

Initial Public Offerings: International Insights

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ABSTRACT OF ARTICLE

This paper discusses evidence on the short-run and long-run performance of companies going public in many countries. Differences in average initial returns are analyzed in terms of binding regulations, contractual mechanisms, and the characteristics of the firms going public. The evidence suggests that the move in recent years by most East Asian countries to reduce regulatory interference in the setting of offering prices should result in less short-run underpricing in the 1990s than in the 1980s. Evidence is presented that companies successfully time their offerings for periods when valuations are high, with investors receiving low returns in the long-run. Implications for investors, issuers, and regulators are discussed.

The following table updates Table 1 of the *Pacific-Basin Finance Journal* article, with the inclusion of data from Argentina, Austria, Bulgaria, China, Cyprus, Denmark, Egypt, Greece, India, Indonesia, Iran, Ireland, Israel, Jordan, Mauritius, Morocco, Nigeria, Norway, Pakistan, the Philippines, Poland, Russia, Saudi Arabia, South Africa, Sri Lanka, Tunisia, Turkey, the United Arab Emirates, and Vietnam, and updated information from all of the original 25 countries. For recent years, Dealogic is the source of most of the data. The numbers are updated through the end of 2022 for some of the 55 countries.

A version of this table with 38 countries was published as “Differences between European and American IPO Markets” by Jay R. Ritter in *European Financial Management* Vol. 9, No. 4 (December 2003), pp. 421-434.

Year-by-year PowerPoint figures for some of these countries can be found elsewhere on Jay Ritter’s IPO Data website page.

Table 1**Equally weighted average initial returns for 55 countries**

Country	Source	Sample Size	Time Period	Avg. Initial Return
Argentina	Eijgenhuijsen & van der Valk; Dealogic	30	1991-2018	5.7%
Australia	Lee, Taylor & Walter; Woo; Pham; Dealogic	2,503	1976-2023	20.2%
Austria	Aussenegg; Dealogic	106	1971-2018	6.2%
Belgium	Rogiers, Manigart & Ooghe; Manigart DuMortier; Dealogic	154	1984-2017	11.0%
Brazil	Aggarwal, Leal & Hernandez; Saito; Ushisima; Dealogic	385	1979-2023	24.8%
Bulgaria	Nikolov	9	2004-2007	36.5%
Canada	Jog & Riding; Jog & Srivastava; Kryzanowski, Lazrak & Rakita; Dealogic	814	1971-2023	6.8%
Chile	Aggarwal, Leal & Hernandez; Celis & Maturana; Dealogic	88	1982-2019	6.8%
China	Chen, Choi, & Jiang; Jia, Xie, Zhang, & Ritter; Qian; Jin; Dealogic; Jia	5,219	1990-2023	155.7%
Cyprus	Gounopoulos, Nounis, and Stylianides; Chandriotis	73	1997-2012	20.3%
Denmark	Jakobsen & Sorensen; Dealogic	190	1984-2021	7.6%
Egypt	Omran; Hearn	74	1990-2017	9.4%
Finland	Keloharju; Dealogic	244	1971-2021	14.5%
France	Husson & Jacquillat; Leleux & Muzyka; Paliard & Belletante; Derrien & Womack; Chahine; Ritter; Vismara; Dealogic	923	1983-2023	9.3%
Germany	Ljungqvist; Rocholl; Vismara; Dealogic	840	1978-2020	21.8%
Greece	Nounis, Kazantzis & Thomas; Thomadakis, Gounopoulos & Nounis	373	1976-2013	50.8%
Hong Kong	McGuinness; Zhao & Wu; Ljungqvist & Yu; Fung, Gul, and Radhakrishnan; Dealogic	2,301	1980-2021	40.5%
India	Marisetty and Subrahmanyam; Dealogic; Seth using Chittorgarh.com; More	3,364	1990-2023	81.1%
Indonesia	Suherman; Dealogic	889	1990-2023	52.2%
Iran	Bagherzadeh; Pelarti & Jafari	517	1991-2022	37.0%
Ireland	Dealogic	50	1991-2023	18.1%
Israel	Kandel, Sarig & Wohl; Amihud & Hauser; Ritter	348	1990-2006	13.8%
Italy	Arosio, Giudici & Paleari; Cassia, Paleari & Redondi; Vismara; Dealogic	413	1985-2018	13.1%
Japan	Fukuda; Dawson & Hiraki; Hebner & Hiraki; Pettway & Kaneko; Hamao, Packer, & Ritter; Kaneko & Pettway; Kaneko	4,161	1970-2023	49.3%
Jordan	Al-Ali and Braik	53	1999-2008	149.0%

