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Political Uncertainty and the Market for IPOs

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I. INTRODUCTION

Political uncertainty[1] affects financial markets. A robust academic literature examines

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1. Political uncertainty, in this context, refers to potential changes in government policy or the legislative

the impact of political uncertainty on a range of macroeconomic matters such as economic growth, inflation, capital flows, stock return volatility, and asset prices.[2] Indeed, Standard & Poor's, a major credit rating agency, cited political uncertainty as one of the key reasons for its unprecedented downgrade of U.S. Treasury debt in 2011. According to David Beers, Standard & Poor's managing director of sovereign credit ratings, the "'degree of uncertainty over the political policymaking process . . . [was] incompatible with the AAA rating.'"[3]

More recently, and especially in the wake of the Great Recession, the impact of political uncertainty on *firm-specific* corporate activity has become a prominent subject of public discourse. This issue has emerged as a talking point for politicians,[4] has been covered at length by major news outlets and the financial press,[5] and has been the subject of academic inquiry.[6] Collectively, this commentary oversimplifies the impact of political

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and regulatory landscape that might impact the economic environment. This Article describes the dynamics of political uncertainty at greater length *infra* Section II.A.

2. *See, e.g.*, S. Brock Blomberg & Gregory D. Hess, *Is the Political Business Cycle For Real?*, 87 J. PUB. ECON. 1091 (2003) (examining the connection between political activity and economic growth); Alberto Alesina et al., *Political Instability and Economic* Growth, 1 J. ECON. GROWTH 189 (1996) (investigating the relationship between political instability and per capita GDP); Alberto Alesina & Dani Rodrik, *Distributive Politics and Economic Growth*, 109 Q. J. ECON. 465 (1994) (studying the relationship between politics and economic growth); Allan Drazen & Elhanan Helpman, *Inflationary Consequences of Anticipated Macroeconomic Policies*, 57 REV. ECON. STUD. 147 (1990) (examining the impact of political uncertainty on inflation); Niels Hermes & Robert Lensink, *Capital Flight and the Uncertainty of Government Policies*, 71 ECON. LETTERS 377 (2001) (demonstrating a correlation between political uncertainty and capital outflows at the country level); Maria Boutchkova et al., *Precarious Politics and Return Volatility*, 25 REV. FIN. STUD. 1111 (2012) (modeling the relationship between political uncertainty and stock return volatility); Ľuboś Pástor & Pietro Veronesi, *Political Uncertainty and Risk Premia*, 110 J. FIN. ECON. 520 (2013) (modeling the impact of political uncertainty on the equity risk premium).

3. Pástor & Veronesi, *supra* note 2, at 520 n.1 (quoting an Aug. 6, 2011 conference call with reporters).

4. *See, e.g.*, John Dickerson, *Uncertainty Principle: What John Boehner Offers in Place of an Economic Plan*, SLATE (Aug. 24, 2010, 7:52 PM), http://www.slate.com/articles/news_and_politics/politics/2010/08/uncertainty_principle.html (describing how Boehner would approach the economy).

5. *See, e.g.*, Gary Fields, *Political Uncertainty Puts Freeze on Small Business*, WALL STREET J. (Oct. 28, 2009, 12:01 AM EST), http://www.wsj.com/articles/SB125659324579108943 (describing that, for small business, there is "uncertainty created by Washington's bid to reorganize a wide swath of the U.S. economy"); Scott R. Baker et al., *Political Uncertainty Is Choking Recovery: Baker, Bloom and Davis*, BLOOMBERGVIEW (Oct. 5. 2011, 8:01 PM EDT), http://www.bloombergview.com/articles/2011-10-06/policy-uncertainty-is-choking-recovery-baker-bloom-and-davis ("A major factor behind the weak recovery and gloomy outlook is a climate of policy-induced economic uncertainty."); Jonathan Weisman, *Uncertainty in Washington Poses Long List of Economic Perils*, N.Y. TIMES (Dec. 2, 2014), http://www.nytimes.com/2014/12/03/business/economy/uncertainty-in-washington-poses-long-list-of-economic-perils.html (describing political uncertainty and the problems related to this).

6. *See, e.g.*, Scott R. Baker et al., *Measuring Economic Policy Uncertainty*, (Nat'l Bureau of Econ. Research, Working Paper, 2015), http://www.policyuncertainty.com/media/BakerBloomDavis.pdf (examining the link between political uncertainty and corporate investment); Brandon Julio & Youngsuk Yook, *Political Uncertainty and Corporate Investment Cycles*, 67 J. FIN. 45 (2012) (documenting cycles in corporate investment that correspond with national elections). *Cf.* Nicholas Bloom, *The Impact of Uncertainty Shocks*, 77 ECONOMETRICA 623, 625 (2009) (theorizing the value of delaying investments in the face of uncertainty); Jonathan E. Ingersoll, Jr. & Stephen A. Ross, *Waiting to Invest: Investment and Uncertainty*, 65 J. BUS. 1, 3 (1992) ("We are not the first to recognize that delaying a project can be desirable, but we are the first to observe that this need have nothing to do with changes in the cash flows of the project itself or with the effects of certain changes in interest rates."); Ben S. Bernanke, *Irreversibility, Uncertainty, and Cyclical Investment*, 98 Q. J. ECON. 85, 85 (1983) ("When individual projects are irreversible, agents must make investment timing decisions that

uncertainty on corporate activity. Analysts focus almost entirely on firms' investment decisions—that is, how companies deploy their resources by hiring employees, investing in research and development, and funding other capital outlays.[7] There has, however, been virtually no attention paid to the impact of political uncertainty on firms' financing decisions.[8] In particular, the literature largely ignores a key question related to the life-cycle of developing companies: how does political uncertainty impact the market for initial public offerings (IPOs)? This omission is rather significant because the vibrancy of the IPO market is a key determinant of venture capital financing, which is a critical source of funding for early-stage companies.[9]

This Article develops a simple theory and model of the market for IPOs under conditions of political uncertainty. Our analysis contributes to two related literatures. First, we broaden the understanding of political uncertainty's firm-specific effects by developing empirically testable hypotheses concerning firms' financing decisions. Our theory and model is timely because, as Pastor and Veronesi recently commented, "our ability to interpret the impact of political news on financial markets is constrained by the lack of theoretical guidance."[10]

Our model generates four central predictions: (i) as political uncertainty increases, the frequency of IPOs decreases; (ii) IPOs conducted during periods of heightened political uncertainty are, on average, of higher quality and generate greater return on investment in the secondary market than those conducted during periods of lower political uncertainty; (iii) political uncertainty increases the cost of capital for IPO firms; but (iv) underpricing, the difference between the IPO price and the first-day trading price on the secondary market (i.e., the amount "left on the table" by IPO firms), is less pronounced during periods of heightened political uncertainty. We demonstrate that each of these predictions is consistent with the available empirical evidence.

Second, we also add to the developing literature on IPO decision-making. The IPO market is strongly cyclical; "hot" phases with a high volume of IPO activity alternate with "cold" phases, in which the frequency of IPOs plummets.[11] A growing body of work seeks

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trade off the extra returns from early commitment against the benefits of increased information gained by waiting.").

7. *See, e.g.*, Weisman, *supra* note 5 ("'From a businessman's standpoint, uncertainty in general just has a huge impact in how you think of the future, how you plan for capital investment and how you plan for hiring . . . .'") (quoting Randall L. Stephenson, chairman of AT&T and the Business Roundtable); Fields, *supra* note 5 ("There is little reliable data explaining why companies are retrenching despite signs of life in the economy, including recent increases in production in some industries and rises in housing prices and new home sales. However, a variety of organizations that monitor business behavior, including the NFIB, the Associated General Contractors of America and the National Small Business Association, say political uncertainty is a substantial factor. . . ."); Baker et al., *supra* note 6, at 1 ("When businesses are uncertain about taxes, health-care costs and regulatory initiatives, they adopt a cautious stance. Because it is costly to make a hiring or investment mistake, many companies will wait for calmer times to expand . . . . Weak investments in capital goods, product development and worker training also undermine longer-run growth."). The academic literature is similarly focused on corporate investment activity. *See* authorities cited *supra* note 6 (describing the academic literature).

8. *See* Gonul Colak et al., Political Uncertainty and IPO Activity: Evidence from U.S. Gubernatorial Elections 1, 1 (Apr. 2015) (unpublished manuscript), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2281269 ("[S]urprisingly little attention has been paid to [the effect of political uncertainty on] another type of important corporate activity, namely firms' financing decisions.").

9. *See infra* Section II.A (describing venture funding and IPOs).

10. Păstor & Veronesi, *supra* note 2, at 520.

11. *See infra* Section II.C (describing IPO market cycles).

to explain this phenomenon and model firms' strategic decisions concerning IPOs. There are few empirical studies of the going public decision-making process,[12] but several theoretical studies hypothesize three determinants of IPO activity: business conditions, investor sentiment, and asymmetry of information between private firm managers and public investors.[13] Based on these hypotheses, commentators have made predictions about several aspects of the IPO cycle, such as IPO frequency, average firm quality, and issue pricing.[14] Our model, supported by available empirical evidence, suggests different outcomes.[15] Thus, political uncertainty is an independently important, but underappreciated, factor bearing on private firms' financing decisions.[16]

Finally, our model provides a more subtle understanding of the costs and benefits of political uncertainty. At present, and especially in partisan and media accounts, political uncertainty is typically presented as an unmitigated cost; any potential benefits are either unnoticed or unmentioned. For example, in a joint letter to President Obama, Congressmen John Boehner and Eric Cantor claimed: "the biggest obstacle to economic recovery and job creation is the policy uncertainty created by Washington."[17] While there are undeniably costs associated with political uncertainty, such as delayed investment[18] or increased undiversifiable risk,[19] there is no a priori reason to exclude the possibility that political uncertainty has benefits as well. An unchangeable, yet inefficient or dysfunctional legal regime may be substantially less desirable than policy in flux.[20] More formally, political uncertainty allows governmental actors the flexibility necessary to craft appropriate responses to unanticipated, exogenous shocks.[21] Beneficial second-order effects may also emerge from the ways in which political uncertainty impacts the behavior of market participants. Our model illustrates that both costs and benefits may stem from political uncertainty. Thus, its net impact on the IPO market is an empirical question, not an a priori conclusion.

The purpose of our model is to demonstrate that very simple dynamics can explain observed phenomena in the IPO market. Consequently, we develop a basic model of surplus sharing that abstracts from many issues that may be relevant in explaining the

12. *See generally* JEAN TIROLE, THE THEORY OF CORPORATE FINANCE 93 (2006). For notable exceptions, see generally Vladimir I. Ivanov & Craig M. Lewis, *The Determinants of Market-Wide Cycles for Initial Public Offerings*, 14 J. CORP. FIN. 567 (2008) (testing empirically three hypotheses concerning the determinants of IPO cycles); Colak et al., *supra* note 8 (collecting and analyzing data concerning IPO activity relative to gubernatorial elections); Marco Pagano et al., *Why Do Companies Go Public? An Empirical Analysis*, 53 J. FIN. 27 (1998) (analyzing Italian IPO data).

