwriting syndicate size and other IPO anomalies, and also the probability of switching syndicate size between the IPO and the subsequent SEO and it relations with underwriter switches and waiting periods. Draho (2000) proposed that the timing decision is made by the firms exercising optimally their option to go public. Logue (1973) positively related underpricing to the market return during the waiting period. Others papers study the partial adjustments of IPO prices to private and public information learned during the waiting period (e.g., Hanley, 1989; Edelen and Kadlec, 2005). However, these authors did not tackle the determinants of the length of the waiting period. Concerning the syndicate size, Corwin and Schultz (2005) find that prices offer are more likely to be revised in response to information when syndicate sizes are larger. These authors have also analyzed the relationships between underwriters and factors that may affect the syndicate size. Note that the findings of Corwin and Schultz (2005) reinforce the importance of studying the syndicate size switches at subsequent seasoned equity offerings (SEOs). The subject of subsequent SEOs decision

[3] There may be an incentive to delay the offerings since some competitors that are not public yet can benefit from information produced.

was tackled by Jegadeesh et al. (1993) but still no paper to our knowledge has studied the influences of investment and leverage on this decision and moreover the probability of switching syndicate size at a subsequent SEO. This paper seeks to find answers to the following questions that remain: (1) What characterize firms that have shorter or longer IPO waiting period? What determine the length of this delay[4]? (2) In which extends this delay is related to syndicate size, investment, leverage -moving capital structure toward an optimum: tradeoff theory- post-IPO managerial and directors' incentives and market sentiment[5]? (3) How does the waiting period affect underpricing, "money leave on the table", pricing and investors trading[6]? (4) What determine the probability of switching syndicate size between the IPO and the first SEO? (5) How does the market react at the subsequent SEO to syndicate size switch and SEO waiting period?

The objectives of this research are two-fold. First, this paper following Draho (2000) proposes a model that formalizes the optimal external timing for an initial public offering by the means of real option modeling and uses the same framework to derive IPO underpricing. To the best of our knowledge, this article presents the first model that incorporates underwriting syndicate size, jump in firm's cash flows and time inconsistency preference[7] of the issuing firms and analyzes their impacts on the external timing for an IPO and underpricing. The second objective is to investigate empirically (1) the determinants of the IPO waiting period and specifically it relation with the syndicate size; (2) the effects of both IPO waiting period and syndicate size on underpricing, "money left on the table", pricing and investors trading; (3) the link between post-IPO managerial and directors' incentives and the waiting period; (4) the probability of switching syndicate size between IPO and subsequent SEO and it relations with underwriters switches- switching for higher or lower ranked lead managers- and finally (5) the relations between the first-day SEO return and syndicate size switch and SEO waiting period.

Results derived from the model show that the IPO waiting periods increase in the syndicate size and uncertainty (possible jump in profit flow) and decrease in the time

[4] Even though the theoretical external preparations delay is estimated at about 120 days (see. Draho, 2004 page 183), the delay in reality varies greatly across firms and can be far above or under this theoretical time.
[5] Are the IPO waiting delays shorter in "hot market" and longer in "cold market"?
[6] As mentioned above the length of the external delay can affect information asymmetry.
[7] Since high-tech or growth firms often bet on the future and can be more patient because they have less cash. In fact, they invest more (R&D and other investments) and then can value more future cash flows than present cash flows. Note that contrary to most of the papers that deals with time inconsistency preferences (Phelps and Pollak, 1968; Laibson, 1997; Harris and Laibson, 2004; Grenadier and Wang, 2007 among others) we focus on the patience instead of impatience that usually characterize these preferences.

inconsistency preference or patience factor. Results also show that underpricing decreases in waiting periods.

Our empirical results are generally consistent with model predictions. We find evidence of information production by waiting periods. Indeed, just as predicted our model, we observe that the syndicate size is positively and strongly related with the waiting period length. Also consistent with the prediction of our model, time inconsistency preference or patience indicator is negatively with the waiting period length. The waiting period is moreover affected by three factors: underwriters' prestige, investment and leverage. These results provide evidence that the more prestigious underwriters are the more likely the IPOs are to be completed sooner. Likewise, overleveraged private firms will also complete the IPO sooner as suggested by the trade-off theory. The results also provide evidence that even though investment is not a significant motive for IPOs as argues Pagano et al. (1998), investment expedites IPOs completion. In contrast, we find no significant impact, on the waiting period, of uncertainty indicator, even if it has the predicted positive sign. We find both Hanley's (1993) partial adjustment effect and James and Wier's (1990) leverage effect on underpricing but no significant effect of waiting period.

Additional further investigations reveal that IPOs with long waiting period are more likely, after the IPO, to remunerate managers of the firms with options and also more likely to provide loans for options exercising, suggesting that the negotiations of stock options and stock ownership may have set back the IPO completion. These investigations also show that investors trade less when the waiting period is longer. Moreover, we find that even though overleveraged private firms complete the IPO sooner, they are less likely to return with a subsequent seasoned equity offering. In contrary, investment increases significantly the probability of a subsequent SEO.

Additional evidence on the role of syndicate size comes from our multinomial model estimates of the determinants of switching syndicate size between the IPO and the subsequent SEO. Results imply that

(a) Firms are more likely to reduce syndicate size when the IPO waiting period is longer and the announced SEO is more likely to be completed sooner when the syndicate size is reduced. Furthermore, the likelihood of reducing syndicate size is positively determined by IPO syndicate size, SEO gross spread and underwriter switch, but negatively related by IPO and SEO sizes.

(b) The probability of increasing syndicate size is positively related by SEO size, underwriter switch and switch for higher ranked underwriting manager, but negatively determined by IPO syndicate size.

(c) Firms are more likely to increase relative to reduce syndicate size when the IPO waiting period is shorter and the completion of announced SEO is more likely to be set back when the syndicate size is increased instead of reduced. Moreover, the likelihood of increasing instead of reducing syndicate size is positively determined by the IPO and SEO sizes but negatively related to SEO gross spread.

Finally, our analysis sheds light on the role of waiting period in market reaction on the SEO day. We find strong positive relation between SEO waiting meaning that the longer the SEO waiting period the more positive is the first-day market reaction. Furthermore, on the subsequent SEO date the market react negatively to higher post-IPO risk.

Overall, these findings complement in many the existing literature on IPO timing and the role of underwriting syndicate. The remainder of the paper is organized as follows. Section II develops the model incorporating underwriting syndicate size, jump in firm's cash flows and time inconsistency preference of the issuing firms and derives the optimal external timing for the IPO, which is the time that elapses between the announcement date and the split effective date. The underpricing problem is also examines as well as comparative statics. Empirical investigations are presented in Section III. Section IV concludes.

II. The model

In this section the IPO external timing is modeled as a real option problem. It is an extension of Draho (2000) framework incorporating underwriting syndicate size, jump in firm's cash flows and time inconsistency preference or patience factor of the issuing firms. Furthermore, we derive the IPO underpricing that has not been tackled by Draho (2000).

II.1 Draho's (2000) framework

The model relies on the assumption that the entrepreneur and investors share the same uncertainty over future profits. Both the firm and industry profits are expected to grow at a constant rate μ. The actual realization of the profits over time will be affected by random disturbances in the market, and the stochastic evolution of the industry profits is thus assumed to follow geometric Brownian motion:

$$\frac{d\pi_t}{\pi_t} = \mu dt + \sigma dz,$$

where z is the stochastic Brownian motion that captures firm profit fluctuations around the industry average. The effect of new public information, implicit in σdz, on the valuations will depend on the size of σ.

The expectation at time t of the profit π the time t is:

$$E(\pi_t \mid \pi_0) = \pi_0 e^{\mu t}.$$

Public investors are well diversified and discount future cash flows at the appropriate risk-adjusted rate ρ^m, which is exogenously given. Since the entrepreneur bears the cost of industry-wide idiosyncratic risk, he will discount the firm profits at rate $\rho^p > \rho^m > \mu > r$, where r is the risk free rate. Conditional on π_t the value of the firm is computed as

$$\upsilon^i(\pi_t) = E\left[\int_t^{\infty} e^{-\rho^i(s-t)}\pi_s ds \mid \pi_t\right] = \frac{\pi_t}{\rho^i - \mu}, \quad i \in \{m, p\}$$

When the entrepreneur takes the firm public he will incur issuing costs. The net proceeds from the IPO, $\Omega(\pi_t)$, are defined as

$$\Omega(\pi_t) = \alpha\frac{\pi_t}{\rho^m}(1-\lambda) - C.$$

where α is the exogenous fraction of shares to be sold to public investors, λ is the fraction of the issue proceeds received by underwriter and C the fixed direct expenses.

The value from owning the α shares consists of the dividend stream and the IPO proceeds. This value is $F(\pi_t)$ and equals

$$F(\pi_t) = E\left[\int_t^{t+T(\pi^*)} \alpha\pi_s e^{-\rho^p(s-t)} ds + e^{-\rho^i T(\pi^*)}\Omega(\pi_s) \mid \pi_t\right].$$

The critical profit level at which the firm goes public is π^* and $T(\pi^*)$ is the first time the process for π_t reaches π^*.

II.2 Extensions

In this subsection, we present the firm valuation, the timing decision along with comparatives statics and derive the IPO underpricing.

II.2.1 Firm valuation

We assume that a private firm has the option to go public at any time from the date the IPO program is known to the public. The IPO is assumed to be irreversible, both the private firm and the public investors are risk averse and time evolves continuously. The private company generates an instantaneous profit flow π_t , with an initial profit level of π_0 at the date the of the IPO announcement to the public. The profit of a private firm is expected to grow at a constant rate $\mu > r$[8], r where is the risk free rate, and affected by random disturbances in the market. The stochastic evolution of the private firm's profit allows for a downward Poisson jump to account for shocks in demand due to new entrants and technological development[9]. The idea here is to assess the influence of potential competition on the IPO timing. Moreover, many papers suggest that there is an incentive to delay the offerings because of product market competition (see Maksimovic and Pichler, 2001; Benveniste, Busaba, and Wilhelm, 2002, among others). Thus, it will be assumed that a mixed diffusion process describes dynamics of the private firm's profit according to the stochastic differential equation:

$$\frac{d\pi_t}{\pi_t} = \mu dt + \sigma dz - dq \qquad (1)$$

where λ is the intensity parameter of the Poisson process, measuring the frequency of a jump; $0 \le \phi \le 1$ is the percentage change in the profit flows if the Poisson event occurs; σ is the instantaneous standard deviation excluding the impact of the Poisson. The terms dz and dq represent respectively an increment to a standard Wiener process and a continuous-time Poisson process and are independently distributed. If the Poisson event occurs, q falls by some percentage ϕ with probability one.

The random variable ratio of the profit flow at time t, π_t to the profit flow at time zero can be written as

$$\pi_t/\pi_0 = \exp\left[\left(\mu - 1/2\sigma^2\right)t + \sigma z_t - \phi q_t\right]. \qquad (2)$$

Public investors will form conditional expectations about the profit flow π for the time t. The expectation at time t of the profit π is:

$$E(\pi_t \mid \pi_0) = \pi_0 e^{(\mu - \phi\lambda)t}. \qquad (3)$$

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[8] If $\mu < r$, no rational public investors would buy the stock.

[9] In fact, the resulting competition will reduce the firm's profits.