Country	Source	Sample Size	Time Period	Avg. Initial Return
Malaysia	Isa; Isa & Yong; Yong; Ma; Dealogic	661	1980-2023	49.8%
Mauritius	Bundoo	40	1989-2005	15.2%
Mexico	Aggarwal, Leal & Hernandez; Eijgenhuijsen & van der Valk; Villarreal	149	1987-2017	9.9%
Morocco	Alami Talbi; Hearn; Tizniti	45	2000-2023	25.8%
Netherlands	Wessels; Eijgenhuijsen & Buijs; Jenkinson, Ljungqvist, & Wilhelm; Dealogic	245	1983-2021	12.0%
New Zealand	Vos & Cheung; Camp & Munro; Alqahtani; Dealogic	277	1979-2022	15.5%
Nigeria	Ikoku; Achua; Dealogic	125	1989-2017	12.8%
Norway	Emilsen, Pedersen & Sættem; Liden; Dealogic; Fjesme	391	1984-2023	11.3%
Pakistan	Mumtaz	80	2000-2013	22.1%
Philippines	Sullivan & Unite; Dealogic	189	1987-2022	16.7%
Poland	Jelic & Briston; Woloszyn; Sieradzki	359	1991-2022	12.4%
Portugal	Almeida & Duque; Dealogic	33	1992-2017	11.5%
Qatar	Dealogic	17	2003-2021	257.2%
Russia	Dealogic	64	1999-2013	3.3%
Saudi Arabia	Al-Anazi, Forster, & Liu; Alqahtani; Dealogic	126	2003-2021	179.2%
Singapore	Lee, Taylor & Walter; Dawson; Dealogic	722	1973-2021	24.7%
South Africa	Page & Reyneke; Ali, Subrahmanyam & Gleason; Dealogic	342	1980-2018	17.2%
South Korea	Dhatt, Kim & Lim; Ihm; Choi & Heo; Mosharian & Ng; Cho; Joh; Lee; Gahng; Choi; Dealogic; Korea Exchange	2,403	1980-2023	52.7%
Spain	Ansotegui & Fabregat; Alvarez Otera; Dealogic	204	1986-2021	9.5%
Sri Lanka	Samarakoon; Dealogic	134	1987-2018	28.9%
Sweden	Rydqvist; Schuster; de Ridder	446	1980-2023	28.2%
Switzerland	Kunz, Drobetz, Kammermann & Walchli; Dealogic	173	1983-2021	24.6%
Taiwan	Chen; Chiang	2,063	1980-2023	37.6%
Thailand	Wethyavivorn & Koo-smith; Lonkani & Tirapat; Ekkayokkaya and Pengniti; Vithessonthi; Dealogic	785	1987-2021	39.8%
Tunisia	Hearn, Dealogic	38	2001-2014	21.7%
Turkey	Kiymaz; Durukan; Ince; Kucukkocaoglu; Elma; Tanyeri, Ozturkkal, & Tirtiroglu	574	1990-2023	18.4%
United Arab Emirates	Alanzi & Al-Zoubi; Dealogic	35	2003-2021	186.4%
United Kingdom	Dimson; Vismara; Levis; Vismara; Doukas & Hoque; Khurshed	5,309	1959-2020	15.7%
United States	Ibbotson, Sindelar & Ritter; Ritter	13,811	1960-2023	17.5%
Vietnam	Tran, Le & Hoang; Nguyen, Trinh, & Ninh	167	2005-2017	33.3%

Sources: See references listed in the published 1994 article and updates listed below. Where more than one set of authors is listed as a source of information, combined sample sizes have been constructed. Average initial returns are constructed in different manners from study to study. In general, in countries where market prices are available immediately after offerings, the one-day raw return is reported. In countries where there is a delay before unconstrained market prices are reported, market-adjusted returns over an interval of several weeks are reported. All of the averages weight each IPO equally.