13. *See infra* Section II.C (surveying the literature on the going-public decision).

14. *Id.*

15. *See infra* Sections II.B–C (modeling the impact of political uncertainty on IPO frequency, quality, and price effects).

16. *Id.*

17. Letter from Congressmen John Boehner and Eric Cantor to President Barack Obama (July 15, 2010), http://johnboehner.house.gov/gop-leaders-urge-president-obama-to-stop-creating-economic-uncertainty-work-with-business-community/. *See* Fields, *supra* note 5 (arguing that political uncertainty "freeze[s]" small business); Baker et al., *supra* note 5 (asserting that political uncertainty "chokes" economy recovery).

18. *See* sources cited *supra* note 6 (discussing the relationship between political activity and capital investment).

19. Păstor & Veronesi, *supra* note 2, at 521.

20. *Cf.* Shawn J. Bayern, *Against Certainty*, 41 HOFSTRA L. REV. 53, 58 (2012) ("[I]t is difficult to evaluate [a] rule by evaluating its certainty.").

21. Păstor & Veronesi, *supra* note 2, at 521.

simplest financial interactions. Our interpretation of the close match between the predictions of our simple model and empirical observations is that the institutions and structures of the IPO market draw interactions closer to those that mimic individual buyers and sellers who collaborate to generate and share a surplus. We hope that future research sheds more light on how these institutions generate this result.

The Article proceeds as follows. Part II describes the market for IPOs as presently understood. We introduce the key players in the market for IPOs (startup firms, venture capitalists, underwriters, and public investors) and illustrate their incentives. We then explore the dynamics of IPO pricing and review the extant literature on the going public decision-making process. Part II highlights that the present understanding of the market for IPOs is incomplete; it fails to consider the impact of political uncertainty on market participants' behavior. Part III presents our model of the market for IPOs under conditions of political uncertainty. We describe the general dynamics of political uncertainty in this context, and then explain our benchmark model of the behavior of the IPO market participants introduced in Part II, which derives predictions about IPO frequency and quality. We then extend the benchmark model to consider the effects of political uncertainty on IPO pricing. Part IV evaluates our model by surveying the available empirical evidence. We demonstrate that the data supports each of our models' predictions. Part V concludes and considers several implications of our model. Part VI, an appendix, mathematically formalizes the model presented in Part III.

II. THE STRUCTURE OF THE MARKET FOR IPOS

Our model explains the behavior of buyers (public investors) and sellers (going-public firms and their venture capital backers) in the market for IPOs under conditions of political uncertainty. This Part introduces the participants in that market and describes their incentives. It begins with the sellers' incentives and documents the dynamics of venture funding and the importance of the market for IPOs. It then turns to the IPO process and the mechanics of price-setting in that market, which typically occurs via negotiation between sellers and underwriters, a group of market intermediaries that gauge buyers' interest in purchasing a seller's shares. Finally, this Part reviews the literature on the going-public decision, highlighting how extant theories fail to account for the impact of political uncertainty on the behavior of the participants in the market for IPOs.

A. Venture Funding and the Importance of the Market for IPOs

Our inquiry is motivated in part by the connection between IPOs and the range of financing options for startup companies. Specifically, there is a direct link between the vibrancy of the market for IPOs and the availability of venture capital financing.[22] Venture capital (VC) firms are organizations that specialize in pooling funds to invest equity capital in early stage companies—referred to as "portfolio companies"—in high-growth/high-risk fields.[23] These portfolio companies are typically unable to satisfy their capital needs

22. *See* Bernard S. Black & Ronald J. Gilson, *Venture Capital and the Structure of Capital Markets: Banks Versus Stock Markets*, 47 J. FIN. ECON. 243, 245 (1998) ("[A] well developed stock market that permits venture capitalists to exit through an initial public offering . . . is critical to the existence of a vibrant venture capital market.").

23. *Id.* Following the literature, we exclude from our discussion buy-out firms that specialize in purchasing

through debt financing, which can be attributed to the delay in their ability to generate meaningful positive cash flows.[24] Thus, if funding an appropriate subset of these portfolio companies generates societal benefits, the availability of venture financing is of significant importance.[25] Moreover, VC-backed firms account for the majority of IPOs.[26]

For reasons of economic efficiency, VCs are not long-term investors in their portfolio companies.[27] This strategy flows from ways in which VCs create value. In addition to the funds invested in their portfolio companies, VCs provide at least three non-financial benefits: managerial assistance, reputational capital, and intensive monitoring.[28] Whereas the founders of startup companies may have little or no prior business experience, the principals of venture firms typically bring to the table a range of managerial expertise, market/industry knowledge, and a valuable network of contacts.[29] Similarly, because VCs are repeat players in this market, they develop credible reputational capital that allows them to act as intermediary between the (relatively unknown) portfolio company and third-parties whose contributions may be necessary to the portfolio firm's development and success.[30] For example, the backing of a well-known VC can entice talented managers or employees to invest their human capital,[31] facilitate negotiations with suppliers and customers,[32] and, ultimately, attract a high quality underwriter for an IPO.[33] Finally, VCs monitor and discipline portfolio company management through their contractual control rights and staged financing model, in which funds are provided to the portfolio company in several rounds and at the discretion of the VC.[34] For each of these non-financial services, the value added by the VC is greatest for early-stage companies. As portfolio companies mature and prove their value, the need for strict monitoring decreases because managers develop their own expertise, connections, and reputation.[35] Accordingly, VCs can generate more value by recycling their financial contributions from more mature firms to early-stage companies.[36]

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mature or distressed companies.

24. *Id.*; Paul Gompers & Josh Lerner, *The Use of Covenants: An Empirical Analysis of Venture Partnership Agreements*, 39 J.L. & ECON. 463, 465 (1996) ("Start-up companies that lack substantial tangible assets, expect several years of negative earnings, and have uncertain prospects are unlikely to receive bank loans or other debt financing.").

25. Note, however, that we take no position on the optimal level of venture financing.

26. *See* sources cited *infra* note 95.

27. *See* Armin Schwienbacher, *Innovation and Venture Capital Exits*, 118 ECON. J. 1888, 1888 (2008) ("[V]enture capital funds invest in start-up companies with the clear wish to exit after 4–7 years.").

28. Black & Gilson, *supra* note 22, at 252–55.

29. *See id.* at 252–53 (discussing the skills venture capitalists bring to the portfolio company); Gompers & Lerner, *supra* note 24, at 465. *See generally* William A. Sahlman, *The Structure and Governance of Venture-Capital Organizations*, 27 J. FIN. ECON. 473 (1990) (discussing the inner workings of venture capital organizations).

30. Black & Gilson, *supra* note 22, at 254.

31. *Id.*

32. *Id.*

33. Joshua Lerner, *The Syndication of Venture Capital Investments*, 23 FIN. MGMT. 16, 16 (1994); William L. Megginson & Kathleen A. Weiss, *Venture Capitalist Certification in Initial Public Offerings*, 46 J. FIN. 879, 880 (1991). This aspect of the IPO process is discussed in greater detail *infra* Section II.B.

34. Paul A. Gompers, *Optimal Investment, Monitoring, and the Staging of Venture Capital*, 50 J. FIN. 1461, 1461–62 (1995); *see also* Black & Gilson, *supra* note 22, at 253 (discussing the "intensive monitoring and control" VCs exercise).

35. Black & Gilson, *supra* note 22, at 255.

36. *Id.*

Recycling funds in this way is also efficient for the VCs' own investors, i.e., the providers of capital used to finance portfolio companies.[37] These investors rely on the expertise of the VC to select attractive portfolio companies but need a way to evaluate periodically the managerial skill of those VCs and the return on their investment relative to other opportunities.[38] Investors also need a mechanism for withdrawing funds and transferring capital from underperforming VCs to those better able to generate higher returns on investment.[39] Exit is the solution here, as well. VCs typically pool their investors' capital in limited partnerships, which have fixed terms of seven to ten years.[40] At the end of this term, the partnership is wound-up, profits (if any) are distributed to its investors, and those investors can decide whether to reinvest with the same firm or pursue other investment options.[41] To maximize profitability, and thereby increase the attractiveness of their subsequent rounds of investment,[42] VCs have strong incentives to exit from their portfolio companies well within the partnership period.[43] Thus, the success of the venture capital firm's business model—and their ability to attract investment capital—depends on the availability of exit options.

VCs exit their portfolio investments in two ways: taking the company public via an IPO or selling the company to another firm.[44] While the value-maximizing exit decision for any particular firm depends on several factors,[45] the IPO path is preferable ex ante from the perspective of both VCs and portfolio company founders. First, on average, IPOs generate substantially higher return on investment than do sales.[46] Second, taking a firm public is viewed by peers as a "win," and confers substantial reputational advantages on VCs.[47] Finally, an IPO benefits founders of portfolio companies by providing them a call option on regaining control of their company.[48] Portfolio company founders cede substantial control rights when they accept venture capital financing.[49] For example, VCs

37. *See id.* at 255–57 (discussing the "exit and reinvestment cycle for venture capital funds and capital providers").

38. *Id.* at 255; Gompers, *supra* note 34, at 1470.

39. Black & Gilson, *supra* note 22, at 255.

40. *Id.* at 256.

41. *Id.*

42. *See id.* ("A fund's performance record, based on completed investments, is the fund's principal tool for soliciting capital providers to invest additional funds in new limited partnerships.").

43. *Id.*; Schwienbacher, *supra* note 27, at 1888–89 (discussing VC exit strategies).

44. In theory, there is a third exit option: leveraging the portfolio company to provide it with sufficient cash to buy out the venture capitalists' ownership stake. However, that option is rarely, if ever, feasible for the type of companies that most often attract venture capital investment. *See* Black & Gilson, *supra* note 22, at 257.

45. *See, e.g.*, Schwienbacher, *supra* note 27, at 1889 (arguing that the structure of the portfolio company's product market is a key determinant in choosing the optimal exit); Black & Gilson, *supra* note 22, at 257 (noting that synergy gains economies of scale in production or marketing might favor an acquisition by a larger firm).

46. Armin Schwienbacher, *Venture Capital Exits*, *in* ROBERT W. KOLB SERIES: VENTURE CAPITAL: INVESTMENT STRATEGIES, STRUCTURES, AND POLICIES 389, 394 (Douglas Cumming ed., 2010) ("An IPO is generally viewed as the most profitable exit route for venture capitalists."); *accord* Gompers, *supra* note 34, at 1470 (reporting an average 60% annual return on investment for IPO exits as compared with a 15% annual return for exits via sales); Black & Gilson, *supra* note 22, at 264 (same).

47. *See* Black & Gilson, *supra* note 22, at 260 (noting "the frequency with which a venture capital fund's portfolio companies go public is a central measure of the venture capitalist's success in the eyes of investors in venture capital funds"); *see also* Paul Gompers, *Grandstanding in the Venture Capital Industry*, 42 J. FIN. ECON. 133, 140 (1996) (comparing characteristics for IPOs backed by young and old venture capitalist firms).