The value of the firm is then computed the expected present discounted value of this profit stream. To distinguish between the discount rates of entrepreneur of high-tech or growth firms from others we assume time inconsistency preference of the issuing firms and study its impacts on external IPO timing and underpricing. Thus, time is divided in two: the present period and all future periods. Indeed, these firms bet on the future and are more patient since they have less cash, invest more (R&D and other investments) and then can logically value more future cash flows than present cash flows. Consequently, in the current period cash flows are discounted exponentially with discount rate ρ^p by the private firm and ρ^m by public investors in such a way that $\rho^p > \rho^m$[10]. In the future periods, cash flows are discounted by the additional factor $\delta \in [1, 1+\varepsilon)$, ε is positive but small enough to keep the discount rate reasonable. Let $D(t,s)$ be the intertemporal discount function and $i \in \{p, m\}$. We have

$$D(t,s) = \begin{cases} e^{\rho^i (t-s)} & \text{if } \; s \in [t, T) \\ \delta e^{\rho^i (t-s)} & \text{if } \; s \in [T, \infty), \end{cases} \tag{4}$$

as in Harris and Laibson (2004) and Grenadier and Wang (2007) T has an exponential distribution with mean $1/\lambda$. In fact this distribution is often used to model the waiting period before a specific event. Using the intertemporal discount function $D(t,s)$ the value of the firm as expected present discounted profit stream is

$$\upsilon^i(\pi_t) = E_T E_\pi \left[\int_t^T e^{-\rho^i (s-t)} \pi_s ds + \int_T^\infty \delta e^{-\rho^i (s-t)} \pi_s ds \right] = \left(\frac{\delta\lambda + \kappa^i}{\lambda + \kappa^i} \right) \frac{\pi_t}{\kappa^i}, \tag{5}$$

where $\kappa^i = \rho^i - \mu + \phi\lambda$. In case of time consistency $\delta = 1$ and the value of the firm is $\frac{\pi_t}{\kappa^i} < \left(\frac{\delta\lambda + \kappa^i}{\lambda + \kappa^i} \right) \frac{\pi_t}{\kappa^i}$.

Applying Ito's lemma to (3), we get

$$\begin{aligned} d\upsilon^i(\pi_t) &= \upsilon^{i'} d\pi_t + \upsilon^{i''} (d\pi_t)^2 = \left(\frac{\delta\lambda + \kappa^i}{\lambda + \kappa^i} \right) \frac{1}{\kappa^i} \left[(\mu - \lambda\phi) \pi_t dt + \sigma \pi_t dz + \pi_t dq \right] \\ &= (\mu - \lambda\phi) \upsilon^i(\pi_t) dt + \sigma \upsilon^i(\pi_t) dz + \upsilon^i(\pi_t) dq. \end{aligned} \tag{6}$$

Thus, the entrepreneur and public investors' valuations of the firm have the same stochastic properties as the profit flow.

[10] Since shares are sold to the public investors at a discount.

Private firms going public will incur issuing costs. These costs include direct administrative costs C[11] and underwriting spread, ψ, as a percentage of the issue proceeds (see Lee, Lockhead, Ritter and Zhao, 1996). A paper by Corwin and Schultz (2005) show that underwriter spreads are increasing in the syndicate size suggesting that it is not always costless to add additional co-managers to the IPO syndicate. Consequently, we allow the underwriter spreads to positively depend on S the syndicate size, such that $\psi'(S) > 0$, $\psi''(S) < 0$ and $0 < \psi(S) < 1$. Then net proceeds to the private firm from the IPO, $\Omega(\pi_t)$, are

$$\Omega(\pi_t) = \alpha\left(\frac{\delta\lambda + \kappa^m}{\lambda + \kappa^m}\right)\frac{\pi_t}{\kappa^m}\left(1 - \psi(S)\right) - C. \tag{7}$$

where α is the ratio of shares sell to the public.

Assumption 1: The market value of the firm to be larger than the private value once the underwriting spread is taken into account.

Assumption 2: The will not issue immediately otherwise the timing decision would be unmotivated.

II.2.2 Timing decision

The value to the private firm from owning the fraction α of the firm consists of cash flow from the dividends until the firm the effective date of the sale and the IPO proceeds. The value is defined as

$$F(\pi_t) = E\left[\int_t^{t+\tau(\pi^*)} \alpha\pi_s e^{-\rho^p(s-t)} ds + e^{-\rho^i\tau(\pi^*)}\Omega(\pi_s) \mid \pi_t\right].^{12} \tag{8}$$

The trigger point π^* is critical profit level at which the firm goes public and $\tau(\pi^*)$ is the first time the process π reaches π^*. Thus, when the private firm's profit reaches π^*, the firm goes immediately public. The first term in equation (8) is the present value of the dividend stream accumulating by the firm until the IPO and the second term is the present value of net IPO proceeds.

If $\tau(\pi^*) = 0$ the firm goes immediately public at the announcement date, the waiting period is zero and the $F(\pi^*) = \Omega(\pi^*)$. The objective of the entrepreneur is to choose

[11] These costs include filing fees, legal expenses, and other administrative costs.

[12] This value assumes that the trigger point of the IPO occurs before the shift in the discount factor wish is reasonable since the timing decision we are dealing with is external IPO timing. Note that the shift in the discount factor still affects the value F through the net IPO proceeds Ω.

between waiting and accumulating more dividends from owning α shares and going public and get the payoff $\Omega(\pi^*)$. The firm has to choose the timing strategy that maximizes the value $F(\pi_t)$ which can be broken into two parts, the immediate dividend plus the discounted value of being private. The Bellman equation for the optimal external IPO timing:[13]

$$F(\pi) = \max\left\{\Omega(\pi), \alpha\pi dt + \frac{1}{\left(1+\rho^{p}dt\right)}E\left[F(\pi+d\pi)\,|\,\pi\right]\right\}. \tag{9}$$

In the continuation region, the second term is larger than the first and the equilibrium condition derived from equation (9) is

$$\rho^{p}F(\pi)dt = \alpha\pi dt + E\left[dF(\pi)\,|\,\pi\right].^{14} \tag{10}$$

Using stochastic dynamic programming (see equation (9)) and expanding $dF(\pi)$ using Ito's lemma (in equation (10)) for mixed diffusion-jump processes gives the following second-order differential equation

$$\frac{1}{2}\sigma^{2}\pi^{2}F^{''}(\pi)+(\rho^{p}-\kappa^{p})\pi F^{'}(\pi)-(\rho^{p}+\lambda)F(\pi)+\lambda F\left[(1-\phi)\pi\right]+(\rho^{p}-\kappa^{p})\pi=0 \tag{11}$$

The optimal IPO timing $\tau(\pi^*)$ is determined solving equation (11) under the following boundary conditions:

$$F(0)=0, \tag{12}$$

$$F(\pi^*)=\alpha\left(\frac{\delta\lambda+\kappa^{m}}{\lambda+\kappa^{m}}\right)\frac{\pi_t}{\kappa^{m}}\left(1-\psi(S)\right)-C, \tag{13}$$

$$F^{'}(\pi^*)=\alpha\left(\frac{\delta\lambda+\kappa^{m}}{\lambda+\kappa^{m}}\right)\frac{\left(1-\psi(S)\right)}{\kappa^{m}}. \tag{14}$$

The first condition (12) states that the value of going public is worthless if the firm value equals zero. Conditions (13) and (14) are the value-matching and smooth-pasting conditions, respectively, at the trigger point π^*.

Proposition 1 presents the solution to equation (11) under the boundary conditions. It characterizes the optimal of IPO realization.

Proposition 1: *The value of the firm to the entrepreneur prior to the IPO realization is*

$$F(\pi)=A\pi^{\beta}+\alpha\left(\frac{\delta\lambda+\kappa^{p}}{\lambda+\kappa^{p}}\right)\frac{\pi}{\kappa^{p}}, \tag{15}$$

[13] Similar to Dixit and Pindyck (1994 page 109).

[14] Terms of order dt^2 are dropped since they go to zero faster and becomes infinitesimally small.

where $\beta > 1$ *and solution to the nonlinear equation:*

$$\frac{1}{2}\sigma^2\beta(\beta-1)+(\rho^p-\kappa^p)\beta-(\rho^p+\lambda)+\lambda(1-\phi)^\beta=0$$

The trigger point π^* *is given by*

$$\pi^*=\left(\frac{\beta}{\beta-1}\right)\frac{C}{\alpha\left(\frac{\delta\lambda+\kappa^m}{\lambda+\kappa^m}\frac{(1-\psi(S))}{\kappa^m}-\frac{\delta\lambda+\kappa^p}{\lambda+\kappa^p}\frac{1}{\kappa^p}\right)}. \quad (16)$$

The entrepreneur chooses to execute the IPO at $\tau(\pi^*)=\inf\{s>t \setminus \pi_t \geq \pi^*\}$, *where* t *is the announcement date.*

The value of A *is given in the appendix.*

Proof. See Appendix.

Proposition 1 states that the firm should execute the IPO when $\pi_t \geq \pi^*$. The threshold π^* is basically influenced by the syndicate size, the issue size, and the time inconsistency preference factor and the size of jump in firm's profit. The following corollary describes how the external IPO timing is affected by these parameters.

Corollary 1:

Holding all other parameters constant, the optimal IPO waiting period is

i) increasing in the syndicate size S *;*

ii) decreasing in the time inconsistency preference factor δ *;*

iii) increasing in the size of jump in firm's profit ϕ.

Proof. See Appendix.

The impact of a larger syndicate size S on the waiting period is positive. Indeed, a larger syndicate size increases the underwriting spread, which in turn lowers the net IPO proceeds to the private firm and reduces the incentive to go public and make waiting more valuable. Furthermore, larger syndicate may wait longer to bring the private firm public because there is a more important risk of competition between syndicate members and consequently it could take more time to find synergy. Indeed, as reported by Corwin and Schultz (2005) "Practitioners tell us that underwriters continue to compete with each other even after the syndicate has been established". In contrary, an increase in the patience factor δ will increase the market valuation for any given profit level and the incentive to go public. Consequently firms with time inconsistency preference such as high-tech or growth firms will complete the IPO sooner. A larger jump size ϕ decreases the market valuation for any given profit level and the incentive to go public. Thus, when there is a threat of a drop in profit due to new entrants, private firm will go public later. This result is consistent with papers suggest that there is an incentive to delay the offerings because of product market competition (see Maksimovic and Pichler, 2001; Benveniste, Busaba, and Wilhelm, 2002, among others).

II.2.3 Numerical analysis

In this section numerical analysis is used to illustrate the magnitude of the critical value π^* at which it is optimal to realize the IPO and consider comparatives statics for the values of the underlying parameters of corollary1, S, δ and ϕ. The following parameter values are held constant throughout the three examples presented: $\alpha = 0.2$ and $C = 1$. The entrepreneur is selling 20 percent of the shares to the public and the fixed cost of the IPO is normalized to one million dollars.

Table I summarizes the values of the parameters used to analyze the impacts of syndicate size, time inconsistency preference or patience factor, and uncertainty on the IPO trigger point. These values are based on the literature. ψ is set to 7% since this rate is the most common (Chen and Ritter (2000) among others). The values of ρ^p and ρ^m are based on Draho (2000).

INSERT TABLE I ABOUT HERE

INSERT FIGURE 1 ABOUT HERE

The effect of the underwriting spread $\psi(S)$ on π^* is shown in Figure 1. The effect of the syndicate size S is straight forward and the same since $\psi'(S) > 0$. Increasing the syndicate size raises π^* and extends the waiting period. Indeed, as mentioned earlier a larger syndicate size reduces net IPO proceeds to the private firm, the incentive to go public and make waiting more valuable. Furthermore, the larger syndicate size is the more important the risk of competition between syndicate members which can set back the IPO completion.

INSERT FIGURE 2 ABOUT HERE

The effect of time inconsistency preference factor δ (which is also the patience factor in our model) on π^* is depicted in Figure 2. The more private firms value future cash flows than present cash flows the sooner the IPO will be completed the IPO. Thus, firms such as high-tech or growth firms will complete the IPO sooner probably for investment motive.