The Argentine numbers are from Hans Eijgenhuijsen and Rob van der Valk for 20 IPOs from 1991-1994. Dealogic is the source for 10 IPOs from 2007-2018. The Australian numbers for 1990-95 are from Li-Anne Woo's University of New South Wales (UNSW) dissertation. The 1996-2005 Australian numbers are from Peter Pham at the UNSW. The 2006-23 numbers are from Dealogic, with Sydney Stock Exchange and National Stock Exchange of Australia IPOs excluded. REITs are also excluded. Note that most Australian IPOs are very small with an offer price of 20 cents per share, raising A\$3-8 million, and are frequently in the mining industry.

The Austrian numbers are from Wolfgang Aussenegg's Vienna University of Technology working paper for 1984-2006, and from him for 2007-2013. Only main market IPOs are included. For 2014-2018, Dealogic is the source. The updated Belgian numbers come from Sophie Manigart of the University of Ghent, with assistance from Alexander Ljungqvist of NYU. For 2000-2004, the Belgian numbers are from Christophe DuMortier. For 2005-2017, the Belgian numbers are from Dealogic, and include Belgian companies that went public in continental Europe.

The Brazilian numbers (62 IPOs with 78.5% underpricing) from 1979-1990 are from Aggarwal, Leal, & Hernandez, and (44 IPOs with 6.7% underpricing) from 2004-2006 are from Dealogic. There are also 74 IPOs from 1995-2003 with unknown underpricing. Richard Saito has also provided numbers from 2004-2006. The 1997-2006 volume numbers are from Emerson Faria, based on information at www.boverspa.com.br. The 2007-2011 numbers (95 IPOs with average underpricing of 3.3%) are from Roberto Ushisima. For 2012-2023, the 108 IPOs are from Dealogic, with confirmation from B3. For several IPOs with missing market prices, Guilherme Junqueira has tracked down the prices from Yahoo Finance and other sources. The Bulgarian numbers for 2004-January 2007 are from von Georgi Nikolov's University of Innsbruck dissertation.

The updated Canadian numbers are from Lawrence Kryzanowski, Skander Lazrak, and Ian Rakita's 2006 *Multinational Finance Journal* article "The Behavior of Prices, Trades and Spreads for Canadian IPOs." For 2003-2023, I have used numbers calculated from Dealogic, using Toronto Stock Exchange-listed IPOs only, and excluding unit offers as well as closed-end funds and REITs. For 2005-2016, I have used numbers from Dealogic and the Toronto Stock Exchange. The numbers from recent years have been confirmed by Ari Pandes of the University of Calgary.

The updated Chilean numbers are from Cristian Celis and Gustavo Maturana's 1998 *Revista ABANTE* article and from Franco Parisi, Joseph Ganitsky, and Antonio Parisi's "The Intra-day Returns Approach in Chilean IPOs." For 2004-2019, I have used numbers from Dealogic.