48. Black & Gilson, *supra* note 22, at 261.

49. *See* Schwienbacher, *supra* note 46, at 390–92 (surveying typical venture capital investment contract

almost always contract for board representation (sometimes a majority), control over the portfolio company's ability to obtain subsequent financing, and decision-making authority over exit choices.[50] VCs also exercise substantial indirect control via their staged financing model, in which they can withhold—or threaten to withhold—subsequent cash infusions if confronted by recalcitrant portfolio company management.[51] Collectively, this provides the VC with effective veto power over significant business decisions.[52] In an IPO, the VC's contractual control rights disappear and their influence wanes dramatically as they divest their equity stake.[53] Founders can then choose to regain de jure control by retaining a voting majority of the firm's shares or exercise de facto control as executives with large stockholdings in a diffusely-held public firm.[54] By contrast, when the portfolio company is sold to another firm, the former's founders almost always lose control of the venture.[55] Thus, if maintaining an option on control is valuable to the portfolio company founders, the prospect of exit via IPO creates strong incentives for success.[56]

In sum, exit is a powerful driver of VCs' investments in startup companies. IPOs are the preferred form of exit for both VCs and portfolio company founders. The following Section turns to the IPO process and the mechanism by which IPO prices are set.

B. The Dynamics of IPO Pricing

Aside from the percentage of the firm's equity for sale, offering price is the key variable determined during the IPO process.[57] In the vast majority of IPOs, the offering price is determined through a negotiation between the firm going public (the "issuer" of securities) and its underwriters. Underwriters are investment banks that specialize in marketing and selling securities to potential public investors.[58] Since most issuers, even those with VC backing, have less extensive contacts in this regard, virtually all IPOs involve professional underwriters.[59]

In the typical IPO process, an issuer will discuss its potential offering with several

provisions).

50. *Id.*; Black & Gilson, *supra* note 22, at 253.

51. Black & Gilson, *supra* note 22, at 253.

52. *Id.* at 261.

53. *Id.*

54. *Id.*

55. Schwienbacher, *supra* note 46, at 396. The founder is either cashed out if the consideration for the purchase is cash, or becomes a minority shareholder of the acquiring company if the consideration comprises shares of the acquirer. *Id.*

56. Black & Gilson, *supra* note 22, at 263–64; Schwienbacher, *supra* note 27, at 1889.

57. *See* JOHN C. COFFEE, JR. & HILLARY A. SALE, SECURITIES REGULATION 84 (12th ed. 2012) ("In the context of an [IPO], the pricing of the issue is the most sensitive matter to be negotiated . . . .").

58. STEPHEN M. BAINBRIDGE, CORPORATION LAW AND ECONOMICS 75 (2002). Technically, the term "underwriter" is defined in the Securities Act of 1933, 15 U.S.C. § 77b(a)(11) (1933) ("The term 'underwriter' means any person who has purchased from an issuer with a view to, or offers or sells for an issuer in connection with, the distribution of any security, or participates or has a direct or indirect participation in any such undertaking, or participates or has a participation in the direct or indirect underwriting of any such undertaking; but such term shall not include a person whose interest is limited to a commission from an underwriter or dealer not in excess of the usual and customary distributors' or sellers' commission. As used in this paragraph the term 'issuer' shall include, in addition to an issuer, any person directly or indirectly controlling or controlled by the issuer, or any person under direct or indirect common control with the issuer.").

59. COFFEE & SALE, *supra* note 57, at 75. Although companies are not legally required to use an underwriter, IPOs are only rarely self-marketed. *Id.*

investment banks and then select one or two to act as lead underwriter(s).[60] The parties then agree to the type of underwriting that the investment banks are willing to provide. "Firm commitment" agreements are the most common type of underwriting arrangement. In a firm commitment offering, the underwriter purchases securities directly from the issuer, and then acts as a dealer by reselling them to an initial group of public investors at an agreed-upon price (the "offering price").[61] The issuer's stock then begins trading on secondary markets such as the New York Stock Exchange (NYSE) or National Association of Securities Dealers Automated Quotations (NASDAQ), and initial purchasers can sell their stock as they see fit to other investors. We focus here on firm commitment arrangements as they account for approximately 90% of all public offerings.[62]

The primary point of negotiation between the issuer and underwriters is the offering price. The issuer's objective is to obtain the maximum price for its shares. While underwriters putatively act on behalf of issuers, their incentives are more complex. Underwriters are compensated by a fixed fee (often a negotiated percentage of the offering price), and typically do not share in any equity appreciation if the stock price rises after the offering.[63] This structure is intended to align the interests of the issuer and underwriters. Yet, in a firm commitment IPO, the underwriter—not the issuer—bears the risk that the offering is undersubscribed. That is, if the offering price is set too high, the underwriter may encounter difficulty in locating a sufficient number of investors to purchase all of the shares for sale. In a firm commitment offering, the underwriter, having already purchased the shares from the issuer, will suffer any losses associated with such an undersubscribed IPO (e.g., the direct financial cost of selling the shares for less than the offering price, and/or reputational cost of having underwritten a failed offering). Accordingly, underwriters also act in a quasi-adversarial capacity by proxying for public investors in the price negotiation process. In this capacity, underwriters regularly seek expressions of interest from potential investors in advance of the actual IPO.[64] If the underwriters perceive a lack of interest at a particular price, they generally advise the issuer to reduce either the size or the price of the offering.[65] Yet, if interest is high, underwriters might be reluctant to disclose the full extent of this positive information because doing so might embolden the issuer to hold out for a higher offering price and thus increase the underwriters' risk.[66]

At least in part as a result of this dynamic, IPOs are chronically "underpriced," as the secondary market for the issuer's shares often spikes during the first day of trading on the secondary market.[67] The magnitude of this spike is economically significant. Coffee and Sale report that IPOs during the 1980s yielded an average first-day return of 16.4%.[68] Tirole reports more generally that IPOs are, on average, 15–20% underpriced.[69]

60. *Id.* at 80.

61. BAINBRIDGE, *supra* note 58, at 75.

62. *Id.* The other main variant of underwriting is the "best efforts" offering, which accounts for approximately 5% of public offerings. *Id.* In a best efforts offering, the underwriter does not purchase the issuer's stock, but instead acts only as a broker, i.e., a marketer and distributor of the issuer's stock. *Id.*

63. COFFEE & SALE, *supra* note 57, at 76.

64. *Id.* at 80.

65. *Id.* at 82.

66. *Id.*

67. *See id.* ("[IPOs] are often 'underpriced'; that is, the offering is sold at a price well below the secondary market price it reaches within hours after the offering begins.").

68. COFFEE & SALE, *supra* note 57, at 87.

69. TIROLE, *supra* note 12, at 93.

Underpricing reached its apex during the tech bubble of the late 1990s, when IPO shares sometimes quadrupled (or more) in price.[70] During periods with less frequent IPOs, underpricing is less pronounced.[71] In either event, the quantum of underpricing is money "left on the table" by the issuer.

Given the factors discussed in this Section, there are strong incentives for an issuer to strategically time its IPO to maximize the benefits to the firm.[72] There are few empirical accounts of the process by which firms decide when to go public.[73] There is, however, a small but growing body of theoretical literature that attempts to explain this phenomenon and to model optimal market-timing strategies given specified intra-firm characteristics.[74] The next Section reviews this literature, and illustrates how it overlooks the impact of political uncertainty on the behavior of participants in the IPO market.

C. Theorizing the Going-Public Decision

Going public is a costly decision. There are non-trivial transaction costs (i.e., legal, underwriting, and other advisory fees) associated with the IPO itself.[75] Once public, the firm also has mandatory reporting obligations to regulators and investors.[76] There are direct costs associated with preparing these disclosures,[77] as well as indirect costs of revealing proprietary information to competitors.[78] Public firms also become potential takeover targets in the market for corporate control,[79] and expose themselves to increased litigation risk in the form of securities class actions.[80] The main countervailing benefit is a substantial influx of capital received in exchange for selling a portion of the firm's equity to public investors. Some of this capital is used to cash out existing investors (such as VCs).[81] The remainder is available for the firm to pursue growth prospects.[82] Going public also creates a liquid market in the firm's securities. This liquidity allows the company to more easily and cheaply raise additional capital in the future,[83] and to use its shares as incentive compensation and consideration for acquisitions.[84] The threshold decision of whether to go public involves balancing these costs and benefits.

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70. COFFEE & SALE, *supra* note 57, at 87 (noting that the average first day return on IPOs during 1999 was 71%).

71. *Id.*; Ulrike Hoffmann-Burchardi, *Clustering of Initial Public Offerings, Information Revelation and Underpricing*, 45 EURO. ECON. REV. 353, 354 (2001).

72. *See* Aydoğan Alti, *IPO Market Timing*, 18 REV. FIN. STUD. 1105, 1106 (2005) ("IPO market timing obtains as an equilibrium outcome.").

73. *Supra* note 12.

74. *See* Hoffmann-Burchardi, *supra* note 71, at 353–54 ("[T]he timing of the IPO decision has only recently been the subject of theoretical investigation.").

75. TIROLE, *supra* note 12, at 92–93.

76. *Id.*

77. BAINBRIDGE, *supra* note 58, at 76.

78. TIROLE, *supra* note 12, at 93.

79. This, of course, may have a positive effect by mitigating managerial agency costs. *See, e.g.*, Jay B Kesten, *Managerial Entrenchment and Shareholder Wealth Revisited: Theory and Evidence from a Recessionary Financial Market*, 2010 B.Y.U. L. REV. 1609, 1618–21 (2010) (discussing managerial incentives in the shadow of a hostile takeover).

80. LARRY D. SODERQUIST & THERESA A. GABALDON, SECURITIES REGULATION 22 (6th ed. 2006).

81. TIROLE, *supra* note 12, at 93.

82. *Id.*

83. Pagano et al., *supra* note 12, at 29.

84. BAINBRIDGE, *supra* note 58, at 76; TIROLE, *supra* note 12, at 93.

Assuming expected benefits exceed anticipated costs,[85] the issuer must decide when to conduct its IPO. All else equal, the objective is simple: maximizing the benefits of the IPO by raising the greatest amount of capital relative to the percentage of the firm's equity sold.[86] But IPO timing is complicated because pricing is not exclusively a function of firm quality.[87] Rather, the market for IPOs is persistently cyclical; "hot" phases with a high volume of IPO activity alternate with "cold" phases, in which the frequency of IPOs plummets.[88]

Two threshold factors might cause an issuer to diverge from an all-else-equal optimal market timing strategy: an issuer's capital needs and VC involvement. First, issuers have variably pressing needs for capital depending on the anticipated availability of positive net present value projects (e.g., capital expenditures, research and development, marketing, other expansion opportunities, and sometimes debt repayments).[89] For some firms, delaying an IPO can result in substantial opportunity costs, and thus undermines net firm valuations.[90] Data on the distribution of firms along this dimension are decidedly mixed. Some studies suggest that most IPO firms do not have urgent funding needs.[91] Others argue that capital raised by going public is often critical to the firm's survival, citing the typical high-growth start-up that attracts venture funding.[92]

Second, the presence of VC investors can also alter a firm's IPO timing decisions. For issuers with no VC backing and soft immediate capital requirements, there is a real option to stay private indefinitely.[93] By contrast—as described in Section II.A—VCs have strong

85. In VC-backed firms, there are potential divergences between founders' evaluation of costs and benefits and the VC's own calculus. Schwienbacher surveys these potential agency conflicts in greater detail. *See* Schwienbacher, *supra* note 46, at 399–401 (discussing various conflicts between entrepreneurs and investors).