INSERT FIGURE 3 ABOUT HERE

Figure 3 shows the impact of jump amplitude ϕ of the Poison event on the IPO trigger point π^*. While π^* increases with the market volatility σ - as in the standard option pricing-, this increase is greater for higher amplitudes, as observed for the cases of $\phi = 0$, $\phi = 0.25$ and $\phi = 0.5$. Higher is the risk of profit drop due to product market competition later will private firms go public because of information disclosure inherent in IPO (see Maksimovic and Pichler, 2001; Benveniste, Busaba, and Wilhelm, 2002, among others). Table A1 presented in the appendix also shows the dependence of β and π^* on various values of σ for different cases of ϕ.

II.2.4 Underpricing

The underpricing is derived under the assumption that the price offer is the price as estimated by the entrepreneur. Thus, we define the initial underpricing return UP as the difference, at the trigger point π^*, between the market value which is the net value of the firm to the public investors $n\upsilon^m(\pi^*)$ and the offer value which is the net value of the firm to the entrepreneur[15] $n\upsilon^p(\pi^*)$, normalized by the latter.

The net value of the firm to the public investors is the value of the firm to the public investors less the issuing costs.

$$n\upsilon^m(\pi^*) = \alpha\left[\left(1-\alpha\psi(S)\right)\upsilon^m(\pi^*) - C\right] = \alpha\left[\left(\frac{\delta\lambda+\kappa^m}{\lambda+\kappa^m}\right)\frac{\pi^*}{\kappa^m}\left(1-\alpha\psi(S)\right) - C\right]. \tag{17}$$

The net value of the firm to the public investors is the value of the firm to the entrepreneur less the issuing costs.

$$n\upsilon^p(\pi^*) = \alpha\left[\left(1-\alpha\psi(S)\right)\upsilon^p(\pi^*) - C\right] = \alpha\left[\left(\frac{\delta\lambda+\kappa^p}{\lambda+\kappa^p}\right)\frac{\pi^*}{\kappa^p}\left(1-\alpha\psi(S)\right) - C\right]. \tag{18}$$

Then,

$$UP \equiv \frac{n\upsilon^m(\pi^*) - n\upsilon^p(\pi^*)}{n\upsilon^p(\pi^*)} = \frac{\left(1-\alpha\psi(S)\right)\upsilon^m(\pi^*) - C}{\left(1-\alpha\psi(S)\right)\upsilon^p(\pi^*) - C} - 1. \tag{19}$$

The purpose of our analysis is to examine the variation in the underpricing return UP as function of the external IPO delay and deduce direct, indirect and total effect for the

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[15] Recall that $\rho^p > \rho^m$.

syndicate size, the issue size, and the time inconsistency preference factor and the size of jump in firm's profit. The Proposition below gives the relation between underpricing and the IPO waiting period.

***Proposition 2**: The underpricing return UP is decreasing in the IPO waiting period.*

Proof. See Appendix.

A longer the waiting period is the lower is the underpricing return. Indeed, a longer external delay can reduce information asymmetry since it can alleviate investors concerns about financial health of the private firm issuing. Moreover, Rock (1986), Beatty and Ritter (1986) and Ellul and Pagano (2006) among others document positive relation between underpricing of an IPO and the uncertainty of investors regarding the value of the issuer. The figure 4 below illustrates the negative relation between underpricing and waiting period.

INSERT FIGURE 4 ABOUT HERE

The effects of syndicate size S, time inconsistency preference factor δ, and jump amplitude ϕ on underpricing UP are indeterminate. The total effect for each parameter depends on which one of direct effect and indirect effect -through π^*- is greater[16]. Our empirical investigation will shed light on these effects.

III. Empirical Analysis

In this section we test hypotheses derived from the model and carry out further investigations.

III. 1 Empirical implications and further investigations

From Propositions 1 and 2 and Corollary 1, we can write our empirical implications as follows:

(I1) Waiting periods increase in the syndicate size and uncertainty (possible jump in profit flow). They decrease in the time inconsistency preference or patience factor.

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[16] The indirect effects are: $\frac{\partial UP}{\partial \pi^*}\frac{\partial \pi^*}{\partial \psi(S)} < 0$, $\frac{\partial UP}{\partial \pi^*}\frac{\partial \pi^*}{\partial \delta} > 0$ and $\frac{\partial UP}{\partial \pi^*}\frac{\partial \pi^*}{\partial \phi} < 0$. The direct effect are $\frac{\partial UP}{\partial \psi(S)} > 0$, $\frac{\partial UP}{\partial \delta} < 0$ and $\frac{\partial UP}{\partial \phi} < or > 0$.

(I2) Underpricing decreases in waiting periods. It is indeterminate in syndicate size and uncertainty and the time inconsistency preference or patience factor.

As we saw earlier in the model, the more private firms value future cash flows than present cash flows the sooner the IPO will be completed the IPO, probably for investment motive. Consequently, we test investment but also trade-off theory[17] motives in setting the waiting period length. Even though investment does not justify IPOs (see. Pagano et al., 1998) we expect investment to quicken the completion of the IPO. Indeed, firms that issue stock to finance investment opportunities will be more impatient to receive the offering proceeds and carry out their investment, the IPO will then be completed sooner. Likewise, overleveraged private firms will not wait long to bring their capital structure to an optimal level. Therefore, we test the relationships between the waiting period and post-IPO investment on the one hand and waiting period and pre-IPO leverage on the other hand:

(H1) Waiting period length decreases in post-IPO investment.

(H2) Waiting period length decreases in pre-IPO leverage.

Furthermore, we examine whether managerial and directors' incentives post-IPO have any link with the waiting period length. Indeed, we expect the waiting period to be longer since incentives such as stock options and stock ownership negotiated during this period may lengthen the waiting period. Thus, we test:

(H3) Waiting period length increases in post-IPO managerial and directors' incentives.

Subsequently, we investigate the link between waiting period and investors demand and the relationships between the probability of a subsequent SEO, the IPO waiting period, investment and leverage. We also examine the link between the probability of switching syndicate size in a subsequent SEO, waiting periods (IPO and SEO), and the switching underwriter and underwriter rank. Finally, we investigate if the SEO first day market reaction depends on syndicate size switch and SEO waiting period.

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[17] According to the trade-off theory the issuance decisions move the firm's capital structure toward an optimal obtained by a trade-off between marginal costs and benefits of debt.

III. 2 Data and variable definitions

Our dataset consists of a sample of 690 IPOs retrieved from Bloomberg with data available on the Center for Research in Security Prices (CRSP) daily master files. All the accounting data are collected from Compustat while managerial and directors' incentives data come from the Institutional Shareholder Services (ISS). Because of the availability of ISS data, our sample covers the period from January 2003 to December 2005[18] for the IPO announcements. Our measure of underwriter prestige is based on the Tombstone underwriter reputation rank developed by Carter and Manaster (1990). The adjusted Carter-Manaster ranks that we use are obtained from Jay Ritter's web page at http://bear.cba.ufl.edu/ritter/Rank.pdf.

Our variable choices and definitions are inspired by the previous literature.

- Waiting period is the number of calendar days between the initial filing date and the offer date. See among others Hanley (1993) and Edelen and Kadlec (2005).
- Underwriting syndicate size is measured by the number of managing underwriters since the problem of synergy and competition between syndicate members are more likely to occur between managing underwriters than non-managing underwriters.
- The jumps in future cash flows are proxied by the standards deviation of a time series of 255 daily raw returns for each IPO. According to Johnson and Miller (1988) and Carter et al. (1998) among others this standard deviation should reflect the riskiness of future cash flows.
- High-tech firms are used to capture time inconsistency preference. Using Fama-French industry classification, high-tech firms include firms with SIC code 3570-3579, 3622, 3660-3692, 3694-3699, 3810-3839, 4800-4899, 7370-7379, 7391, and 8730-8734.
- "Underpricing"=First-day return = 100% x (Closing price – offer price)/offer price.
- Money left on the table = number of shares sold x (closing price – offer price).
- Investment is measured following Dittmar and Thakor (2007) by capital

[18] Note that we find many results consistent with previous studies that covered larger period. For instance, the average underpricing, money left on the table and gross proceed in our sample are very close to the average values for 6 816 IPOs over the period 2001-2005 (see the website of Jay Ritter: http://bear.cba.ufl.edu/ritter/work_papers/IPOsMarch2006.ppt). We also find different effects such as Hanley's (1993) partial adjustment effect and James and Wier's (1990) leverage effect.

expenditures to sales ratio.

- Leverage is measured by total debt divided by total capital invested, and multiplied by 100.
- First-day turnover is the first day trading volume divided by the number of shares issued.
- Managerial and directors' incentives
  - *Dirsubstock*: equals 1 if directors are subject to stock ownership requirements (otherwise it is equal to zero) during the year following the IPO completion;
  - *Dirownership*: equals 1 if directors' and officers' ownership as % of shares outstanding is >5% and <=30% (otherwise it is equal to zero) during the year following the IPO completion;
  - *Stockplan*: this takes the value of 1 when the company managers are remunerated with options during the year following the IPO completion and 0 otherwise;
  - *Loansoption*: this takes the value of 1 when the company provides loans to executives for exercising options during the year following the IPO completion and 0 otherwise.
  - *Incentives Global* takes the value of 1 when *Dirsubstock, Dirownership, Stockplan* and *Loansoption* take simultaneously the value of 1 and 0 otherwise. Given that specific incentives might in some cases affect the decisions surrounding the split (the decision to split, the choice of the split factor and the delay within which the split becomes effective) in different ways, *Incentives Global* allow us to determine the overall effect.

III. 3 Descriptive statistics

Table II presents descriptive statistics on company (Panel A) and offering characteristics (Panel B), IPO costs and money left on the table (Panel C) and market conditions and aftermarket performance (Panel D).

INSERT TABLE II ABOUT HERE

The average size of the firms, measured by the total asset, is $907.75 million. The median is far small, $120.97 million, indicating positive skewness. The median leverage

(47.14%) is however very close the mean (48.94%). The average post-IPO investment is 6.80% more than the double of the median, 2.63%.

As it appears in Panel B the characteristics of our market-adjusted underpricing, mean (8.98%), median (1.24) and standard deviation (22.37), are very close to those observe by Carter et al. (1998): (8.08%), median (2.38) and standard deviation (17.38). The nominal gross proceeds, the turnover and the syndicate size exhibit positive skewness as in the firm size.

The average underpricing, money left on the table and gross proceed in our sample are very close to the average values for 6 816 IPOs over the period 2001-2005 (see Jay Ritter's website at http://bear.cba.ufl.edu/ritter/work_papers/IPOsMarch2006.ppt). The average rank of lead underwriters is high, 8.0 on Carter and Manaster's 0-9.1 scale. The median of 9.1 is the highest rank. For comparison, the average (median) in Corwin and Schultz (2005) and Habib and Ljungqvist (2001) are respectively 7.67 (8.10) and 7.26 (8.75). The gross spread includes underwriting fees, management costs, and selling concessions. The mean gross spread is 0.92 (6.04%). The median of 0.90 (6%) is very close. The tendency for gross spread to be exactly 7% documented by Chen and Ritter (2000)[19] is less pronounced in our sample (52%).

The average waiting period is 113.58 days which is lower than the theoretical days of 120 days mentioned in Draho (2004). The median is even lower (95 days). The waiting period is highly volatile (79.72) which makes important the study of the determinants of its length.

We observe in Panel D that market condition at the IPO announcement date exhibits low volatility and a median slightly higher than the mean (respectively 3.89% and 3.65%). The market conditions are proxied by the return of the market value-weighted index in the 3-month period leading to the IPO announcement. This return is a buy-and-hold calculated as

$$BHR = \prod_t (1 + r_{mt}) - 1,$$

where r_{mt} is the return of the market value-weighted index on date t.