The Chinese numbers for 1990-2005 were originally from Zhaohui Chen, Jongmoo Jay Choi, and Cao Jiang's 2007 Temple University working paper "Corruption in State Owned Firms: Evidence from China's IPOs." Their numbers are consistent with Lihui Tian and William Megginson's 2006 Peking University and University of Oklahoma working paper "Extreme Underpricing: Determinants of Chinese IPO Initial Returns" for 1992-2000 and Shiguang Ma and Robert Faff's April 2007 *Pacific-Basin Finance Journal* article "Market Conditions and the Optimal IPO Allocation Mechanism in China" for 1994-2003. Slightly revised numbers for 1990-2018 provided by Yiming Qian of the University of Connecticut are now being used. For 2006-2016, data are provided by Chunxin Jia of Peking University, Jay R. Ritter of the University of Florida, Zhen Xie of Shanghai University of Finance and Economics, and Donghang Zhang of the University of South Carolina "Pre-IPO Analyst Coverage: Hype or Information Production?" For 2017, data is provided by Shunlin Song of Central University of Finance and Economics. For 2018, Yiming Qian of the University of Connecticut has provided the numbers. For 2019, Jimmy Jin of Hong Kong Polytechnic has provided the numbers. For 2020, numbers come from Dealogic, using first-day returns for STAR market IPOs and Shenzhen ChiNext IPOs after August 15, 2020 when market prices were unconstrained, and one-month returns for other IPOs. For 2021, Chunxin Jia of Peking University has supplied the numbers. Chinese IPOs are A shares traded domestically. In 2014, a new regulation limiting stock price changes on the first day of trading was implemented, resulting in a cap of 44% on the first day return, and 10% price changes on subsequent days. The CSRC also started to implement an offer price ceiling of

a price-earnings ratio of 23. Consequently, for 2014-2019, average initial returns are computed over a window that is long enough so that an unconstrained market price is established. In 2015-2018, average underpricing of 200% has reappeared. In 2019, the average underpricing on the new STAR market, which did not have a PE of 23 or less constraint, was less than on the other markets. For 2022, using Dealogic data, there were 335 IPOs with average underpricing of more than 80% on the Shanghai and Shenzhen main markets, but much lower underpricing on the STAR and GEM markets, where offer prices are not constrained by price-earnings limits. For 2023, there were 236 IPOs, with the patterns in 2022 repeating. After March, 2023, the 44% first-day price limit for Shanghai and Shenzhen main market IPOs ended, allowing the use of first-day returns for all IPOs.

Data from Cyprus are provided by Dimitrios Gounopoulos, Christos Nounis, and Paris Stylianides for 1999-2002, whose 2008 *Journal of Financial Decision Making* article "The Short and Long Term Performance of Initial Public Offerings in the Cyprus Stock Exchange" reports numbers for 75 IPOs. The numbers for 51 IPOs reported here exclude 24 IPOs that raised less than U.S.\$1 million (2007 purchasing power). Dimitrios Gounopoulos of the U of Surrey has supplied data for 15 Cypriot IPOs from 2003-2011, and Athos Chandriotis has supplied numbers for 1997-1998. The Danish numbers are from Jan Jacobsen and Ole Sorensen at Copenhagen Business School for 1984-1998, with Dealogic being the source for 1999-2006 (with confirmation from Christian Nielsen) and 2007-2021. The Egyptian numbers for 1990-2000 are for share issue privatizations only, and are in Table 2 of Mohammed Omran's Summer 2005 *Journal of Financial Research* article "Underpricing and Long-run Performance of Share Issue Privatizations in the Egyptian Stock market." The 2001-2009 numbers are from Bruce Hearn of the University of Sussex. The 2010-2017 numbers are from Dealogic. The Finnish numbers are from Matti Keloharju, and from 2014-2021 from Dealogic (including First North Finland issues).

The French numbers from 1993-98 are from Francois Derrien and Kent Womack. The French numbers from 1999-2000 are from Salim Chahine. The French numbers from 2001-2006 and 2009-2023 are from Dealogic, and exclude Marché Libre IPOs. In 2022, 1 SPAC is excluded. The 2007-2008 French numbers are from Silvio Vismara. For 2009-2017, closed-end funds, REITs, trusts, and investment funds are excluded, and for 2011 three IPOs with proceeds of less than \$100,000 are also excluded. The German numbers are a weighted average of 27.7% for 407 IPOs from 1978-1999 from Alexander Ljungqvist and 41.0% for 138 Neuer Market IPOs from 2000-2001, with the latter numbers from Jorg Rocholl's 2005 University of North Carolina working paper. For 2002-2006, data on the 107 IPOs comes from Dealogic. For 2007-2009, Silvio Vismara has supplied numbers from the *EurIPO Factbook*. For 2010, the Deutsche Borse website is the source. For 2011-2020, Dealogic is the source for Frankfurt Stock Exchange IPOs (excluding Munich offerings).