86. *See* Michael Klausner, *Institutional Shareholders, Private Equity, and Antitakeover Protection At the IPO Stage*, 152 U. PA. L. REV. 755, 769 (2003) ("Pre-IPO shareholders' incentive, therefore, is to maximize share value . . . . Managers of [VCs] are sophisticated businesspeople who, one would expect, seek to maximize the value of their investments in portfolio companies.").

87. *See* Gonul Colak & Hikmet Gunay, *Strategic Waiting in the IPO Markets*, 17 J. CORP. FIN. 555, 555 n.2 (2011) ("[T]here is enough evidence to suggest that the private firms believe their IPO's success to be dependent not only on their own quality, but also on the aggregate state of the economy.").

88. *See id.* at 556–57 (arguing that successful IPO observation draws other firms to enter the market en mass); Hugh M.J. Colaco et al., *IPOs, Clustering, Indirect Learning and Filing Independently*, 33 J. BANKING & FIN. 2070, 2070 (2009) (showing IPO "clusters" from cash flows, prior underpricing, and industry characteristics); Alti, *supra* note 72, at 1105 (exploring potential causes of hot and cold markets); Ľuboś Pástor & Pietro Veronesi, *Rational IPO Waves*, 60 J. FIN. 1713, 1713 (2005) (arguing fluctuation in IPO volume comes from changes in stock pricing); Hoffmann-Burchardi, *supra* note 71, at 354.

89. Alti, *supra* note 72, at 1107 (modeling IPO decisions based, in part, on endogenously determined project discovery probabilities); *see generally* Woojin Kim & Michael S. Weisbach, *Motivations for Public Equity Offerings: An International Perspective*, 87 J. FIN. ECON. 281 (2008) (finding a correlation between public offerings and the firm's need for capital).

90. *See* Colaco et al., *supra* note 88, at 2072 ("[W]hen a firm has greater capital requirements, it may choose to file for an IPO even when indirect learning from other IPOs is limited or non-existent.").

91. *See* Alti, *supra* note 72, at 1106 (arguing that IPO market valuations, not immediate financing needs, drives firms' decisions to go public); Pagano et al., *supra* note 12, at 28–29 (studying the Italian IPO market).

92. *See* Schwienbacher, *supra* note 46, at 395 ("[S]tart-ups, as high-growth firms, do not simply time their IPO for hot issue markets . . . going public is vital for their survival, since they typically need substantial funds to stay in business."); *see also* Pástor & Veronesi, *supra* note 88, at 1745 (summarizing the literature and concluding that "[t]he IPO decision is often delinked from the investment decision . . . but the link is essential to obtaining the relation between IPO volume and market conditions documented in this paper").

93. *See* Schwienbacher, *supra* note 46, at 395 ("For a non-venture-backed company with access to alternative financial resources, keeping the status quo (i.e., remaining private) is always an option; but for a

incentives to exit their portfolio companies on a schedule set by the term of their limited partnership agreements and sufficient control rights to direct the firm's exit strategy.[94] Thus, VC-backed firms might conduct an "early" IPO to secure a timely return on investment for the VC's own investors.[95]

Beyond these threshold factors, the current literature posits three major determinants of IPO cycles: changing business conditions, investor sentiment, and asymmetry of information between insiders and public investors. These hypotheses are not mutually exclusive, though their respective impact on the IPO market is debated.[96] The business conditions hypothesis asserts that the frequency of IPOs depends on current economic conditions.[97] More precisely, this strand of the literature argues that IPO volume is positively correlated with several measures of business activity such as the cost of capital, expected profitability, and changes in uncertainty about the profitability of IPO firms as compared with the market.[98] In this model, private firms face tradeoffs between current net value positive projects requiring a capital influx from an IPO and the time value associated with the real option to go public in the future.[99] Improvements in market conditions urge firms towards IPOs for two reasons: the value of the option to wait is reduced, as market conditions are typically mean-reverting, and the opportunity costs of delaying the IPO are increased.[100] In support of this hypothesis, several studies document a correlation between IPO volume and the current state of the economy.[101]

The investor sentiment hypothesis suggests that during certain periods public investors are irrationally optimistic about stock valuations.[102] This optimism leads to high demand for new security issues, which in turn reduces the marginal cost of capital for issuers.[103] Reduced cost of capital makes a wider range of projects attractive at the margin,

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venture-backed firm, the fact that the VC wants to exit rules out the option of a status quo.").

94. Black & Gilson, *supra* note 22, at 256 ("[V]enture capital funds have strong incentives to exit from their investments, when feasible, well before the end of the partnership period. A fund's performance record, based on completed investments, is the fund's principal tool for soliciting capital providers to invest additional funds in new limited partnerships.").

95. *See* Schwienbacher, *supra* note 46, at 395 ("[T]he decision to go public is not simply a way to adjust the firm's capital structure (i.e., debt/equity ratio), but is primarily driven by the need to raise more funds and to allow the VC to divest. Stock market conditions are therefore even more crucial for start-ups as their flexibility in timing their IPO is limited."). To put these decision criteria in perspective, venture-backed firms account for a supermajority of all IPOs. Kaplan and Lerner estimate, conservatively, that more than 60% of IPOs had VC backing from 1999 through 2009. Stephen N. Kaplan & Josh Lerner, *It Ain't Broke: The Past, Present, and Future of Venture Capital*, 22 J. APPLIED CORP. FIN. 36, 37 (2010). They note, however, that their methodology likely underestimates the true number of venture-funded IPOs. *Id.* at 37 n.7. Other studies report substantially higher percentages. For example, a detailed study of the 2004 cohort of IPOs found that 83% were VC-funded. Steven N. Kaplan et al., *Should Investors Bet on the Jockey or the Horse? Evidence from the Evolution of Firms from Early Business Plans to Public Companies*, 64 J. FIN. 75, 108 (2009). Note, however, that the Kaplan sample excludes, inter alia, financial firms (such as Real Estate Investment Trusts and closed-end funds), firms already listed on foreign exchanges, holdings companies, and spinoffs of existing companies. *Id.*

96. Ivanov & Lewis, *supra* note 12, at 568.

97. *Id.* at 567; Păstor & Veronesi, *supra* note 88, at 1714; Colak & Gunay, *supra* note 87, at 555.

98. Ivanov & Lewis, *supra* note 12, at 569.

99. *Id.* at 568.

100. Păstor & Veronesi, *supra* note 88, at 1725.

101. *See* Colak & Gunay, *supra* note 87, at 555 n.2 (collecting sources).

102. Pagano et al., *supra* note 12; Tim Loughran & Jay R. Ritter, *The New Issues Puzzle*, 50 J. FIN. 23 (1995) (noting that companies who go public tend to underperform their private counterparts in subsequent years).

103. Ivanov & Lewis, *supra* note 12, at 568.

and thus entices a wider range of private firms to conduct an IPO.[104] At the extreme, some "truly bad" firms (i.e., those with negative net present values) may go public opportunistically.[105] Proponents of this hypothesis point to the fact that, on average, IPO firms systematically underperform both similarly situated non-issuing firms and the market more generally.[106]

The asymmetric information hypothesis claims that the IPO market suffers from an adverse selection problem.[107] When information is asymmetrically held by issuers' insiders and public investors, the latter will demand price discounts, which in turn raises the cost of capital.[108] Some commentators suggest that this accounts for the "cold" periods observed in the IPO market cycle.[109] For example, Alti argues that this cyclical clustering is a function of the endogeneity of information spillovers.[110] When investors are asymmetrically informed about valuation information that applies across several firms, the outcome of an IPO makes public information that was previously private.[111] A high offer price realization reveals good news about these valuation fundamentals, which triggers a larger number of IPOs.[112] Other commentators argue that information asymmetries are more pronounced during "hot" markets. For example, according to a study by Yung, Colak, and Wang, waves of IPOs are caused by exogenous positive information or technological shocks that increase the expected value of private firms' potential projects.[113] During these "hot" periods, a greater number of seemingly—but not actually—identical firms go public.[114] Thus, the variance of unobservable qualities during these periods is substantially higher.[115]

Based on these three interrelated hypotheses, several studies model firms' optimal strategic options and make predictions about several aspects of the IPO cycle, such as average firm quality and issue pricing. Hoffman-Burchardi's model assumes that exogenous factors drive the order in which firms go public.[116] Several other models predict that the order of new issues is endogenously determined based on firm quality. In Alti's model, IPO waves are begun by a set of "pioneers" from firms with the highest project discovery probabilities, i.e., by implication, those with the highest expected quality.[117] By contrast, Colak and Gunay develop a game-theoretic model in which private firms obtain

104. *Id.*

105. Colak & Gunay, *supra* note 87, at 557.

106. Loughran & Ritter, *supra* note 102, at 32 (finding that IPO firms underperformed matched non-issuers by 7% per year from 1970–1990); COFFEE & SALE, *supra* note 57, at 91 (finding that IPOs tend to systematically underperform the market during both one- and three-year periods after the offering); Hoffmann-Burchardi, *supra* note 71, at 353 (noting that the underperformance of IPOs is well-documented).

107. Ivanov & Lewis, *supra* note 12, at 568; Hoffmann-Burchardi, *supra* note 71, at 355–57; Alti, *supra* note 72, at 1106–10; Chris Yung et al., *Cycles in the IPO Market*, 89 J. FIN. ECON. 192 (2008).

108. Ivanov & Lewis, *supra* note 12, at 568.

109. *See, e.g.*, Alti, *supra* note 72, at 1106–10; Hyuk Choe et al., *Common Stock Offering Across the Business Cycle: Theory and Evidence*, 1 J. EMPIRICAL FIN. 3 (1993); Robert A. Korajczyck, *Equity Issues With Time-Varying Asymmetric Information*, 27 J. FIN. & QUANT. ANALYSIS 397 (1992).

110. Alti, *supra* note 72, at 1106–10.

111. *Id.* at 1106.