Panel D also presents two 12-month post IPO stock price performances[20]. The unadjusted performance exhibits positive mean (16%) and median (5.74%) and high volatility (55%). We observe that even though the average market-adjusted aftermarket

[19] The authors documented this tendency for over 90% of medium-sized IPOs in the mid-to late 1990. Note that this tendency is less and affects 60% of Habib and Ljungqvist's (2001) sample that cover the period 1991-1995.

[20] A 12-month horizon is chosen because it is the longest for which data are available for all the offerings of the sample.

performance is not negative, it is weak and close to zero (0.67%). The median is negative, -9.13%, and consistent with the long-run underperformance of IPO firm documented in the literature. The market-adjusted aftermarket performance is computed as

$BHAR_i = \prod_t (1 + r_{it}) - \prod_t (1 + E(r_{it}))$

where r_{it} is the return of the IPO company i on date t, and $E(r_{it})$ is the return of the market value-weighted index.

III. 4 Regression results

This section presents and discusses tests of empirical implications directly drawn from the model, in particular implications (1) and (2).

Let recall the statements of the first hypothesis:

> *(I1) Waiting periods increase in the syndicate size and uncertainty (possible jump in profit flow). They decrease in the time inconsistency preference or patience factor.*

Before investigating the determinants of the waiting period, we first study the probability of choosing a syndicate size large than one lead manager and analyze the conditional syndicate size effect on the waiting period. Indeed, the competition risk between syndicate members (Corwin and Schultz (2005)) that we mentioned earlier really begins when there is more than one lead manager. We then study if there is any incremental syndicate size information revealed through the waiting period.

Let X_i^s be a vector of the market information set explaining the choice of the syndicate size for IPO i. The syndicate size variable S takes value 1 when there is more than one lead manager and 0 when there is only one lead manager. Thus, the syndicate size for IPO i is modelled as follow

$$S_i = \begin{cases} 1 & if \;\; X_i^{s}{}'\theta + u_i^s > 0 \\ 0 & otherwise \end{cases} \tag{20}$$

If there is certain unobserved characteristics that increase the likelihood of choosing larger syndicate size contribute to further increase the waiting period, we should find a positive value for β^s in the following regression

$$\pi^* = \gamma^s + \beta^s \hat{\lambda}_s + \varepsilon^s \tag{21}$$

Under the assumption that u_i^s is normally distributed, $\hat{\lambda}_s$ is the Inverse Mills Ratio (IMR) computed following Barnow et al. (1981) as

$$\lambda_s = E(u^s \mid X^s, S=1) \times 1_{[S=1]} + E(u^s \mid X^s, S=0) \times 1_{[S=0]}$$

$$\hat{\lambda}_s = \frac{\phi(X^{s}{}'\hat{\theta})}{\Phi(X^{s}{}'\hat{\theta})} \times 1_{[S=1]} + \frac{-\phi(X^{s}{}'\hat{\theta})}{1-\Phi(X^{s}{}'\hat{\theta})} \times 1_{[S=0]} \tag{22}$$

where $\phi(.)$ is the density probability function; and $\Phi(.)$ is the cumulative probability function and $1_{[.]}$ is the indicator value; $1_{[S=1]} = 1$ if $S = 1$ and $1_{[S=0]} = 1 \text{ if } S = 0$. We then estimate equation (20) using probit model since u_i^s is assumed to be normally distributed and also estimate equation (22) using least squares with standard errors adjusted (see Heckman, 1979). Results are presented in Table III below.

INSERT TABLE III ABOUT HERE

Panel A of Table III reports the probit syndicate size choice. The likelihood of choosing more than one lead manager is strongly and positively determined by offerings size and lead underwriter prestige. We also find that significantly larger syndicate size the less the offer price exceeds the midpoint of the filing range. NYSE/AMEX listings IPOs' are more likely to have larger syndicate size. Panel B represents standard errors adjusted least squares regression for waiting period. Result reveals positive and significant coefficient of the estimated Inverse Mills Ratio. This result suggest that there is certain unobserved characteristics that increase the likelihood of choosing larger syndicate size that contribute to further increase the waiting period.

Since IMR an endogeneity indicator is significant, we conduct two-stage least squares (2SLS) of the determinants of the waiting period allowing the choice of the syndicate size to be endogenous. Results are presented in table IV below

INSERT TABLE IV ABOUT HERE

In Panel A of Table IV, the average (median) length of the waiting period is equal to 106.43 days (91.5 days) for IPOs with one lead manager, vs. 124.73 days (99.5 days) for IPOs with more than one lead manager. The differences between the means and medians of the two groups are statistically significant at 1%, suggesting that IPOs with larger syndicate size wait longer as predicted by our model.

Panel B of the table presents the results the 2SLS regressions. The dependent variable in the first stage least square regression is a natural logarithm of the syndicate size. As observed in Panel A of table III syndicate size is strongly and positively determined by offerings size, lead underwriter prestige and NYSE/AMEX listing dummy. The second-stage regressions address the waiting period length issue controlling for endogeneity. We present the model in Column 1 to show that the waiting period does not significantly depend on offerings size, gross spread, price revision, post-IPO risk, firm size and NYSE/AMEX listing dummy. Even though the coefficient of the uncertainty variable *STD return* exhibits a positive sign as predicted by the model it is insignificant. The F-Statistic of the model is not significant spite of the significance of the syndicate size at the 1% level. Column 2 shows that the coefficient of *Underwriter rank* is negative and significant. This reveals that the more prestigious underwriters are the more likely the IPOs are to be completed sooner. Controlling for the underwriter rank, *Syndicate size* exhibits positive and significant coefficient, just as predicted by our model and depicted in *Figure 1*. This result suggests that a large syndicate size is more likely to set back the IPO completion. The coefficient of High-Tech is negative and significant at the 10 % level but as we will see later in Table V in a simple OLS regression the coefficient remains negative but significant at the 5% level. This result is also consistent with the predictions of our model, as depicted in *Figure 2*.

Panel B of Table IV also presents the tests of hypotheses 1 and 2. Let recall the statement of these hypotheses:

(H1) Waiting period length decreases in post-IPO investment.

(H2) Waiting period length decreases in pre-IPO leverage.

We observe as expected that the coefficients of both *Leverage* and *Investment* are negative and strongly significant (p<0.001 for both). These results indicate that even though investment is not the main motive for IPOs (see. Pagano et al., 1998), investment can quicken the completion of an IPO. Likewise, overleveraged private firms will also complete the IPO sooner as suggested by the trade-off theory.

Table V presents the tests of implication 2 allowing the waiting period to be endogenous. Let recall the statement of this implication:

(I2) Underpricing decreases in waiting periods. It is indeterminate in syndicate size and uncertainty and the time inconsistency preference or patience factor.

INSERT TABLE V ABOUT HERE

In Panel A of Table V, the average (median) level of initial return (underpricing) is equal to is equal to 10.32% (4%) for IPOs with long waiting period, vs. 7.83% (0.36%) for IPOs with short waiting period. The difference between the means of the two groups is not statistically significant but the difference between the medians is significant at 5% level. In Panel B of Table V, the first stage is the OLS regression of the natural logarithm of the waiting period. We find that both *syndicate size* and *High-Tech* are significant at 5% level and exhibit respectively positive and negative coefficients, just as predicted by the model. Underwriting rank, leverage and investment still significantly and negatively affect the waiting period. The first column of the second stage (regression UP1) is presented to show that underpricing is not significantly impacted by the both High-Tech and NYSE/AMEX listing dummies and the waiting period. The F-Statistic of the regression is not significant even though offerings size exhibit positive and significant coefficient. In column 2 (regression UP2), controlling for potential endogeneity, we find no evidence of the expected negative relation between waiting period and IPO underpricing[21]. Our results confirm the existence of both Hanley's (1993) partial adjustment effect and James and Wier's (1990) leverage effect. Indeed, the coefficient of the variable *Upward price revision* is positive and significant at 1% level. This result suggests that underpricing is significantly greater when the offer price exceeds the midpoint of the filing range [Hanley's (1993)]. Furthermore, the coefficient of *Leverage* is negative and significant at 1% level, which means that prior credit relationships significantly reduces underpricing because the presence of credit relationship reduces uncertainty [James and Wier's (1990)].

III. 5 Further investigations

The first investigation in this section is the link between post-IPO incentives and waiting period. We subsequently study the link between waiting period and investors demand, the relationships between the probability of a subsequent SEO, the IPO waiting period, investment and leverage and the link between the probability of switching syndicate size in a subsequent SEO, waiting periods (IPO and SEO), and the switching underwriter and underwriter rank. We finally investigate if the SEO first day market reaction depends on syndicate size switch and SEO waiting period.

A- Waiting period and post-IPO incentives

The results of our investigation of the relationship between waiting period and post-IPO

[21] Note that he coefficient of the waiting period remain statistically insignificant even by assuming exogeneity. The coefficient of the waiting period in that case is negative as predicted by the model (-2.285) but not significant (p-value=0.354).

managerial and directors' incentives are presents in the Table VI below[22]

INSERT TABLE VI ABOUT HERE

Panel A shows that when there are managerial and directors' incentives or more specifically when after the IPO managers are remunerated with options or when loans are provided for options exercising, IPO waiting period is significantly shorter. This result is consistent with hypothesis 3.

(H3) Waiting period length increases in post-IPO managerial and directors' incentives.

Panel B presents the OLS regressions of the natural logarithm of the waiting period on the managerial and directors' incentives controlling for market condition and aftermarket performance. The results observe in this multivariate analysis are consistent with those obtain earlier in Panel A in the univariate context. Post-IPO managerial and directors' incentives are positively associated with waiting period. More precisely, IPOs with long waiting period are more likely, after the IPO, to remunerate managers of the firms with options and also more likely to provide loans for options exercising. This result, in accordance with hypothesis 3, suggests that the negotiations of stock options and stock ownership may have set back the IPO completion. We do not find any evidence of significant relationship of the waiting period with both market condition and aftermarket performance.

B- Turnover, Pricing, Money Left on The table (MLT) and IPO Waiting period

This subsection seeks to analyze the relationship between the first-day investors' trading measured by Turnover (first-day trading volume divided by the number of shares issued) and the waiting period. We test whether investors learn more about the firm during a long waiting period and then trade less. Thus, we expect a negative impact of the waiting period on the first day turnover. The subsection also examines the links between Pricing (pricing at the upper limit of the price range) and the waiting period on the one hand and Money Left on the Table (MLT) and the waiting period on the other hand. Since waiting period is positively associated with syndicate size as we've seen earlier and syndicate size in its turn is positively related with underwriter spreads [Corwin and Schultz (2005)], we expect respectively negative and positive effects of the waiting period on

[22] The number of observations is reduced because of data availability in the ISS database.

Pricing and MLT. Results are presented in the Table VII below:

INSERT TABLE VII ABOUT HERE

The first column of Table VII presents a robust least square regression of the first-day turnover determinants. We find as conjectured a negative and significant impact of the waiting period on first-day investors' trading (measured by turnover). A natural interpretation of this negative relation is that investors conceivably may have learned more about the firm during a long waiting period- which is associated with less adverse selection risk- and then trade less. The first-day turnover is also positively related to the offerings size and the pre-IPO earnings. We also observe that, controlling for the offerings size, firm size has negative impact on turnover.

The second column of Table VII reports a logistic regression of IPO pricing: The dependant variable is the IPO priced at the upper limit of the price range dummy variable. Even though the waiting period exhibits the expected sign, it is not significant. The pricing, as for the turnover is significantly positively and negatively related to offerings size and firm size respectively.

The third column presents of Table VII a robust least square regression analyzing the influence of waiting period on the Money Left on the Table. The coefficient of the waiting period exhibits the expected sign but is insignificant. As for the turnover and the pricing, the MLT is significantly positively and negatively affected to offerings size and firm size respectively. Moreover, the coefficient of the variable *STD return* is positive and significant at 5% level suggesting that firms that left money on the table are more likely to be volatile.