The Greek numbers for 1987-1994 can be found in a chapter in Mario Levis' 1996 book *Empirical Issues in Raising Equity Capital*, but the reported numbers for 1976-1989 are from a working paper by Christos Nounis of the National and Kapodistrian University of Athens, and the 1990-2006 numbers are from "Price Cap Effect in the Performance of Greek IPOs" by S. Thomadakis, D. Gounopoulos, and C. Nounis, which uses the first unconstrained market price. Dimitrios Gounopoulos reports that 2010-2013 saw zero IPOs in Greece.

Zhao and Wu's Hong Kong numbers are from a City University of Hong Kong working paper. For 1997-2001, the Hong Kong numbers are from Alexander Ljungqvist and Xiaoyun Yu's 2003 working paper "Stock market development, liquidity, and corporate governance." For 2002-2003, the Hong Kong numbers are from Simon Yu Kit Fung, Ferdinand A. Gul, and Suresh Radhakrishnan's "Investment Banks' Repeated IPO Business Opportunities and IPO Underpricing." For 2004-2021, the Hong Kong numbers are from Dealogic, and include GEM IPOs. The average first-day return on GEM IPOs is much higher than on Main Board IPOs. For 241 GEM IPOs from 2009-2017, the average proceeds were US\$11.9 million with an average first day return of 282.3%, with approximately 10% of GEM IPOs having a first-day return of over 1,000%. The average first-day return on 665 Main Board IPOs was 7.7%. GEM IPOs that were priced in January 2018 and later have not had a high frequency of very high initial returns. Steve Dawson of the University of Hawaii has confirmed the Hong Kong numbers for the early years.

The average initial return for India from 1990-2003 is from the NYU working paper "Group Affiliation and the Performance of Initial Public Offerings in the Indian Stock Market," by Vijaya B Marisetty and Marti G. Subrahmanyam. The average initial return for 1992-93 would be only 35.3% based upon IPOs with an offer price of above 10 Rupees, with the data coming from the 2002 *Managerial Finance* article by Chandra Krishnamurti and Pradeep Kumar. This is only about one-third of the unconditional average for these two years (145.2% for 1992 and 90.6% for 1993). Indian data for 2005-2007 has been supplied by Vijayi Marisetty. IPOs from 2004-2017 are from Dealogic, excluding SME offerings on both the Bombay Stock Exchange and the National Stock Exchange. Most SME

offers have proceeds of less than US\$2 million. For 2018-2020, Rama Seth has supplied data from Chittorgarh.com. For 2021-2022, Chittorgarh and Dealogic are the data sources. Mangesh More supplied 2023 numbers. For 2004-2023, SME offerings are excluded.

The Indonesian numbers for 1990-2023 are from Suherman of the State University of Jakarta, confirmed for 2002-2003 by Freddy Danny and for recent years by Dealogic. For IPOs with an offer price of 200 Rupiah or below, a 70% rise is the maximum allowed until early 2020, when the maximum was changed to 35%. For IPOs with an offer price above 200 rupiah up to 5,000, a 50% rise is the maximum allowed (at least during 2011-early 2020; I am not sure about earlier years). For IPOs with an offer price above 5,000, a 40% rise or fall is the maximum allowed until early 2020. After the first day of trading, the bands are 35%, 25%, and 20% respectively, starting on January 3, 2017 according to Suherman. As of June 5, 2023, the Indonesia Stock Exchange has limit-up rules of 35% for share prices between Rp 50 and Rp 200, 25% for share prices above Rp 200 up to Rp 5,000, and 20% for share prices above Rp 5,000. The limit down rule is 15% after the first day of trading. For the IPOs in 2012-2020, I have used one-week returns rather than first-day returns for all but 2011, 2013, and 2015. In 2011, 2013, and 2015 the difference between 1-day and 1-week average returns is minimal, but it is large in each year from 2016-2020. For 2021-2023, I have used 1-day returns for IPOs not subject to price limit constraints, and 1-week returns for other IPOs.