112. *Id.*

113. Yung et al., *supra* note 107, at 193.

114. *Id.*

115. *Id.*

116. Hoffmann-Burchardi, *supra* note 71, at 357.

117. Alti, *supra* note 72, at 1107.

new information about aggregate economic conditions by strategically waiting to observe the results of other firms' IPOs.[118] Specifically, on average, high-quality firms will wait for lower-quality firms to conduct their IPOs in order to obtain valuable and costly information about the market.[119]

Missing from these hypotheses is any account of the impact of political uncertainty. This omission is important because, unlike the three determinants presently identified in the literature, political uncertainty modifies the incentives of both buyers and sellers in the market for IPOs. The following Part explains our model of that market under conditions of political uncertainty.[120]

III. MODELING THE MARKET FOR IPOS UNDER POLITICAL UNCERTAINTY

Economic models are simplified representations of reality.[121] The descriptive value of a model depends on whether the predictions of the model are consistent with empirical observations. Our model is premised on two observations. First, IPOs involve the division of a surplus between buyers and sellers in that market. Second, political uncertainty alters the incentives of both sides of the market. From these observations, we generate predictions about IPO frequency, quality, and pricing. We first describe the channels by which political events can cause economically relevant uncertainty. We then explain our benchmark model, which predicts that political uncertainty has a dampening effect on IPO frequency, but that the average quality of IPOs increases with political uncertainty. Finally, we make conjectures based on our model regarding the likely effect of political uncertainty on offering prices and underpricing. We find that both should decrease as political uncertainty rises. As demonstrated in Part IV, our predictions are consistent with available empirical evidence.

A. Political Uncertainty and Financial Markets

Governmental action—in the form of legislation, regulation, and enforcement policies—affects financial markets.[122] Individual firms, for example, are affected by tax policy, subsidies, various regulatory compliance regimes (such as consumer protection laws, labor and employment laws, environmental regulation, securities regulation, etc.), and prohibitions on anti-competitive behavior.[123] These rules of the game are not, however, static. There is a persistent, albeit variable, background level of political uncertainty because governments regularly change these rules.[124] The literature separates

118. Colak & Gunay, *supra* note 87, at 556.

119. *Id.* at 557. More precisely, Colak and Gunay's model yields two Perfect Bayesian Nash equilibria. They assert that the probabilistic equilibrium described in the text is the more common. The other possibility is a pure strategy separating equilibrium in which the low-quality firm always issues first. *Id.*

120. We describe our model intuitively in Part III. We relegate its more precise mathematical explication to the Appendix in Part VI.

121. *See* Daniel Klein & Pedro Romero, *Model Building versus Theorizing: The Paucity of Theory in the Journal of Economic Theory*, 4 ECON. J. WATCH 241, 243–44 (2007) (explaining the function and definition of models).

122. *See, e.g.*, authorities cited *supra* note 2 (detailing the effects political uncertainty can have on financial markets).

123. Ľuboś Păstor & Pietro Veronesi, *Uncertainty About Government Policy and Stock Prices*, 67 J. FIN. 1219, 1219 (2012).

124. *Id.*

this uncertainty into two categories. First, there is pure political uncertainty—uncertainty over if and when changes to the rules of the game will occur.[125] Second, there is impact uncertainty—uncertainty over the effects of the new governmental policy.[126] Political uncertainty, in our model, combines both categories of potential variance.[127]

Changes to the rules of the game are not purely exogenous events; they are determined by, among other things, the very economic forces and conditions that they are intended to regulate.[128] Modeling governmental actors' decision-making processes, Pástor and Veronesi argue that policy changes targeting financial markets and/or business activity are more likely during economic downturns.[129] Thus, the impact of political uncertainty is greater during periods of weak economic conditions.[130] But political uncertainty is not purely endogenous to economic conditions.[131] Exogenous inflection points of political uncertainty include elections, popular referenda, and the like.[132] These events create regular cycles of political uncertainty, the magnitude of which varies depending on predictability of outcome, the divergence in candidates' regulatory ideology, the transparency of candidates' political platforms, and other similar factors.[133]

From these theoretical observations, several commentators argue that political uncertainty increases the equity risk premium; investors' discount rates vary with political uncertainty, and thus heightened political uncertainty increases firms' cost of capital.[134] None of these studies, however, examine firms' financing decisions explicitly. Because of the exogeneity described above, we expect that political uncertainty should have an impact independent of underlying business conditions. In the following Section, we build on these general insights to develop a model of the impact of political uncertainty on the market for IPOs.

B. Benchmark Model: An Investigation of Equilibrium Frequency and Quality of IPOs

The degree of uncertainty regarding important future events affects behavior in the present in many markets. Political uncertainty is a species of uncertainty that has several important characteristics. First, it is likely to have an impact on the behavior of many economic actors who are under the jurisdiction of the political entity causing the

125. *Id.* at 1220.

126. *Id.* These categories can be treated collectively so long as the effect is symmetric.

127. The first type of political uncertainty can be conceived as generating variance around the future value of the firm, e.g., the firm's value may drop down to (1-v)X or go up to (1+v)X where X is the current value of the firm. Impact uncertainty can then be conceived as increases and reductions in v. In the model described in Part III and formalized in Part VI, we incorporate both types of uncertainty by considering mean-preserving spreads, i.e., changes in the probability distribution that keep the mean of the distribution constant while altering its variance.

128. *Id.* at 1219; Păstor & Veronesi, *supra* note 2, at 521.

129. Păstor & Veronesi, *supra* note 2, at 521; Păstor & Veronesi, *supra* note 123, at 1220.

130. Păstor & Veronesi, *supra* note 2, at 522.

131. *See id.* at 521 ("Interestingly, political shocks command a risk premium despite being unrelated to economic shocks.").

132. Colak et al., *supra* note 8, at 1–2.

133. *Id.* at 15–16.

134. Păstor & Veronesi, *supra* note 2, at 521–22; Colak et al., *supra* note 8, at 21–25.

uncertainty.[135] Second, unlike uncertainty caused by pure informational asymmetry,[136] it can generate an equal amount of uncertainty for both buyers and sellers in economic transactions.

IPOs involve several parties whose incentives are not completely aligned.[137] In its simplest form, though, an IPO is no different than a sale of assets from a group of sellers (the issuer's pre-IPO shareholders) to a group of buyers (the investing public). Viewed in this perspective, transactional economics teaches that a sale will take place if and only if it generates a surplus.[138] In this Section, we consider a benchmark model that focuses on buyers and sellers engaging in negotiations that are intended to reveal whether an IPO is likely to generate a surplus.

Our model considers two potential investment climates: one with high political uncertainty and the other with low political uncertainty. Periods with high political uncertainty involve substantial unpredictability regarding future policies, some of which may have a direct impact on the operations of the firm. Thus, the degree of political uncertainty naturally affects firms' propensities to launch IPOs as well as the public investors' willingness to invest in IPOs. The interactions between these two effects are what drive the changes in the equilibrium frequency, quality, and price of IPOs.

As described in Section II.B, an IPO is both costly and risky for the issuer. The alternative, remaining private, is functionally equivalent to operating the corporation in its current state. The latter option is thus less risky, although it may generate lower expected returns. Therefore, given any degree of risk aversion, *ceteris paribus*, the greater the risk involved, the more a firm will be inclined to choose the latter option.[139] A corollary of this observation is that potential issuers require greater expected returns from launching an IPO during times of high political uncertainty to compensate for the increased risk. The expected return from launching an IPO is, all else equal, increasing in the offering price. Therefore, the range of offer prices that will make the IPO option preferable to the status quo will be smaller in periods with high political uncertainty.

These observations are diagrammed in Figure I below. C_S represents the propensity of the firm to launch an IPO—or, more precisely, its net increase in utility from launching an IPO—under conditions of low political uncertainty as a function of the offer price and is upward sloping. An increase in political uncertainty shifts C_S downwards to C_S^h—the net increase under conditions of high political uncertainty. This increases the threshold price that the firm requires to launch an IPO from O_s to O_s^h.

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135. This aspect of political uncertainty eases empirical investigations of its effect on various financial institutions. *See, e.g.*, Colak et al., *supra* note 8 (testing the effect of political uncertainty on IPOs by focusing on gubernatorial elections).

136. *See generally* George A. Akerlof, *The Market for Lemons: Quality Uncertainty and the Market Mechanism*, 84 QUART. J. ECON. 488 (1970) (discussing how the "Market for Lemons" (used cars) is a famous example of the behavioral effects of uncertainty caused by pure informational asymmetry).

137. *See supra* Section II.B (discussing the various incentives parties have in an IPO).

138. In theory, a surplus-generating transaction may nevertheless fail to happen if the two sides have diverging expectations or if frictions due to the complex structure of IPOs cause market failures. Because the predictions of our model are entirely consistent with available empirical evidence, though, such market failures (if there are any) appear relatively unimportant.

139. More specifically, a risk-averse decision maker is willing to pay a premium to avoid risk. This premium is increasing in the amount of uncertainty. Hence, if the amount of uncertainty exceeds a threshold value, the decision maker prefers the less risky option with the lower expected return, instead of the high risk option with the higher expected return.

The buyers' willingness to purchase shares through the IPO is similarly affected by increased political uncertainty. There are less risky investment options than purchasing IPO shares. Thus, given an increase in political uncertainty, the expected return from the latter option must also be increased to induce buyers to purchase shares. This implies that the highest price buyers are willing to pay per share is reduced. This, too, is reflected in Figure I. C_D represents the willingness of the buyer—or more precisely, the net increase in utility—from purchasing shares in an IPO under low political uncertainty. An increase in political uncertainty shifts this curve to the left to C_D^h, and thus reduces the maximum price buyers are willing to pay per share from O_D to O_D^h.

Figure I: Effect of political uncertainty on net gains from IPOs as a function of share price