C- How do the probability of a subsequent SEO is affected by IPO waiting period, Leverage and Investment?

To be included in the sample, an SEO had to occur within 18 months after the IPO and to be the first SEO of the firm. The number of first seasoned equity offerings is 190 which represent about 28% of our initial IPO sample[23]. We test whether firms with longer IPO waiting period are more likely to issue seasoned equity within 18 months after the IPO. Indeed, the waiting period for these IPOs may be a kind of preparation delay for both IPO and the subsequent SEO. We also explore the role played by pre-IPO

[23] Note that this proportion was about 21% in Jegadeesh et al. (1993).

leverage and post-IPO investment in likelihood of a subsequent SEO. Assuming that the probability of a firm's issuing seasoned equity is characterized by a logistic distribution; we conduct logit estimations over the dichotomic variable that takes the value 1 when there is a subsequent SEO within 18 months after the IPO and 0 otherwise.

INSERT TABLE VIII ABOUT HERE

Table VIII presents the logit regressions estimates. The three independent variables of primary interest are the waiting period, leverage and investment. The waiting period coefficient in column 1 has the expected sign but it is only significant at 10% level. This significativity disappears in the models presented in columns 2 and 3. These results suggest that even though the IPO waiting period exhibits the expected sign it is not a significant indicator of a subsequent SEO announcement. Throughout the three models, the probability of a subsequent SEO is positively determined by the offerings size ($p<0.001$ in model 3) and aftermarket performance ($p<0.000$ in model 3), indicating that firms that raise relatively larger amounts of capital or firms that experience abnormal aftermarket performance are more likely to return with a seasoned equity offering within 18 months after the IPO completion. We also find a significant and negative relation between the likelihood of a subsequent SEO and pre-IPO leverage and a significant and positive link between the likelihood of a subsequent SEO and post-IPO investment. These results suggest that even though overleveraged private firms complete the IPO sooner, as we observe earlier, they are less likely to return with a seasoned equity offering within 18 months after the IPO completion. In contrary, investment increases significantly the probability of a subsequent SEO within 18 months after the IPO.

D- Probability of switching syndicate size between the IPO and the first SEO

Regarding the importance of syndicate size as it appears in Corwin and Schultz (2005) and as we showed earlier in the paper, we explore the determinants of the probability of switching syndicate size between the IPO and the subsequent SEO[24]. More precisely, we relate issuing firms' decision whether or not to reduce (or increase) the syndicate size between the IPO and the first SEO to underwriters switches and other potential determinant as IPO syndicate size, IPO and SEO sizes and ranks, and IPO and SEO waiting periods. Table IX reports the coefficients from multinomial logistic regressions,

[24] The study of the syndicate size switch is very different from underwriter switch studied by authors like Ljungqvist and Wilhelm (2005) since the firm can keep the same lead manager but reduce or increase the size of the syndicate.

modeling the decision to reduce, increase or keep the same syndicate size. Positive or negative coefficients in "size reduction" and "size increase" equations suggest that the independent variable is associated with a higher or lower probability of choosing respectively to reduce and to increase the syndicate size.

INSERT TABLE IX ABOUT HERE

Models 1 of Table IX focus on the impact of offerings characteristics (initial IPO return, IPO size, and IPO gross spread), syndicate characteristics (IPO syndicate size and IPO underwriter rank) and waiting periods (SEO waiting period and days from IPO to SEO announcement) on syndicate size switch decision. The overall explanatory power of the models is good, in term of the pseudo R^2 of 30.17%. Among the offerings characteristics, issuers are *less* likely to reduce syndicate size (scenario 1) and *more* likely to increase instead of reducing syndicate size (scenario 3), the *larger* the IPO size. In contrast, the effect of IPO size on probability to increase the syndicate size (scenario 2) is not statistically significant.

Furthermore, we logically find that firms are *more* likely to reduce syndicate size (scenario 1) and *less* likely to increase (scenario 2) and to increase relatively to reduce the syndicate size (scenario 3), the *larger* the IPO syndicate size.

Last, we find that the SEO waiting period (time elapses from SEO announcement to it completion) has a negative and significant impact on the probability of reducing syndicate size and a positive and significant effect on the likelihood of increasing relatively to reducing syndicate size. Consistent with the strong impact of syndicate size on waiting period that we find earlier, these results suggest that firms that reduce syndicate size are more likely to be those that complete the announced SEO sooner.

Models 2 provide results from estimation of the same model including underwriter switch variables. The general fit of the model improve substantially, the IPO size, the IPO syndicate and the SEO waiting period still strongly significant with the same sign in scenarios 1 and 3 and the underwriter switch is positively and significantly related to the likelihood of reducing the syndicate size (scenario 1) and also to the likelihood of increasing the syndicate size (scenario 2).

Models 3 provide results from estimation of the same model including SEO size instead of IPO size and also the switch for higher ranked lead manager dummy. The general fit of the model improve again. The IPO syndicate and the SEO waiting period are still strongly significant with the same sign in scenarios 1 and 3. We observe that issuers are *less* likely to reduce syndicate size (scenario 1) and *more* likely to increase (scenario2) and to increase instead of reducing syndicate size (scenario 3), the *larger* the SEO size. The switch for higher ranked lead manager dummy is only significant in scenario 2. We then conclude that firms that increase syndicate size are more likely to be those that switch for more prestigious lead-manager.

E- Does the market react at the subsequent SEO to syndicate size switch and SEO waiting period?

The results presented earlier, show the importance of syndicate size and the determinants of syndicate size switch between IPO and the subsequent SEO. The natural question that these findings arise is does the market react to syndicate size switch? Since a longer waiting period is associated with less adverse selection risk, we also explore whether long SEO waiting periods are positively related to the first-day market reaction. To answer these questions we perform robust least square regressions analyzing the influences of syndicate size switch and SEO waiting period on the adjusted SEO first-day return (AR)[25]. We control for SEO size, gross spread, syndicate size, underwriter rank, post-IPO price volatility (STD return), prospect indicator (market-to-book) and syndicate size and underwriter switches. Results are presented in Table X below:

INSERT TABLE IX ABOUT HERE

We find no significant impact of syndicate size switch on first-day market adjusted return. In contrast, as conjectured we find strong positive relation between SEO waiting period and first-days market adjusted return. This result indicates that the longer the SEO waiting period the more positive is the first-day market reaction. Indeed, as mentioned earlier longer waiting period are associated with less adverse selection risk. Furthermore, SEO first-days market adjusted return is negatively and significantly affected by the post-IPO price volatility meaning that at a subsequent IPO market react negatively to higher post-IPO risk.

IV. Conclusion

This paper proposes a model that formalizes the optimal external timing of initial public offering using real options concept, derived underpricing and examined comparative

[25] The market value-weighted index return is used for the adjustment.

statics. To the best of our knowledge, this article presented the first model that incorporates underwriting syndicate size, jump in firm's cash flows and time inconsistency preference to capture patience for high-tech and other growth firms. It is also the first to investigate empirically the determinants of IPO waiting period.

Results generated by the model reveal that the IPO waiting periods increase in the syndicate size and uncertainty (possible jump in profit flow) and decrease in the time inconsistency preference or patience factor. Results also show that underpricing decreases in waiting periods.

These findings complement the existing literature on IPO timing and the role of underwriting syndicate. First, these predictions of the model suggest that a larger syndicate size reduces net IPO proceeds to the private firm, the incentive to go public and make waiting more valuable. On the other hand, the larger syndicate size the more important the risk of competition between syndicate members which can set back the IPO completion. In addition, the results indicate that, higher the risk of profit drop due to product market competition later will private firms go public because of information disclosure inherent in IPO (see Maksimovic and Pichler, 2001; Benveniste, Busaba, and Wilhelm, 2002, among others). These predictions furthermore suggest that the more private firms value future cash flows than present cash flows the sooner the IPO will be completed the IPO, certainly for investment motive. Finally, a longer the waiting period is the lower is the underpricing return since it reduces adverse selection risk and information asymmetry.

The results of our empirical tests are generally in line with the predictions of our model. We find evidence of information production by waiting periods. Indeed, just as predicted our model, we find that the syndicate size is positively and strongly correlated with the waiting period length. Also consistent with the prediction of our model, time inconsistency preference or patience indicator is negatively related to the waiting period length. The waiting period is moreover affected by three factors: underwriters' prestige, investment and leverage. These results provide evidence that the more prestigious underwriters are the more likely the IPOs are to be completed sooner. Likewise, overleveraged private firms will also complete the IPO sooner consistent with the trade-off theory. The results also provide evidence that although investment is not a significant motive for IPOs as argues Pagano et al. (1998), investment expedites IPOs completion. In contrast, we find no significant impact, on the waiting period, of uncertainty indicator, even if it has the predicted positive sign. We find both Hanley's (1993) partial adjustment effect and James and Wier's (1990) leverage effect on underpricing but no significant effect of waiting period.

Additional further investigations reveal that IPOs with long waiting period are more likely, after the IPO, to remunerate managers of the private firms with options and also more likely to provide loans for options exercising, suggesting that the negotiations of stock options and stock ownership may have set back the IPO completion. These investigations also show that investors trade less when the waiting period is longer. Moreover, we find that even though overleveraged private firms complete the IPO sooner, they are less likely to return with a subsequent seasoned equity offering. In contrary, investment increases significantly the probability of a subsequent SEO.

Additional evidence on the role of syndicate size comes from our multinomial model estimates of the determinants of switching syndicate size between the IPO and the subsequent SEO. Results imply that (a) issuers are *less* likely to reduce syndicate size, the *smaller* IPO syndicate size, the *shorter* IPO and the *longer* SEO waiting periods, the *larger* the IPO and SEO sizes, the *smaller* SEO gross spread and the *less* likely lead underwriting manager switch; (b) issuers are *more* likely to increase syndicate size, the *larger* the SEO size, the *smaller* the IPO syndicate size and the *more* likely lead underwriting manager switch and switch for more prestigious; and (c) issuers *more* likely to increase instead of reducing syndicate size, the *larger* the IPO and SEO sizes, the *shorter* IPO and the *longer* SEO waiting periods and the *smaller* the SEO gross spread.

Our analysis finally sheds light on the impact of waiting period on the SEO first-day market reaction. We find strong positive relation between SEO first-day return and SEO waiting meaning that the longer the SEO waiting period the better is the first-day market reaction, since waiting periods are associated with less adverse selection risk. Furthermore, on the subsequent SEO date the market react negatively to higher post-IPO risk.

Appendix

Proposition 1

According to Dixit and Pindyck (1994), the solution to the second-order differential equation (11) will have the form

$$F(\pi) = A\pi^{\beta} + \alpha\left(\frac{\delta\lambda + \kappa^{p}}{\lambda + \kappa^{p}}\right)\frac{\pi}{\kappa^{p}}. \tag{A1}$$

where A and $\beta > 0$ are constants to be determined. The first term in (A1) is solution to the homogeneous part of (A1) and the second term is the particular solution to (A1). Replacing $F(\pi)$ by $A\pi^{\beta}$ in equation (11) yields the nonlinear equation:

$$\frac{1}{2}\sigma^{2}\beta(\beta-1) + (\rho^{p} - \kappa^{p})\beta - (\rho^{p} + \lambda) + \lambda(1-\phi)^{\beta} = 0 \tag{A2}$$

The value of is obtained as solution to (A2).