The Iranian numbers from 1991-2004 are from Saeed Bagherzadeh's 2006 University of Tehran working paper "The Initial Public Offerings Underpricing and Long-Run Underperformance in the Iranian Emerging Stock Market: Some Empirical Evidence." For 2005-2022, the numbers are from Vahid Pelarti and Alireza Jafari. During this time period, there were daily price change limits that were binding for most IPOs, and initial returns are computed from the offer price to the first closing market price for which a price limit was not binding.

The Irish numbers are from Dealogic, with REITs excluded. The Israeli numbers are from Yakov Amihud and Shmuel Hauser's 2001 NYU working paper. Kandel, Sarig, and Wohl's *Review of Financial Studies* article covers the period after Israeli auctions with no price limits became mandatory. For 1999-2006, the numbers for 63 Israeli IPOs are from Dealogic. Many Israeli IPOs are unit offerings, and first-day returns must be carefully constructed to avoid using a unit offer price and market price per share. The updated Italian numbers are from a working paper by Arosio, Giudici and Paleari of Politecnico di Milano and Università degli Studi di Bergamo through 2000, and from Cassia, Paleari & Redondi for 2001. For 2002-2013, the numbers have been supplied by Silvio Vismara using the EurIPO database. For 2014-2018, Dealogic data is used including both main board and AIM-Italia IPOs.

The updated Japanese numbers are from Hamao, Packer and Ritter's 2000 *Pacific-Basin Finance Journal* article for 1989-1995 OTC firms, and from Takashi Kaneko and Richard Pettway's "Auctions versus Book-Building Underwriting of Japanese IPOs: OTC, Mothers, and Nasdaq-Japan Issues" for 1996-1997. Takashi Kaneko also supplied numbers on TSE-listed IPOs from 1992-1997. Numbers from 1998-2009 are from Kaneko and Pettway and can be found at <http://www.fbc.keio.ac.jp/~kaneko/KP-JIPO/top.htm>. (This web site also gives individual IPO data.) It should be noted that the Japanese average initial returns are sensitive to whether some very small issues are included, and whether the first trading day close is used or the close on the first day that price limits are not a binding constraint. For example, in December 2006, Piped Bits raised ¥420 million (about \$4 million) by selling 2,000 shares at an offer price of ¥210,000 per share, with a first-day close of ¥430,000 (probably constrained by price limits) and a one-week close of ¥1,200,000 (up 471%). Also in December 2006, eBase sold 1,000 shares at ¥185,000 per share, raising less than \$2 million. The stock closed at ¥428,000 on the first day and ¥890,000 after one week (up 381%). The 1998-2009 numbers use the first closing market price that is unconstrained by price limits. For 2010, 2011, 2014, and 2016, TokyoIPO.com is the source. For 2012-2020, Takashi Kaneko of Keio University is the primary source. For 2015, Takato Hiraki of Tokyo University of Science has also supplied information. For 2015 and 2016, the average first-day returns on IPOs raising more than ¥2 billion were 15.8% and 9.5%, respectively, whereas smaller IPOs had average first-day returns of 117.3% and 96.5%, respectively. Takashi Kaneko's book *Economic Analysis of Initial Public Offering* (in Japanese) on page 134 reports that the average first-day return on 1,620 IPOs from 2001-2017 is 74.8% on an equally weighted basis and 18.6% on a proceeds-weighted basis. He reports that the corresponding numbers for the U.S. for this time period are 13.9% and 12.9%. Takashi Kaneko has also supplied updated numbers for 2,205 IPOs from 2001-2023, with an EW average of 75.4% and a proceeds-weighted average of 16.5%. For these last numbers, ETFs and REITs are not included, and neither are IPOs listed on the Tokyo PRO Market for professional investors.