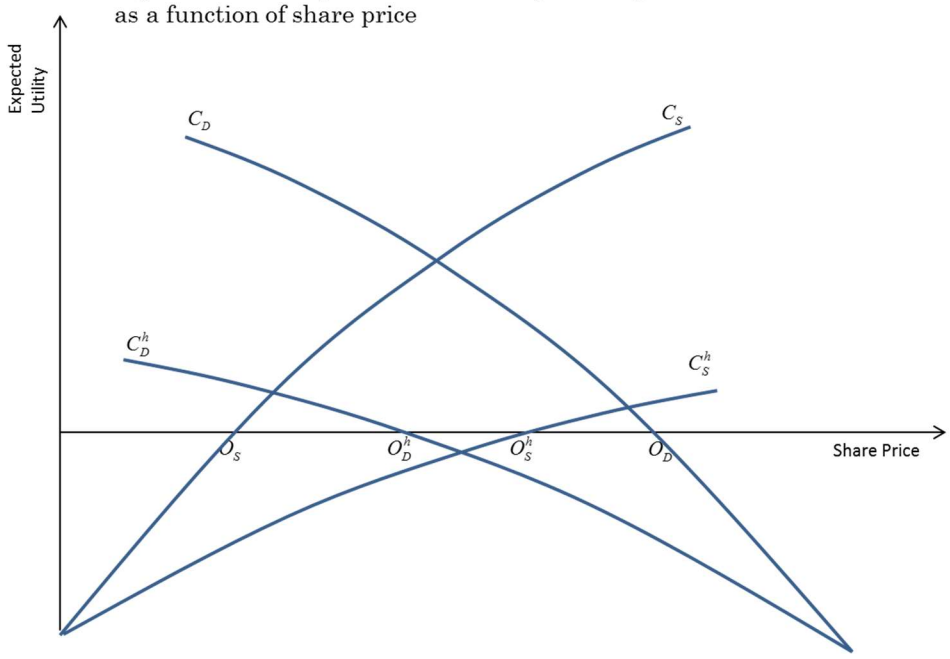


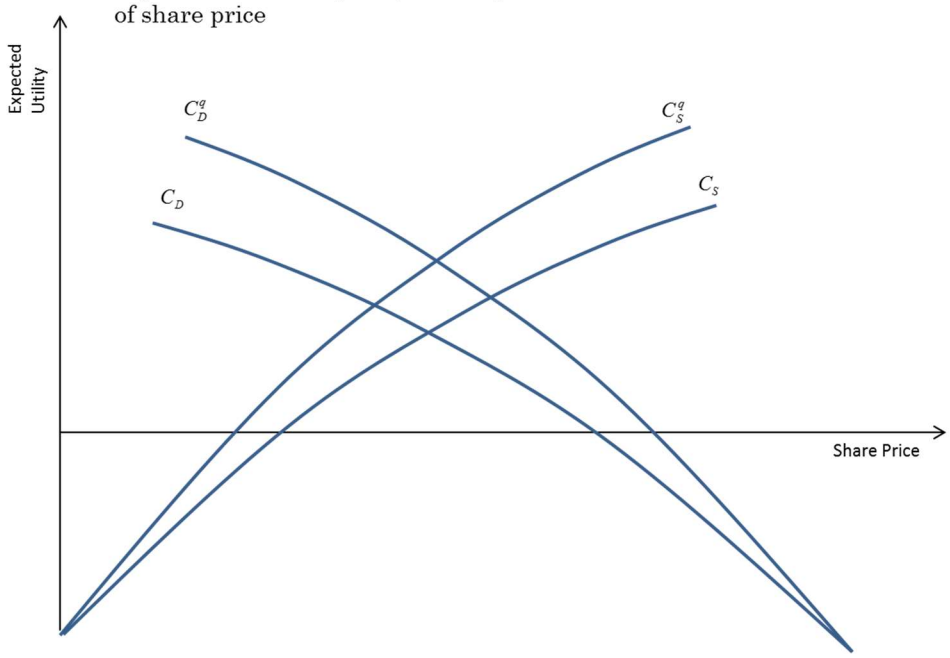
Figure I illustrates how political uncertainty can cause the surplus from an IPO to vanish. A positive surplus exists when the lowest price the seller is willing to take is smaller than the maximum price the buyer is willing to pay, i.e., when $O_s < O_D$. If, as reflected in Figure I, uncertainty increases O_s and reduces O_D significantly, the two parties may not be able to reach an agreement at any price because $O_s^h > O_D^h$.

A second, and related, consideration is the quality of the IPO firm.[140] Not all IPOs are equally successful from the perspective of investors: the capital raised through an IPO may generate more or less value for the firm, and thus more or less return for buy-and-hold purchasers of the issuer's shares. This consideration affects the total value to be gained through an IPO, which can be interpreted as the size of the surplus to be shared by the buyer and the seller as a result of the IPO. Therefore, given any share price, the greater the quality of the IPO, the greater is the expected return to the firm, as well as the expected

140. *See generally* Colak et al., *supra* note 8 (measuring the quality of IPOs and investigating the relationship between IPO quality and gubernatorial elections).

return to the buyer. This is reflected in Figure II, below, where C_D and C_S represent returns from a low quality IPO, and C_D^q and C_S^q represent returns from a high quality IPO.

Figure II: Effect of quality on net gains from IPOs as a function of share price



Given these observations, we can make predictions concerning the expected frequency and quality of IPOs under political uncertainty.

Propositions I & II: (I) IPO frequency is inversely related to the level of political uncertainty; and (II) average IPO quality is higher in periods of heightened political uncertainty.

Proposition I describes a result that is relatively intuitive: political uncertainty reduces the number of IPOs. As is well known, most people act in a risk-averse manner when making investments. Therefore, political uncertainty has the effect of reducing the perceived surplus to the relevant parties. A natural result is a reduction of IPOs. This result is also conveyed through Figure I, which shows that some IPOs which would generate positive surplus given low political uncertainty do not occur during periods of higher political uncertainty because the buyer becomes willing to pay less than what the seller would be willing to accept (i.e., $O_S^h > O_D^h$).

Proposition II, on the other hand, is less intuitive. Political uncertainty reduces the surplus obtainable through IPOs as reflected in Figure II. One implication is that low quality IPOs that would generate a small but positive surplus in times of low political uncertainty are no longer desirable investments during periods of increased political uncertainty because that surplus disappears. Hence, increasing political uncertainty has the effect of deterring low quality IPOs at the margin. This, in turn, increases the average quality of IPOs.

Thus far, we have focused only on the existence of a surplus in IPO transactions. If a potential surplus exists, buyers and sellers have an incentive to commence the IPO and share the surplus produced. Assuming rational actors, the size of the surplus and the share

of that surplus allocated to the parties is irrelevant for purposes of determining IPO frequency and quality. However, these pricing effects are of substantial practical importance to the participants in the market for IPOs. In the following Section, we consider these questions by introducing the underwriters' incentives.

C. Price Effects: Offering Prices and Underpricing

First, we use our model to explore the likely effects of political uncertainty on equilibrium offering prices. Before proceeding, it is useful to note that in Section III.B we derived all results by focusing on a very simple observation: political uncertainty reduces the surplus available to be split between the buyer and the seller. This observation, on its own, does not allow us to provide insights regarding price effects; absent further assumptions, the effect of political uncertainty on offer prices is ambiguous.

To demonstrate this ambiguity, we briefly consider various ways in which surplus can be split by the buyer and the seller. First, consider a surplus-splitting rule that allocates all but a negligible fraction to the buyer. The price that corresponds to this rule is O_S in Figure I, otherwise, the seller is making a positive return, which implies that he is getting a share of the surplus generated by the IPO.

Next, consider an increase in political uncertainty. As explained in Section III.B, such increases are reflected by downward shifts in C_S and C_D. When C_S shifts downwards, its intersection with the horizontal axis moves towards the right, which corresponds to an increase in the offer price. This is reflected in Figure I as a move from O_S to O_S^h. Hence, an increase in political uncertainty causes an increase in the offer price if the buyer captures the entire surplus. The intuition behind these geometric observations is that when the buyer captures the entire surplus, any reduction in that surplus must be accounted for in the form of higher prices.

Finally, consider the opposite surplus-splitting rule where the seller captures the entire benefit from the IPO. In this case, we observe the opposite effect, namely a reduction in the offer price for similar (albeit reversed) reasons described in the previous paragraph.

These two extreme surplus-splitting rules demonstrate that the impact of political uncertainty on offer prices is, a priori, ambiguous. In reality, though, neither party is expected to acquire the entirety of the surplus. Therefore, the way the buyer and seller split the surplus may depend on the degree of political uncertainty. To form hypotheses regarding the likely effect of political uncertainty on the share of the surplus captured by the buyer, we introduce the incentives of underwriters and the initial buyers of IPO shares.

Recall the initial buyers ordinarily purchase directly from underwriters at the offering price, and then have the option to sell those shares on the secondary market when the issuer's stock begins trading. Hence, underpricing—the difference between the offering price and the first day trading price—is a proxy (albeit imperfect) for the buyers' surplus. Therefore, the offering price determined by underwriters plays a crucial role in the determination of how surplus is split in an IPO.

As described in Section II.B, underwriters typically purchase securities directly from the issuer, and then sell those shares to the initial investors. Thus, underwriters bear the risk that they will not be able to find a sufficient number of investors to purchase those shares at the offering price. Hence, one can theoretically conceive of the underwriters' price choice as a private utility maximization problem under uncertainty. The benefit to the underwriter from increasing the offering price is relatively unsophisticated: an increased per-share profit from IPOs, conditional on the IPO being fully subscribed. The cost from increasing the offering price, on the other hand, is a reduction in the probability that the

IPO is successfully executed. This latter effect is more complicated and requires further explanation.

Underwriters never have complete information regarding public investors' reservation prices. Although they may have good guesses about what investors are willing to pay per IPO share, those guesses are seldom completely accurate. If an underwriter misjudges investors' reservation prices on the high side, it will not be able to sell the IPO shares to the investors as planned and will have to bear the costs associated with this failure. Thus, from the underwriters' perspective, increasing the offering price corresponds to a higher probability of being unable to close the IPO deal as planned, and therefore, an increase in expected costs.

Underwriters therefore seek to achieve an optimal balance between two objectives when negotiating the offering price: (i) increasing the per-share profit from completing an IPO transaction, and (ii) reducing the probability of transaction failure. The most important question for our current purposes is how the trade-off between these two objectives is affected by an increase in political uncertainty. The benefits captured in (i) are unaffected by uncertainty: the percentage of the share-price received by the underwriters given a successful IPO is constant. The costs reflected in (ii), on the other hand, depend on the magnitude of political uncertainty. Underwriters have incomplete information regarding investors' reservation prices partly because they lack knowledge concerning investors' precise risk attitudes. While underwriters may know that investors are risk-averse, they may not know their *degree* of risk-aversion. If an underwriter underestimates investors' degree of risk-aversion, it may fix the offering price at a level above the investors' reservation price. This type of erroneous guess is more likely in times of greater political uncertainty, because reservation prices are more responsive to the investors' degree of risk-aversion in such times. Investors' reservation prices are completely inelastic to their degree of risk-aversion in a deterministic setting, because there is no risk. On the other hand, in periods of heightened uncertainty, there is variation between what investors are willing to pay for an investment caused by the variation in their risk attitudes. Thus, there is more variation in investors' tendencies to invest in times of high political uncertainty.

The preceding discussion highlights that political uncertainty generates unpredictability for underwriters vis-à-vis investors' reservation prices. This implies that the relative costs associated with overpricing are greater in times of high uncertainty. Alternatively stated, political uncertainty increases the relative importance of (ii) in comparison to (i). Hence, it is rational for an underwriter to negotiate for lower offering prices in times of high political uncertainty.

Political uncertainty is also likely to impact underpricing. As explained in Section III.B, buyers' tendency to purchase IPO shares respond negatively to uncertainty, i.e., the maximum price it is willing to pay drops from O_D to O_D^h in Figure I. This implies that the ultimate first-day trading price is reduced, since the buyers' reservation price is a proxy for what investors are willing to pay per IPO share on the first trading day. However, the first day return is not equivalent to the first-day trading price. It is the return that an investor collects by purchasing shares prior to the first day of trading and selling them on the first trading day. Hence, the return corresponds to the ratio between the first-day trading price and the offer price minus one.

This analysis indicates that both the first-day trading price and the offer price are reduced in response to political uncertainty. Yet, the effect of political uncertainty on the first day return is ambiguous a priori; the magnitude of this spread depends completely on which of the two prices is reduced by a greater amount. We now explain why the first day price, on average, is likely to be reduced more than the offer price, which implies that the

first day return, i.e., the magnitude of underpricing, is smaller in times of greater political uncertainty.