From the smooth pasting condition (14)

$$A\pi^{\beta} = \left(\frac{\pi^{*}}{\beta}\right)\alpha\left(\frac{\delta\lambda + \kappa^{m}}{\lambda + \kappa^{m}}\frac{\left(1-\psi(S)\right)}{\kappa^{m}} - \frac{\delta\lambda + \kappa^{p}}{\lambda + \kappa^{p}}\frac{1}{\kappa^{p}}\right). \tag{A3}$$

Substituting this into the value matching condition gives

$$\left(\frac{\pi^{*}}{\beta}\right)\alpha\left(\frac{\delta\lambda + \kappa^{m}}{\lambda + \kappa^{m}}\frac{\left(1-\psi(S)\right)}{\kappa^{m}} - \frac{\delta\lambda + \kappa^{p}}{\lambda + \kappa^{p}}\frac{1}{\kappa^{p}}\right) + \alpha\left(\frac{\delta\lambda + \kappa^{p}}{\lambda + \kappa^{p}}\right)\frac{\pi^{*}}{\kappa^{p}} = \alpha\left(\frac{\delta\lambda + \kappa^{m}}{\lambda + \kappa^{m}}\right)\frac{\pi^{*}}{\kappa^{m}}\left(1-\psi(S)\right) - C,$$

$$\left(\frac{\pi^{*}}{\beta}\right)\alpha\left(\frac{\delta\lambda + \kappa^{m}}{\lambda + \kappa^{m}}\frac{\left(1-\psi(S)\right)}{\kappa^{m}} - \frac{\delta\lambda + \kappa^{p}}{\lambda + \kappa^{p}}\frac{1}{\kappa^{p}}\right) - \alpha\pi^{*}\left(\frac{\delta\lambda + \kappa^{m}}{\lambda + \kappa^{m}}\frac{\left(1-\psi(S)\right)}{\kappa^{m}} - \frac{\delta\lambda + \kappa^{p}}{\lambda + \kappa^{p}}\frac{1}{\kappa^{p}}\right) = -C,$$

$$\alpha\pi^{*}\left(1 - \frac{1}{\beta}\right)\left(\frac{\delta\lambda + \kappa^{m}}{\lambda + \kappa^{m}}\frac{\left(1-\psi(S)\right)}{\kappa^{m}} - \frac{\delta\lambda + \kappa^{p}}{\lambda + \kappa^{p}}\frac{1}{\kappa^{p}}\right) = C,$$

$$\pi^{*} = \left(\frac{\beta}{\beta-1}\right)\frac{C}{\alpha\left(\frac{\delta\lambda+\kappa^{m}}{\lambda+\kappa^{m}}\frac{(1-\psi(S))}{\kappa^{m}} - \frac{\delta\lambda+\kappa^{p}}{\lambda+\kappa^{p}}\frac{1}{\kappa^{p}}\right)}. \tag{A4}$$

Assumption 1 ensures that the denominator of π^{*} is positive.

Substituting π^{*} into (A4) gives

$$A = \frac{(\beta-1)^{\beta-1}}{\beta^{\beta}}\left(\frac{\delta\lambda + \kappa^{m}}{\lambda + \kappa^{m}}\frac{\left(1-\psi(S)\right)}{\kappa^{m}} - \frac{\delta\lambda + \kappa^{p}}{\lambda + \kappa^{p}}\frac{1}{\kappa^{p}}\right)^{\beta}\frac{\alpha^{\beta}}{C^{\beta-1}}. \tag{A5}$$

Corollary 1:

Holding all other parameters constant,

i)

$$\frac{\partial \pi^*}{\partial S} = \frac{\partial \pi^*}{\partial \psi(S)} \frac{\partial \psi(S)}{\partial S} = \frac{\frac{\delta\lambda+\kappa^m}{\lambda+\kappa^m}\frac{\pi^*}{\kappa^m}}{\underbrace{\left(\frac{\delta\lambda+\kappa^m}{\lambda+\kappa^m}\frac{(1-\psi(S))}{\kappa^m} - \frac{\delta\lambda+\kappa^p}{\lambda+\kappa^p}\frac{1}{\kappa^p}\right)}_{>0}} \underbrace{\frac{\partial \psi(S)}{\partial S}}_{>0} > 0.$$

ii)

$$\frac{\partial \pi^*}{\partial \delta} = -\pi^* \frac{\left(\frac{\lambda}{\lambda+\kappa^m}\frac{(1-\psi(S))}{\kappa^m} - \frac{\lambda}{\lambda+\kappa^p}\frac{1}{\kappa^p}\right)}{\left(\frac{\delta\lambda+\kappa^m}{\lambda+\kappa^m}\frac{(1-\psi(S))}{\kappa^m} - \frac{\delta\lambda+\kappa^p}{\lambda+\kappa^p}\frac{1}{\kappa^p}\right)} = -\pi^* \frac{A}{B}.$$

Assumption 1 ensures that B is positive. The numerator A is positive if $\psi(S)$ is small. Since the fraction of the issue proceeds paid as underwriting spread is small

$$\frac{\partial \pi^*}{\partial \delta} < 0.$$

Figure 2 confirms this sign.

iii) Since the value of β that satisfies (A2) can only be found numerically we present numerical results in Table 1 and Figure 3. These results show that the IPO trigger point π^* increase with σ and this increase is greater for higher jump size ϕ.

Table A1: Dependence of β, π^*, ϕ, and σ

σ	β			π^*		
	$\phi = 0.5$	$\phi = 0.25$	$\phi = 0$	$\phi = 0.5$	$\phi = 0.25$	$\phi = 0$
0.0	4.51	2.40	1.30	7.18	3.06	1.46
0.1	3.53	2.18	1.28	7.80	3.30	1.54
0.2	2.60	1.86	1.24	9.08	3.86	1.74
0.3	2.09	1.62	1.20	10.73	4.65	2.07
0.4	1.78	1.47	1.16	12.72	5.62	2.50
0.5	1.59	1.36	1.12	15.06	6.79	3.05
0.6	1.46	1.28	1.10	17.76	8.14	3.69
0.7	1.37	1.23	1.08	20.82	9.70	4.45
0.8	1.30	1.18	1.07	24.27	11.45	5.31
0.9	1.25	1.15	1.06	28.11	13.42	6.28
1	1.21	1.13	1.05	32.34	15.59	7.36

Proposition 2

$$\frac{\partial UP}{\partial \pi^*} = -(1-\alpha\psi(S))C\frac{\left(\frac{\delta\lambda+\kappa^m}{\lambda+\kappa^m}\frac{1}{\kappa^m}-\frac{\delta\lambda+\kappa^p}{\lambda+\kappa^p}\frac{1}{\kappa^p}\right)}{\left[\left(\frac{\delta\lambda+\kappa^p}{\lambda+\kappa^p}\right)\frac{\pi^*}{\kappa^p}(1-\alpha\psi(S))-C\right]^2} < 0.$$

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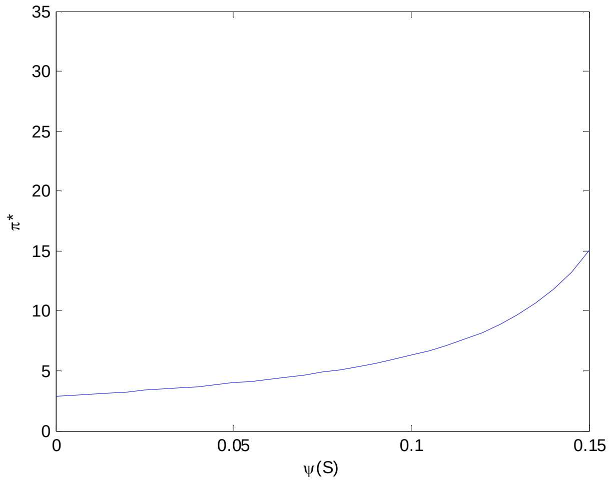

Figure 1: The effect of the fraction of the issue proceeds paid as underwriting spread $\psi(S)$ on the critical value π^* measured in millions of dollars.

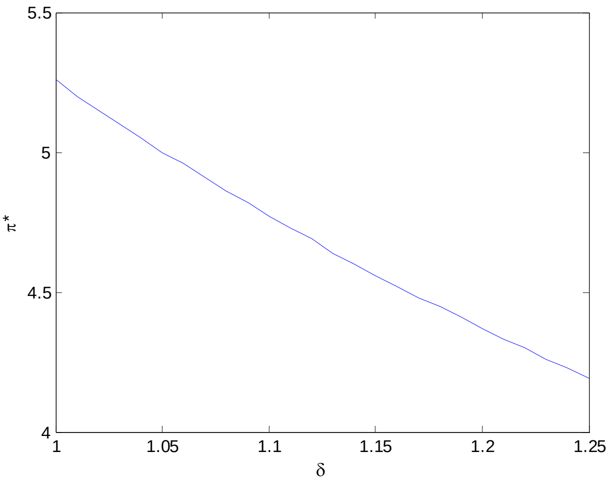

Figure 2: The effect of time inconsistency preference or patience factor δ on the critical value π^* measured in millions of dollars.

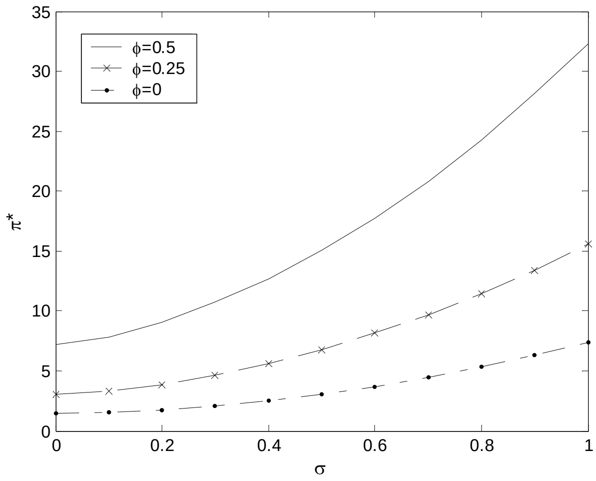

Figure 3: The effect of the jump amplitude ϕ on the critical value π^* measured in millions of dollars.

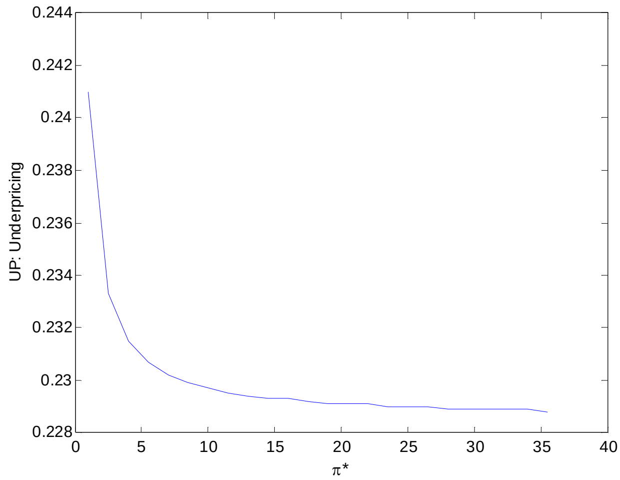

Figure 4: Underpricing and IPO critical value π^* measured in millions of dollars.