Jordanian numbers are from Asaad H. Al-Ali and Fayza A. Braik's "An Empirical Investigation of Initial Public Offerings (IPOs) Short Term Underpricing—Evidence in the Jordanian Stock Market" in the *Arab Journal of Administrative Sciences* Vol. 18, No. 2 (2011). 49 of the 53 IPOs are from 2006-2008, with the highest market-adjusted initial returns in 2005 and 2006.

The updated Korean numbers are from Byung Kyun Ihm's 1997 *Korean Journal of Financial Management* and Choi and Heo's 2000 *Korean Journal of Finance* articles, for years through 1996. For 1997-1999, David Ng has supplied the data. For 2000-2009, 963 IPOs from Sung Wook Joh are used, with 7-day returns used for 2000-2003 and first-day returns used for 2004-2009. Seven-day returns are used because of price limits of 124% or 130% for the first day. For 2004-2008, KSE first-day returns supplied by Sungil Cho of Chung-Ang University give very similar numbers. The 1980-1999 average is 74.3% for 558 IPOs, and the 2000-2009 average is 57.2% for 963 IPOs. For 2010, Dealogic is the source with seven-day returns used. For 2011-2012 and 2014-2019 and 2022-2023, Dealogic is the source with 1-day returns used unless the 130% price limit is hit, in which case 1-week returns are used. For 2018-June 2023, the price limit was raised to 160%, with a 300% limit for the second half of 2023 (and 30% up or down limit for IPOs subject that had offer price revisions). For 2013, Seokhoon Lee of KCMI is the source. For 2020-2023, the Korea Exchange is the source. Minmo Gahng downloaded the data from the Korea Exchange, and cross-checked the 2022 data with Dealogic. Seung Doo Choi of Dongeui University assisted in tracking down missing numbers for 2023 IPOs. In 2023, there were 91 operating company IPOs, with 84 on KOSDAQ and 7 on KOSPI. SPACs and REITs are not included.

The numbers for Malaysia come from several sources: Isa, Isa and Yong, and Othman Yong, and Dealogic. The numbers for most years have been confirmed by Steve Dawson of the University of Hawaii. In general, only Main Board IPOs are included for 1993-2009. Yong has provided numbers separating the main board, second board, and MESDAQ, with the majority of IPOs from 1991-2006 on the second board. There is a 2007 *Journal of Business Finance & Accounting* article by Ahmad, Cambell, and Goodacre that covers 1990-2000. Yusaf P. Ma has provided numbers for 1991-2009 in which all three markets are aggregated, and his numbers are very close to Othman Yong's numbers. For 2007-2008, I have used his numbers for all markets. Even on the main board, many IPOs raise less than US\$5 million. For 2010-2023, Dealogic data is used, with second board (ACE) IPOs included but MESDAQ/LEAP IPOs excluded. Numbers for Mauritius are from Sunil Kumar Bundoo's 2007 *African Journal of Accounting, Economics, Finance, and Banking Research* article "An Analysis of IPOs Underpricing in Mauritius."

Numbers for several European countries for the 1992-99 period are supplied by Jenkinson, Ljungqvist, and Wilhelm, who compiled data for their 2003 *Review of Financial Studies* article. The Mexican numbers for 1991-1994 (51 IPOs with 3.45% underpricing) are from Hans Eijgenhuijsen and Rob van der Valk. For 1995-1999, Josef Schuster and Dealogic are the source of information. For 2000-2012, numbers supplied by the author for Cuauhtemoc Villarreal's December 2013 *Journal of Economics, Finance, and Administration* article is the source, with 21 IPOs having a -0.57% average first-day return. For 2013-2017, Dealogic is the source of Mexican numbers.