The difference between the first day trading price and the seller's reservation price represent a proxy for the total amount of surplus generated by the IPO. This surplus is split among three main parties: the seller, the buyer, and the underwriters. Political uncertainty reduces the amount of surplus available. This reduction is recovered from the shares available to all three parties. For the offer price to face a reduction that more than offsets the reduction in the average first day price, the seller's surplus must face a reduction that is greater than the reduction in total surplus. This is unlikely, because underwriters (who face the incentives described in Section II.B and herein) have an interest in passing only part of the losses in surplus to the seller. Otherwise, their per-share earnings are reduced by more than what is justified due to increased risks associated with a failed IPO. In other words, political uncertainty is unlikely to cause a reduction in the offering price that offsets entirely the average drop in the first day trading price because the underwriters' incentives make it desirable for them to set prices that split the reduction in the total surplus across all three parties. Hence, our conjecture is that underpricing is likely less pronounced as political uncertainty increases.

IV. EVALUATING THE MODEL: EMPIRICAL EVIDENCE

This Part maps the predictions generated by our model onto the currently available empirical evidence. As illustrated below, this evidence is entirely consistent with the theory and model set forth in Parts III and VI respectively.

A. Frequency Effects

Our model makes two related predictions concerning IPO frequency: (i) that the frequency of IPOs is inversely correlated with political uncertainty, and (ii) that this frequency-effect persists independently of other factors (such as business conditions) that might affect IPO decision-making. Our model is consistent with available empirical evidence. In a recent working paper, Colak, Durnev, and Qian investigate the impact of gubernatorial elections on in-state IPOs.[141] Gubernatorial elections provide a natural experiment with respect to political uncertainty. As regularly scheduled events—virtually all states employ a four year election cycle—gubernatorial elections are exogenous shocks that create predictable cycles of increasing and decreasing political uncertainty.[142] Political uncertainty peaks during the election year, especially for "close" races, and declines in the post-election period as government policies crystallize.[143] In addition to this time-series variation, gubernatorial elections create cross-sectional (i.e., state-to-state) variation in ways that presidential elections or other nation-wide drivers of political uncertainty do not.[144] These cross-sectional variations allow comparisons of neighboring state IPO activity to isolate the effects of political uncertainty from those of baseline macroeconomic conditions.[145]

141. Colak et al., *supra* note 8, at 1–2. To the best of our knowledge, this as-yet-published study is the only empirical evaluation of political uncertainty on the IPO process.

142. *Id.* at 2.

143. *Id.* at 7–8.

144. *Id.* at 2.

145. *Id.*

Based on data from 1988–2011 (a sample of 317 gubernatorial elections), Colak, Durnev, and Qian document a "strong and robust" relationship between these election cycles and IPO activity.[146] Their findings fully support our model of the effects of political uncertainty. First, IPO activity is systematically lowest during election years (T = 0), picks up substantially in the two years after the election (T = 1 and 2), peaks in the second year post-election (T = 2), and then declines in the year prior to the subsequent election (T = -1).[147] On average, across the entire sample, there are 16% fewer election-year IPOs than during T = -1.[148] Similarly, there are 24% more IPOs in T = 1 than during election years.[149] T = 2 features the highest level of IPO activity—45% higher than during election years.[150] These variations are all statistically significant.[151] Further, cross-sectional analysis reveals that fluctuations in IPO activity are even more pronounced in the ten states with the highest number of IPOs during the sample period (CA, TX, NY, MA, FL, IL, NJ, PA, GA, and MN).[152]

Second, the Colak, Durney and Qian study presents data consistent with our prediction that political uncertainty acts independently of other economic factors. The variations in IPO activity persist even after controlling for state and nationwide economic conditions.[153] Similarly, the cycles are robust to regional economic conditions or localized exogenous shocks, as demonstrated by comparing election-year states to their off-election-year neighboring states.[154] Further, these cycles also persist after controlling for the existence of an otherwise "hot" IPO market.[155] That is, political uncertainty dampens even "hot" IPO markets. Ultimately, based on these data, Colak, Durnev, and Qian conclude that "[gubernatorial] elections seem to induce their own IPO cycles."[156]

Finally, a more granular cross-sectional examination of the data demonstrates that IPO activity is sensitive to varying levels of political uncertainty. Not all elections cause the same levels of political uncertainty. Our model predicts that the more uncertain an election, the greater the impact on IPO activity. Colak, Durnev, and Qian demonstrate that "high uncertainty" elections (i.e., elections with very narrow margins of victory, special off-cycle elections, elections that involve a governor change, and elections lacking an incumbent) have a stronger impact on IPO frequency than "low uncertainty" elections.[157] Our model also predicts that issuers might have varying sensitivity to political uncertainty. Here, too, the data supports our predictions: the dampening effects of political uncertainty are stronger for geographically concentrated firms and firms in industries that rely heavily on government (especially state) contracts.[158]

146. Colak et al., *supra* note 8, at 2.
147. *Id.*
148. *Id.* at 8.
149. *Id.*
150. *Id.*
151. Colak et al., *supra* note 8, at 37.
152. *Id.* at 2.
153. *Id.* at 8–10.
154. *Id.* at 10–13.
155. *Id.* at 9.
156. Colak et al., *supra* note 8, at 2.
157. *Id.* at 15–17.
158. *Id.* at 3.

B. Firm Quality Effects

Our model predicts that while the frequency of IPOs decreases during periods of political uncertainty, the average IPO during those periods is of higher quality. It is difficult to measure firm quality directly, but stock returns over the medium- to long-term provide a useful proxy.[159] Here, too, the Colak, Durnev, and Qian data strongly supports our model. The mean three year post-IPO buy-and-hold abnormal return[160] for firms that go public during election years (i.e., firms that conduct their IPOs during the peak of political uncertainty) is on average 2% (median = -41%).[161] By contrast, non-election year IPOs generate average abnormal returns of -23% (median = -63%) over the same period.[162] The variation between the two groups is both statistically and economically significant.[163]

C. Pricing Effects

Our model makes two predictions concerning the effect of political uncertainty on IPO prices: (i) all else equal, increased political uncertainty should reduce aggregate offering prices on average; but (ii) increased political uncertainty also reduces the level of underpricing. As to these pricing effects, there is both theoretical and empirical support for our predictions.

Our first prediction is consistent with other commentators' assertion that investors' discount rates, and thus firms' cost of capital, should correlate with political uncertainty.[164] Colak, Durnev, and Qian also present several pieces of empirical evidence supporting lower offering prices for IPOs conducted during periods of high uncertainty. First, in their sample, election year IPO firms sold, on average, a larger percentage of their firms' equity.[165] They interpret this data as suggesting that "these IPOs may receive lower prices for their securities."[166] Second, the authors match each IPO firm in their sample with a mature firm in the same industry with similar sales and EBITDA profit margins.[167] They then calculate price-to-value ratios based on sales, EBITDA, and earnings.[168] From these comparisons, they conclude that "controlling for firm characteristics, the offer price is set lower during election year[s]."[169] Finally, Colak, Durnev, and Qian note that IPO price revisions (defined as the final offering price relative to the initial range identified in the issuer's preliminary filing documents) differ substantially between the firms in their

159. *See, e.g.*, Colak & Gunay, *supra* note 87, at 569 (noting that long-run return performance of the firm after issuance is a standard measure of "firm quality" in the financial literature, and employing 3- and 5-year post issuance returns as an ex post measure of quality).

160. Buy-and-hold returns refer to the returns (including dividends) that an investor would have obtained had they purchased the security and held it throughout the measurement period. Abnormal returns are the difference between the actual return of a security and the expected return predicted by a benchmark asset pricing model. *See* Kesten, *supra* note 79, at 1642–43 (discussing an example of these benchmark models, the Fama-French-Carhart four factor model); Colak & Gunay, *supra* note 87, at 569 (describing the market adjusted model).

161. Colak et al., *supra* note 8, at 25.

162. *Id.*

163. *Id.*

164. Pástor & Veronesi, *supra* note 2, at 521–22; Colak et al., *supra* note 8, at 21–25.

165. Colak et al., *supra* note 8, at 6.

166. *Id.*

167. *Id.* at 21.

168. *Id.* at 22–23.

169. *Id.* at 23.

sample.[170] Election-year IPOs tended to have their offering prices revised downwards; off-election IPOs tended to have theirs revised upwards.[171] Assuming the issuer's insiders have better information about a firm's true prospects (which they use to set the initial range for their preliminary documents), this pattern of revision suggests that investors systematically discount firms' prospects in the face of increased political uncertainty.

With respect to our second prediction, both general and specific data support our model. First, as described above, "hot" IPO markets are characterized by severe underpricing, whereas the underpricing during "cold" periods is substantially less pronounced.[172] If political uncertainty dampens IPO frequency, then we should anticipate diminished underpricing as well. Colak, Durnev, and Qian also present data that supports this prediction. In their sample, first-day returns are, on average, significantly lower for election-year IPOs than for off-election IPOs (11% vs. 23%).[173] Regressions demonstrate that these variations are both statistically and economically significant.[174]

V. CONCLUSION AND IMPLICATIONS

This Article fills a gap at the intersection of the literatures on the impact of political uncertainty on financial markets and the going public decision-making process. Building on the incentives faced by participants in the market for IPOs, we model the effects of political uncertainty on their behavior. Our model predicts that the frequency of IPOs is inversely related to the level of political uncertainty (independent of other factors), but the average quality of IPOs increases in periods of heightened uncertainty. Our model also predicts that political uncertainty decreases both offering prices and average first day trading prices for IPO stocks. Building on the insights from our model, we predict that increased political uncertainty is likely to reduce the magnitude of IPO underpricing. We demonstrate that each of these predictions is supported by available empirical evidence.

Thus, political uncertainty creates both costs and potential benefits in the market for IPOs. Heightened political uncertainty dampens the frequency of IPO activity. Accordingly, all else being equal, prolonged periods of political uncertainty could negatively impact the amount of venture capital funding available for startup companies. Moreover, political uncertainty likely increases these firms' cost of capital. However, increased political uncertainty also improves the average quality of IPO firms. Secondary market investors may benefit in the long run if political uncertainty deters the least promising private firms from going public. Finally, political uncertainty reduces underpricing. This can be interpreted as increases in firms' cost of capital being offset by the fact that less money "is left on the table" as a result of the underwriting process. These additional funds are immediately available for the firm to pursue its growth opportunities. The net impact of these effects is an, as of yet, unexplored empirical question.

VI. APPENDIX: AN ECONOMIC MODEL INVESTIGATING THE EFFECT OF POLITICAL

170. Colak et al., *supra* note 8, at 6.

171. *Id.*

172. Hoffmann-Burchardi, *supra* note 71, at 354; *see also* COFFEE & SALE, *supra* note 57, at 87 (noting characteristics of hot and cold IPO markets).

173. Colak et al., *supra* note 8, at 6.

174. *Id.* at 24.