Table I: Values of parameters

Parameters	Values
δ	1.125
λ	0.1
ρ^m	0.12
ρ^p	0.13
$\varphi(S)$	0.07
C	1
α	0.2
ϕ	0.25

Table II: Descriptive sample statistics

The sample covers 690 IPOs retrieved from Bloomberg with data available on the Center for Research in Security Prices (CRSP) daily master files. Panel A tabulates three firm characteristics. Asset is annual total asset in the fiscal year prior to the IPO. Leverage is the total debt divided by total capital invested, and multiplied by 100. Investment is measured following Dittmar and Thakor (2007) by capital expenditures to sales ratio. Panel B reports various offerings characteristics. The offer price is in $ and the nominal gross proceeds are the total amount issued. Underpricing=First-day return = 100% x (Closing price – offer price)/offer price. Underpricing is adjusted to the market value-weighted index return. First-day turnover is the first day trading volume divided by the number of shares issued. We use Jay Ritter's updated Carter and Manaster (1990) ranks as a measure of underwriter reputation on scale from 0 (lowest) to 9.1 (highest). Underwriting syndicate size is measured by the number of managing underwriters. Waiting period is the number of calendar days between the initial filing date and the offer date. Panel C presents IPO total cost and "money left on the table". The gross spread includes underwriting fees, management costs, and selling concessions. Money left on the table = number of shares sold x (closing price – offer price). Panel D summarizes market conditions and aftermarket performance. The market conditions are proxied by the return of the market value-weighted index in the 3-month period leading to the IPO announcement. 12-month adjusted performance is post IPO stock price performance adjusted to the market value-weighted index return. STD return is the standards deviation of a time series of 255 daily raw returns for each IPO.

Variable description	Mean	Median	Standard Deviation	First quartile	Third quartile
Panel A: Firm characteristics					
Asset, in million of $	907.75	120.97	5192.77	30.76	448.59
Leverage, in %	48.94	47.14	648.65	3.06	89.47
Investment, in %	6.80	2.63	0.13	0.9	7.16
Panel B: Offering characteristics					
Offer price	15.23	15	5.23	12	19.75
Nominal gross proceeds, in million of $	249.88	130	351.28	66	275
Underpricing unadjusted return, in %	9.08	1.43	22.41	0	13.68
Underpricing adjusted return, in %	8.98	1.24	22.37	-0.003	13.63
First-day turnover, in %	21.19	15.34	30.09	0.06	27.53
Carter-Manaster underwriter reputation rank	8.00	9.1	1.77	7.10	9.10
Syndicate size	1.51	1.00	0.74	1	2
IPO waiting period, calendar days	113.48	95	79.72	71	131
Panel C: IPO costs and Money Left on the Table					
Gross spread	0.92	0.90	0.31	0.68	1.12
Money left on the table, in million of $	15.79	1.21	53.03	0	14.85
Panel D: Market conditions and aftermarket performance					
Market conditions-3 months (%)	3.65	3.89	0.05	-1.06	7.43
12-month unadjusted performance (%)	15.99	5.74	0.55	-11.72	33.54
12-month adjusted performance (%)	0.67	-9.13	0.59	-30.06	20.56
STD return	2.45	2.31	0.01	1.35	3.24

Table III: Syndicate size effect

This table presents the results of conditional syndicate size effect on the waiting period. Panel A reports the robust probit syndicate size choice. The dependent variable takes value 1 when there is more than one lead manager and 0 when there is only one lead manager. Waiting period is the number of calendar days between the initial filing date and the offer date. Panel B represents least square regression for waiting period with the estimated Inverse Mills Ratio (IMR) as explanatory variable. *Offerings size* is the natural logarithm of the gross proceeds. The gross spread includes underwriting fees, management costs, and selling concessions. Jay Ritter's updated Carter and Manaster (1990) ranks are used as a measure of underwriter reputation. *Upward price revision* is a dummy variable that takes the value 1 when the offer price exceeds the midpoint of the filing range 0 otherwise. *Ln(Asset)* is the natural logarithm of the total asset. Heteroscedasticity-consistent p-values are provided. *** et ** indicate significance at respectively a 1%, and a 5% level.

Panel A: Probit model for syndicate size

	Coefficient	p-value
Intercept	-4.831***	*0.000*
Offering Characteristics		
Offerings size	0.458***	*0.000*
Gross spread	0.302	*0.248*
Underwriter prestige		
Underwriter rank	0.248***	*0.000*
Price revision		
Upward price revision	-0.344**	*0.035*
Firm size		
Ln(assets)	0.029	*0.595*
Market		
NYSE/AMEX listing	0.472***	*0.005*
Diagnostics		
Pseudo R2	27.92%	
Wald χ^2 test: coeff.=0	101.75*** *0.000*	
No. of observations	485	

Panel B: Second-pass regression: Log (1+ waiting period)

Intercept	4.560***	0.000
Mills Ratio	0.095**	0.013
Diagnostics		
R2	0.93%	
F-Statistic	6.28** *0.013*	
No. of observations	485	

Table IV: Two-stage least-squares (2SLS) regressions explaining syndicate size and waiting period

This table presents tests of Implication 1 of the model and hypotheses 1 and 2. *Syndicate size* is the number of lead managers. *Waiting period* is the number of calendar days between the initial filing date and the offer date. Panel A presents the mean and median values of the waiting period depending on the syndicate size dummy. It also reports *p*-values of mean comparisons (with unequal variance) and Mann-Whitney comparisons of the waiting period between the two groups. Panel B presents 2SLS regressions explaining syndicate size and waiting period. It also tests the effects of uncertainty, patience factor, leverage and investment on the waiting period. Uncertainty is proxied by STD return that is the standards deviation of a time series of 255 daily raw returns for each IPO. The patience factor is proxied by the High-Tech firms' dummy. The first-stage regression is estimate robust OLS of natural logarithm of the syndicate size, and the fitted value from this regression is used as the waiting period instrument in the second-stage OLS regression. *Leverage* is the total debt divided by total capital invested, and multiplied by 100. *Investment* is measured by capital expenditures to sales ratio. *Ln(Asset)* is the natural logarithm of the total asset. *Offerings size* is the natural logarithm of the gross proceeds. The *gross spread* includes underwriting fees, management costs, and selling concessions. Underwriter rank is Jay Ritter's updated Carter and Manaster (1990) ranks. *Upward price revision* is a dummy variable that takes the value 1 when the offer price exceeds the midpoint of the filing range 0 otherwise. The *NYSE/AMEX listing* dummy takes a value of 1 if the IPO is listed on the NYSE or AMEX, and 0 otherwise. Heteroscedasticity-consistent p-values are provided. ***, **,* indicate significance at respectively a 1%, a 5% and a 10% level.

Panel A: Univariate relations

Syndicate size	IPO Waiting period		
	Mean	Median	No. of Observations
No. lead managers =1	106.43	91.5	424
No. lead managers >1	124.73	99.5	266
p-Value (comparison tests)	0.005***	0.004***	

Panel B: Multivariate relations

	First Stage	Second Stage	
	Syndicate size (S)	IPO waiting period ($\pi*$)	
	Log(S)	Log(1+ $\pi*$)	Log(1+ $\pi*$)
		(1)	(2)
Intercept	-0.661***	4.932***	4.900***
	0.000	*0.000*	*0.000*
Offering Characteristics			
Offerings size	0.129***	-0.029	
	0.000	*0.563*	
Gross spread	-0.015	0.023	
	0.785	*0.845*	
Underwriter prestige			
Underwriter rank	0.035***	-0.040*	-0.034**
	0.001	*0.076*	*0.039*
Price revision			
Upward price revision	-0.060*	-0.011	
	0.086	*0.876*	
Variables of the model			
Syndicate size (S)		0.228***	0.161**
		0.006	*0.049*
STD return (ϕ)		0.039	
		0.869	

High-Tech (δ)			-0.177*
			0.053
Leverage and investment			
Leverage			-0.0001***
			0.000
Investment			-0.935***
			0.000
Firm size			
Ln(assets)	0.020*	-0.003	
	0.083	*0.892*	
Market			
NYSE/AMEX listing	0.168***	0.039	
	0.000	*0.592*	
Diagnostics			
R2 (pseudo for	37.65%	2.33%	5.97%
F-Statistic (Wald χ^2 test: coeff.=0)	46.16***	1.56	7.73***
	0.000	*0.135*	*0.000*
No. of observations	485	476	459

Table V: IPO waiting period and Underpricing

This table presents tests of Implication 2 of the model. *Underpricing*=First-day return = 100% x (Closing price – offer price)/offer price. *Waiting period* is the number of calendar days between the initial filing date and the offer date. Panel A presents the mean and median values of *Underpricing* depending on the waiting period dummy. It also reports *p*-values of mean comparisons (with unequal variance) and Mann-Whitney comparisons of the Underpricing between the two groups. Panel B presents 2SLS regressions explaining waiting period and Underpricing. It also tests the impacts of syndicate size, uncertainty and patience factor on Underpricing. *Syndicate size* is the number of lead managers. Uncertainty is proxied by STD return that is the standards deviation of a time series of 255 daily raw returns for each IPO. The patience factor is proxied by the High-Tech firms' dummy. The first-stage regression is estimate robust OLS of natural logarithm of the waiting period, and the fitted value from this regression is used as the Underpricing instrument in the second-stage OLS regression. *Offerings size* is the natural logarithm of the gross proceeds. The *gross spread* includes underwriting fees, management costs, and selling concessions. Underwriter rank is Jay Ritter's updated Carter and Manaster (1990) ranks. *Upward price revision* is a dummy variable that takes the value 1 when the offer price exceeds the midpoint of the filing range 0 otherwise. *Leverage* is the total debt divided by total capital invested, and multiplied by 100. *Investment* is measured by capital expenditures to sales ratio. *Ln(Asset)* is the natural logarithm of the total asset. The *NYSE/AMEX listing* dummy takes a value of 1 if the IPO is listed on the NYSE or AMEX, and 0 otherwise. Heteroscedasticity-consistent p-values are provided. ***, **,* indicate significance at respectively a 1%, a 5% and a 10% level.

Panel A: Univariate relations

IPO Waiting period	Underpricing	
	Mean	Median
IPO Waiting period ≥ median	10.32	4.00
IPO Waiting period < median	7.83	0.36
p-Value (comparison tests)	0.149	0.019**

Panel B: Multivariate relations

	First Stage	Second Stage	
	IPO waiting period (π^*)	Underpricing (UP)	
	Log(1+ π^*)	(UP1)	(UP2)
Intercept	4.895*** *0.000*	0.053 *0.945*	0.121 *0.877*
Offering Characteristics			
Offerings size		0.297** *0.011*	0.076 *0.529*
Gross spread			0.772*** *0.002*
Underwriter prestige			
Underwriter rank	-0.031** *0.042*		0.059 *0.346*
Price revision			
Upward price revision			1.366*** *0.000*
Variables of the model			
IPO waiting period (Log(1+ π^*))		0.041 *0.753*	-0.091 *0.433*
Syndicate size (S)	0.173** *0.029*	-0.468* *0.058*	
STD return (ϕ)			2.358 *0.745*

High-Tech (δ)	-0.226**	0.100	
	0.011	*0.668*	
Leverage and investment			
Leverage	-0.0001***		-0.0001***
	0.000		*0.003*
Investment	-0.941***		
	0.000		
Firm size			
Ln(assets)			-0.124*
			0.068
Market			
NYSE/AMEX listing		-0.181	
		0.401	
Diagnostics			
R2	6.35%	1.72%	23.06%
F-Statistic	6.68***	1.58	18.52***
	0.000	*0.165*	*0.000*
No. of observations	492	486	451

Table VI: IPO waiting period and Post-IPO managerial and directors' incentives

This table presents tests of Hypothesis 3. The dependant variable is the natural logarithm of the waiting period. The market conditions are proxied by the return of the market value-weighted index in the 3-month period leading to the IPO announcement. Aftermarket performance is 12-month post IPO stock price performance adjusted to the market value-weighted index return. *Dirsubstock*: equals 1 if directors are subject to stock ownership requirements during the year following the IPO completion and 0 otherwise. *Dirownership* equals 1 if directors and officers ownership as % of shares outstanding is >5% and <=30% during the year following the IPO completion (otherwise it is equal to zero). *Stockplan* takes the value of 1 when the company's directors are remunerated with options during the year following the IPO completion and 0 otherwise. *Loansoption* takes the value of 1 when the company provides loans to executives for exercising options during the year following the IPO completion and 0 otherwise. *Incentives Global* takes the value of 0 when *Dirsubstock* and *Dirownership* and *Stockplan* and *Loansoption* take simultaneously the value of 0 and 1 otherwise. The number of observations is reduced because of data availability in the ISS database. Heteroscedasticity-consistent p-values are provided. ***, **,* indicate significance at respectively a 1%, a 5% and a 10% level.

Panel A: Univariate relations

		IPO Waiting period		Diff. mean
		Mean	Median	p-value
Directors ownership	Yes	150	89	0.514
	No	118.08	102	
Directors and officers ownership (5%-30%)	Yes	133.93	115	0.052*
	No	114.85	99	
Stock option plan	Yes	252.71	229	0.043**
	No	115.89	101	
Loan for option exercise	Yes	133.82	111	0.000***
	No	104.65	92	
Incentives Global	Yes	131.53	110	0.000***
	No	105.24	92	

Panel B: Multivariate relations

	IPO waiting period	
	(1)	(2)
Intercept	4.532***	4.539***
	0.000	*0.000*
Market conditions-3months	-0.288	-0.400
	0.529	*0.378*
Aftermarket performance	-0.015	-0.012
	0.766	*0.804*
Post IPO incentives		
Dirsubstock	0.206	
	0.337	
Dirownership	0.048	
	0.477	
Stockplan	0.669***	
	0.000	
Loansoption	0.210***	
	0.001	
Incentives Global		0.237***
		0.000
Diagnostic		
R^2	7.84%	4.64%
F-Statistic (coeff.=0)	6.730***	8.600***
	0.000	*0.000*
No. of observations	359	366

Table VII: Turnover, Pricing, Money Left on The table (MLT) and IPO Waiting period

This table tests the effects of the waiting period on first-day turnover, pricing and "money left on the table". The first regression is a robust OLS of the first-day turnover. The second regression is a logistic regression of the pricing, where the dependant variable is the IPO priced at the upper limit of the price range dummy variable. The last equation is a robust OLS regression of the money left on the table. Money left on the table = number of shares sold x (closing price – offer price). *Offerings size* is the natural logarithm of the gross proceeds. *Waiting period* is the number of calendar days between the initial filing date and the offer date. The market conditions are proxied by the return of the market value-weighted index in the 3-month period leading to the IPO announcement. *Ln(Asset)* is the natural logarithm of the total asset. *High-Tech* is High-Tech firms' dummy. *STD return* is the standards deviation of a time series of 255 daily raw returns for each IPO. EPS is the earning per share of the fiscal year prior to the IPO. Heteroscedasticity-consistent p-values are provided. *** and ** indicate significance at respectively a 1% and a 5% level.

Estimation method	OLS	Logit	OLS
Dependant Variable	Turnover	Pricing at the Upper limit	MLT
Intercept	0.222	-2.329**	-120.27***
	0.119	*0.041*	*0.001*
Offerings size	0.105***	0.751***	30.99***
	0.000	*0.000*	*0.000*
IPO waiting period	-0.081**	-0.177	1.054
	0.046	*0.272*	*0.804*
Market conditions-3months	0.077	-1.696	-17.40
	0.712	*0.418*	*0.583*
Ln(assets)	-0.029***	-0.213**	-4.824***
	0.000	*0.014*	*0.000*
High-Tech	0.070	-0.054	4.259
	0.144	*0.827*	*0.417*
STD return	1.292	1.851	466.12**
	0.423	*0.824*	*0.044*
EPS_{-1}*0.01	0.002***	-0.190	-0.059
	0.000	*0.611*	*0.789*
Diagnostics			
R^2 (pseudo for Logit)	9.04%	4.87%	21.09%
F-Statistic (Wald χ^2 test: coeff.=0)	12.58***	12.58***	5.100***
	0.000	*0.002*	*0.000*
No. of observations	452	437	451

Table VIII: Probability of a subsequent SEO, IPO waiting period, Leverage and Investment

Logit regression estimates of the probabliity of a subsequent seasoned equity offering (SEO) are presented in this table. The dependent variable is a dummy that is assigned a value of one if a firm issues seasoned equity within 18 months of its IPO and zero otherwise. The three independent variables of primary interest are the waiting period, leverage and investment. *Waiting period* is the number of calendar days between the initial filing date and the offer date. *Leverage* is the total debt divided by total capital invested, and multiplied by 100. *Investment* is measured by capital expenditures to sales ratio. *Offerings size* is the natural logarithm of the gross proceeds. *Underpricing*=First-day return = 100% x (Closing price – offer price)/offer price. Aftermarket performance is 12-month post IPO stock price performance adjusted to the market value-weighted index return. Heteroscedasticity-consistent p-values are provided. *** and ** indicate significance at respectively a 1% and a 5% level.

Estimation method		Logit	
Dependant Variable	(1)	(2)	(3)
Intercept	-3.388***	-3.751***	-3.844***
	0.000	*0.000*	*0.000*
Offerings size	0.176**	0.482***	0.422***
	0.032	*0.000*	*0.000*
Underpricing	0.018	0.010	0.010
	0.123	*0.150*	*0.160*
Aftermarket performance	1.248***	0.948***	0.921***
	0.000	*0.000*	*0.000*
IPO waiting period	0.286*	0.140	0.211
	0.073	*0.373*	*0.199*
Leverage		-0.0003**	-0.0003**
		0.020	*0.044*
Investment			1.678**
			0.016
Diagnostics			
Pseudo R^2	10.52%	10.60%	10.56%
Wald χ^2 test coeff.=0	39.28***	48.65***	48.23***
	0.000	*0.000*	*0.000*
No. of observations	677	516	487

Table IX: Multinomial Logistic Regressions modeling Syndicate Size Switching Decision

This table presents the results of multinomial logistic regressions, modeling the decision to reduce, increase or keep the same syndicate size between the IPO and the subsequent SEO. Scenarios 1 and 2 represent respectively the decision to reduce and to increase instead of keeping the same syndicate size (the model default: the comparison group). Scenario 3 represents the decision to increase instead of reducing the syndicate size (the model default: the comparison group). The dependant variable is -1 for syndicate size reduction, 1 for size increase and 0 for syndicate size kept the same. We relate a firm's switching decision to Offerings characteristics, Syndicate characteristics, Underwriter switch and Waiting periods. *Underpricing*=First-day return = 100% x (Closing price – offer price)/offer price. IPO and SEO are the total amount issued. The *gross spreads* includes underwriting fees, management costs, and selling concessions. *Syndicate sizes* are the numbers of lead managers. Underwriter ranks is Jay Ritter's updated Carter and Manaster (1990) ranks. *Waiting periods* are the numbers of calendar days between the filing date and the offer date. Coefficient p-values are provided in parentheses. ***, **,* indicate significance at respectively a 1% level, a 5% and a 10% level.

	Scenario1			**Scenario2**			**Scenario3**		
	(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
Offerings characteristics									
Underpricing	-0.037	-0.066	-0.058	0.00005	0.002	-0.005	0.037	0.068	0.053
	0.222	*0.122*	*0.144*	*0.994*	*0.789*	*0.536*	*0.228*	*0.114*	*0.193*
Log IPO size	-1.994***	-2.259***		0.107	0.357		2.101***	2.617***	
	0.002	*0.004*		*0.709*	*0.258*		*0.003*	*0.001*	
Log SEO size			-2.433**			0.794**			2.433***
			0.021			*0.044*			*0.003*
IPO gross spread	0.987	1.166		-0.657	-0.752		-1.643	-1.918	
	0.537	*0.522*		*0.359*	*0.304*		*0.334*	*0.309*	
SEO gross spread			3.210**			-1.051*			-3.210***
			0.019			*0.079*			*0.004*
Syndicate characteristics									
IPO syndicate size	3.975***	5.017***	4.513***	-1.065**	-1.421***	-1.747***	-5.041***	-6.439***	-4.513***
	0.000	*0.000*	*0.000*	*0.016*	*0.003*	*0.003*	*0.000*	*0.000*	*0.000*
IPO underwriter rank	0.208			-0.066			-0.274		
	0.617			*0.582*			*0.519*		
SEO underwriter rank		-0.175	0.247		0.405**	0.551**		0.581	0.304
		0.758	*0.693*		*0.049*	*0.044*		*0.325*	*0.651*
Underwriter switch									
=1 if underwriter switch		2.090**			1.636***			-0.453	
		0.033			*0.000*			*0.662*	
=1 if switch for higher ranked			2.126*			3.484***			1.358
			0.070			*0.000*			*0.274*
Waiting periods									
IPO waiting period			2.340**			-0.200			-2.540**
			0.046			*0.615*			*0.036*
Log (days from IPO to SEO announcement)	-0.273	-0.082	0.247	0.190	-0.282	-0.500	0.463	-0.200	-0.126
	0.761	*0.941*	*0.693*	*0.647*	*0.554*	*0.373*	*0.629*	*0.863*	*0.917*
SEO waiting period	-1.206***	-1.361***	-1.494***	-0.279	-0.259	0.095	0.927**	1.102**	1.589***
	0.000	*0.001*	*0.006*	*0.113*	*0.192*	*0.748*	*0.010*	*0.010*	*0.008*
Intercept	2.041	2.583	-10.516	0.775	-1.902	-3.493	-1.266	-4.485	7.023
	0.769	*0.760*	*0.289*	*0.792*	*0.574*	*0.371*	*0.863*	*0.610*	*0.499*
Diagnostics									
McFadden pseudo-R2	30.17%	39.00%	44.87%	30.17%	39.00%	44.87%	30.17%	39.00%	44.87%
Wald χ^2 test (all coeff.=0)	100.25***	127.99***	129.32***	100.25***	127.99***	129.32***	100.25***	127.99***	129.32***
No. of observations	188	187	173	188	187	173	188	187	173

Table X: Market reaction at the subsequent SEO to syndicate size switch and SEO waiting period

This table presents the first-day market reaction at the subsequent SEO to syndicate size switch between the IPO and the first SEO and to SEO waiting period. The dependant is the market adjusted SEO first-day return. The two independent variables of primary interest are the SEO waiting period and syndicate size reduction dummy. *SEO size* is the natural logarithm of the gross proceeds. The *gross spread* includes underwriting fees, management costs, and selling concessions. *Syndicate size* is the number of lead managers. *Underwriter rank* is Jay Ritter's updated Carter and Manaster (1990) ranks. *Waiting periods* are the numbers of calendar days between the filing date and the offer date. *STD return* is the standards deviation of a time series of 255 daily raw returns for each IPO. *Market-to-book* is monthly market-to-book ratio prior to the SEO. Heteroscedasticity-consistent p-values are provided. *** and ** indicate significance at respectively a 1% and a 5% level.

	(1)	(2)	(3)
Offerings characteristics			
Log SEO size	-0.004	-0.002	-0.004
	0.400	*0.627*	*0.422*
SEO gross spread	0.005	0.005	0.005
	0.444	*0.485*	*0.446*
Syndicate characteristics			
SEO syndicate size	0.003		0.003
	0.532		*0.537*
SEO underwriter rank		-0.001	
		0.783	
Waiting periods			
SEO waiting period	0.009***	0.008**	0.009***
	0.009	*0.016*	*0.008*
Risk			
STD return	-0.242**	-0.240**	-0.239**
	0.031	*0.031*	*0.032*
Prospect indicator			
Market-to-book	0.0002	0.0002	0.0002
	0.458	*0.477*	*0.477*
Syndicate size and underwriter switch			
=1 if reduce syndicate size		-0.002	
		0.789	
=1 if switch for lower ranked			0.002
			0.820
Intercept	-0.012	-0.007	-0.013
	0.549	*0.729*	*0.533*
Diagnostics			
R2	5.05%	4.95%	5.07%
F-Statistic	2.75**	2.21**	2.37**
No. of observations	169	168	169