UNCERTAINTY ON IPOS

This Part formalizes the model described in Part III, which was used to derive Propositions I and II. Consider a continuum of decision makers, who each confront an investment opportunity. Each decision maker ("*S*" after supplier) has capital of value *V* and needs an increase of *I* in capital to take advantage of the investment opportunity. If he does not make this investment, his capital grows at rate *r*, such that in the next period his assets will be worth $(1+r)V$. There is an investor ("*D*" after demander), who has the necessary capital *I*, which he can inject into *S*'s corporation. *D*'s outside option is to let his capital of *I* grow at a rate of *r*.[175]

If *D* makes the investment and *S* invests in the opportunity, then the corporation will grow at one of two rates: $qh(e)$ or $ql(e)$, where $h(e)>l(e)$ and *e* denotes a dummy variable identifying whether the period is one in which there is high political uncertainty ($e=1$) or low political uncertainty ($e=0$), and q denotes the investment's quality. We assume that $q\in[0,1]$, and f with $f(q)>0$ for all $q\in[0,1]$ represents the probability density function describing the likelihood with which *S*'s investment is of various qualities. We further assume that $l(1)>(1+r)$. The growth rate is h with a probability of p, and l with the residual probability of $(1-p)$. It is assumed that $ph(1)+(1-p)l(1)=ph(0)+(1-p)l(0)$, but that $h(1)-l(1)>h(0)-l(0)>0$ so that the effect of increased political uncertainty is to create variance over potential growth rates while preserving the mean growth rate. To make this assumption more tractable, we assume the specific form of $h(e)=h+\frac{e}{p}$ and $l(e)=l-\frac{e}{1-p}$.

Assume that both *S* and *D* are risk-averse and seek to maximize their post-investment expected utility. The investment is accomplished through an IPO. *D* provides capital of *I* to *S* and in return gets a share of $(1-\gamma)$ in *S*'s corporation, effectively making the share price $\frac{I}{1-\gamma}$. Accordingly, the expected utilities of each party, from an IPO are given by:

$$U_S = p(\gamma q h(e)(V+I))^{\alpha} + (1-p)(\gamma q l(e)(V+I))^{\alpha} \qquad (1)$$

and

$$U_D = p((1-\gamma)qh(e)(V+I))^{\beta} + (1-p)((1-\gamma)ql(e)(V+I))^{\beta} \qquad (2)$$

where U_S and U_D respectively represent *S*'s and *D*'s expected utility, and α and β are parameters reflecting the parties' respective risk-attitudes.

An IPO will be agreeable by both parties only if it generates greater expected utility to both parties than their respective outside option. The conditions for a mutually agreeable deal are therefore:

$$C_S \equiv p(\gamma q h(e)(V+I))^{\alpha} + (1-p)(\gamma q l(e)(V+I))^{\alpha} - ((1+r)V)^{\alpha} \geq 0 \qquad (3)$$

and

$$C_D \equiv p((1-\gamma)qh(e)(V+I))^{\beta} + (1-p)((1-\gamma)ql(e)(V+I))^{\beta} - ((1+r)I)^{\beta} \geq 0 \qquad (4)$$

The following lemma is useful in proving Propositions I and II described in Part III:

Lemma I: Given either $e\in\{0,1\}$, there exists a unique q^* such that there are no mutually acceptable IPO deals if and only if $q< q^*$.

Proof: The proof proceeds in four steps which respectively show the following:

175. The assumption that *S*'s and *D*'s assets grow at the same rate of $(1+r)$ if the investment does not take place is only simplifying; repeating the analysis with two separate growth rates has no meaningful effect on our analysis.

Step 1: There exists $\underline{q}\in(0,1)$ such that $q<\underline{q}$ implies that *S* and *D* cannot reach a mutually beneficial agreement, and there exists a unique $\gamma^*(q)\in(0,1)$ for all $q\geq\underline{q}$ for which $C_S(\gamma^*(q),q)= C_D(\gamma^*(q),q)$.

Step 2: $C_S(\gamma^*(q),q)$, and therefore $C_D(\gamma^*(q),q)$, is increasing in q.

Step 3: There exists $q^*\in(0,1)$ such that $C_S(\gamma^*(q),q)\geq 0$ if and only if $q\geq q^*$.

Step 4: A pair (γ,q) can make $C_S(\gamma,q)$ and $C_D(\gamma,q)$ jointly non-negative if and only if $q\geq q^*$.

Because *S* and *D* are willing to accept an IPO arrangement if and only if $C_S(\gamma,q)$ and $C_D(\gamma,q)$ are jointly non-negative, Step 4 implies that there are mutually beneficial agreements for S and D if and only if $q\geq q^*$. Accordingly, proving Steps 1–4 amounts to proving Lemma 1.

Proof of Step 1: Let $C_{i\in\{D,S\}} = C_{i\in\{D,S\}}(\gamma,q)$. Then, it follows that $C_S(0,q) = -((1+r)V)^\alpha$ and $C_D(1,q) = -((1+r)I)^\beta$ for all q.

Next, note that $C_S(1,1) = p(hV+I))^\alpha + (1-p)(l(V+I))^\alpha - ((1+r)V)^\alpha > 0$, and that C_S is increasing in q. Hence, there is a $q^{S*}\in(0,1)$, such that $C_S(1,q^{S*})=0$, which can implicitly be defined as:

$$p(q^{S*}h(V+I))^\alpha + (1-p)(q^{S*}l(V+I))^\alpha - ((1+r)V)^\alpha = 0 \qquad (5)$$

This implies that for all $q<q^{S*}$ there is no feasible IPO deal, because even if *S* issues no shares to *D* in exchange for *D*'s investment, he is still worse off compared to his outside option.

Similarly, note that $C_D(0,1) = p(h(V+I))^\beta + (1-p)(l(V+I))^\beta - ((1+r)I)^\beta > 0$, and that C_D is increasing in q. Hence, there is a $q^{D*}\in(0,1)$, such that $C_D(0,q^{D*})=0$, which can implicitly be defined as

$$p(q^{D*}h(V+I))^\beta + (1-p)(q^{D*}l(V+I))^\beta - ((1+r)I)^\beta = 0 \qquad (6)$$

This implies that for all $q<q^{D*}$ there is no feasible IPO deal, because even if *S* gives out all shares to *D* in exchange for *D*'s investment, *D* is worse off compared to his outside option of not investing.

Next, let $\underline{q}=\max\{q^{S*},q^{D*}\}$. Due to the preceding observations it follows immediately that when $q<\underline{q}$ there is no mutually beneficial IPO deal.

Finally, let $M(\gamma,q) = C_S(\gamma,q) - C_D(\gamma,q)$. For all $q\geq\underline{q}$ it follows that

(i) $M(0,q)<0$, since $C_D(0,q)\geq 0$ when $q\geq\underline{q}$, but $C_S(0,q)<0$.

(ii) $M(1,q)>0$, since $C_S(1,q)\geq 0$ when $q\geq\underline{q}$, but $C_D(1,q)<0$.

(iii) $M(\gamma,q)$ is increasing in γ.

Therefore, the intermediate value theorem implies that there is a unique $\gamma^*(q)\in(0,1)$ for all $q\geq\underline{q}$ such that $M(\gamma^*(q),q)=0$.

Proof of Step 2: Suppose $C_S(\gamma^*(q),q)$ is not increasing in quality. This implies that there is a pair q^i and q^f such that $q^i<q^f$ but $C_S(\gamma^*(q^i),q^i)\geq C_S(\gamma^*(q^f),q^f)$. WLOG assume $\gamma^*(q^f)\geq\gamma^*(q^i)$. This implies that $C_S(\gamma^*(q^f),q^i) \geq C_S(\gamma^*(q^i),q^i) \geq C_S(\gamma^*(q^f),q^f)$. This contradicts the fact that C_S is increasing in its second component. Hence, the initial supposition cannot be correct.

Proof of Step 3: $C_S(\gamma^*(1),1)>0$, and it follows from the definition of $\underline{q}$ that $C_S(\gamma^*(\underline{q}),\underline{q})<0$. Furthermore as proven in step 2 $C_S(\gamma^*(q),q)$ is increasing in quality. Hence, the intermediate value theorem implies that there exists $q^*\in(0,1)$ such that $C_S(\gamma^*(q),q)\geq 0$ if and only if $q\geq q^*$.

Proof of Step 4: $q<q^*$ implies, per step 3, that $C_S(\gamma,q)\leq C_S(\gamma^*(q),q)<0$ for all $\gamma\leq\gamma^*(q)$, and that $C_D(\gamma,q)\leq C_D(\gamma^*(q),q)=C_S(\gamma^*(q),q)<0$ for all $\gamma\geq\gamma^*(q)$. Hence, there is no $\gamma\in[0,1]$

such that $C_S(\gamma,q)\geq 0$ and $C_D(\gamma,q)\geq 0$ when $q<q^*$. But, when $q\geq q^*$, it follows immediately, per steps 1 and 3, that $C_S(\gamma^*(q),q)=C_D(\gamma^*(q),q)\geq 0$, and therefore that there are mutually beneficial IPO deals.

Proof of Propositions I and II: Let $C_{i\in\{D,S\}} = C_{i\in\{D,S\}}(\gamma, q, e)$ to capture the dependency of C_i to uncertainty. Per lemma 1, the threshold quality, q^*, is implicitly defined as $C_S(\gamma, q^*, e) = C_D(\gamma, q^*, e) = 0$, which creates a system of two equations with two unknowns and an exogenously given parameter e.

Applying Cramer's rule, we can calculate $\frac{\partial q^*}{\partial e}$, which represents the effect of increased political uncertainty on the threshold investment quality. According to Cramer's rule:

$$\frac{\partial q^*}{\partial e} = \frac{\begin{vmatrix} \frac{\partial C_S}{\partial \gamma} & -\frac{\partial C_S}{\partial e} \\ \frac{\partial C_D}{\partial \gamma} & -\frac{\partial C_D}{\partial e} \end{vmatrix}}{\begin{vmatrix} \frac{\partial C_S}{\partial \gamma} & \frac{\partial C_S}{\partial q} \\ \frac{\partial C_D}{\partial \gamma} & \frac{\partial C_D}{\partial q} \end{vmatrix}} \qquad (7)$$

Hence,

$$\frac{\partial q^*}{\partial e} = \frac{\frac{\partial C_D}{\partial \gamma}\frac{\partial C_S}{\partial e} - \frac{\partial C_S}{\partial \gamma}\frac{\partial C_D}{\partial e}}{\frac{\partial C_S}{\partial \gamma}\frac{\partial C_D}{\partial q} - \frac{\partial C_D}{\partial \gamma}\frac{\partial C_S}{\partial q}} \qquad (8)$$

and the respective sign of each term in expression (8) are given by:

$$\frac{\partial q^*}{\partial e} = \frac{(-)(-) - (+)(-)}{(+)(+) - (-)(+)}$$

Therefore, $q^*(1) > q^*(0)$. This implies that $\int_{q^*(1)}^{1} f(q)\,dq < \int_{q^*(0)}^{1} f(q)\,dq$, which simply states that the number of IPOs in high political uncertainty periods is smaller than the number of IPOs in low political uncertainty periods. Furthermore, it trivially follows that the average IPO quality is higher in high political uncertainty periods, since inferior investment opportunities of quality $q \in [q^*(0), q^*(1))$ do not generate IPOs in high political uncertainty periods but do generate IPOs in low political uncertainty periods.