Information from Morocco for 2004-2007 is originally from Fatima-Zohra Alami Talbi's 2011 *Banque et Stratégie* article "Les entreprises introduites en Bourse sont-elles correctement évaluées ?" For 2000-2003 and 2008-2011, Bruce Hearn of the University of Sussex provided supporting data. For 2004-2022, Douaa Tizniti supplied data and market prices, based on the 2021 *International Journal of Financial, Accounting, and Management* article "How discounts impact IPOs valuation performance and underpricing? A confrontation between warranted and unwarranted discount" with Mohammed Rachid Aasri. Both authors are from the University of Rabat. For Casablanca Stock Exchange IPOs, the first five days of IPO trading are subject to 10% daily price limits, with 6% (or 10%, depending on trading halts) daily limits after that. I have calculated the initial returns using the first closing market price for which a daily price limit is not binding, using data supplied by Douaa Tizniti, although for 3 out of 45 IPOs, the market price two weeks after the IPO is used, with a 114% return, even though daily price limits were still binding. In their published paper, the authors report a maximum return from the offer price to the market price one month later of 133.36%.

For the Netherlands, the 2000-2006 numbers are from Dealogic and Silvio Vismara, and 1983-1999 numbers have been supplied by Tjalling van der Goot of the University of Amsterdam. 2007-2021 numbers are from Dealogic. The New Zealand numbers for 1992-99 are from a University of Auckland and University of Melbourne working paper by Graeme Camp and Robert Munro. The 2000-2004 numbers for New Zealand have been supplied by Graeme Camp. Data for 2005-2006 and 2011-2022 come from Dealogic. For 2007-2010, the numbers are from Faisal Alqahtani. The

Nigerian numbers for 61 IPOs from 1989-1993 are from a University of Southern California working paper by Ikoku. For the 51 IPOs from 1995-2006, the source is Joseph Achua's 2007 University of Nigeria dissertation "Price Performance of Initial Public Offerings: Empirical Evidence from Deregulated Nigerian Capital Market." Data for 1994 is missing. For 2007-2017, Dealogic is the source of information for 13 IPOs, although only 10 have prices.

The Norwegian numbers for 1984-1996 are from N. Haug Emilsen, K. Pedersen, and Frode Sætem, 1997, *Børsintroduksjoner, BETA - Tidsskrift for bedriftsøkonomi* 11, 1-13 (in Norwegian). For 1997-2001, they are from Erik Liden, and from 2002-2023, they are from Dealogic, with corrections from Sturla Fjesme and Karin Thorburn. The Pakistani numbers are from Muhammad Zubair Mumta's NUST Business School 2014 working paper "An Examination of Short-run Underpricing of IPOs Using Extreme Bounds Analysis."

The Philippine numbers are from Michael Sullivan and Angelo Unite's 2001 *Pacific-Basin Finance Journal* article for 1987-1997, and Dealogic for 1999-2018 (downloaded Dec. 13, 2018).

The Polish numbers are from Jelic and Briston's 2003 *European Financial Management* article for 1991-1998, from Dealogic for 1999-2004, from Adrian Woloszyn for 2005-2014, and from Rafal Sieradzki for 2015-2022. Starting in 2007, the Polish New Connect market has had many IPOs, primarily of small companies, but only Warsaw Stock Exchange IPOs are included. The offers in the New Connect market are mainly private placements, i.e. for less than 150 investors according to Polish law. Only WSE offers are included, with other debuts excluded. For example, the 172 debuts on the New Connect market in 2011 are not included, and only 27 of the 38 debuts on the WSE are included. If both a price for shares and for rights to shares are posted, the rights to shares price is used. In Poland, court registration of shares is required, and this frequently takes several days, so the rights to shares price would correspond to the first closing market price.

The Portuguese numbers are from Miguel Almeida and Joao Duque's chapter in *Initial Public Offerings: An International Perspective*, edited by Greg. N. Gregoriou (Elsevier, 2006) for 1992-1998, and from Dealogic for 1999-2017. Russian numbers are from Dealogic.

Numbers for Qatar are from Dealogic, with several IPOs dropped because of missing market prices.

Saudi Arabian numbers through 2010 come from the 2011 Griffith University working paper "IPOs Underpricing in a Demand and Supply Simultaneous Model" by Ahmed Al-Anazi, John Forster, and Benjamin Liu. The authors note that Saudi Arabian IPOs are sold only to domestic investors, and that the largest 32 IPOs in their sample have average underpricing of 170.5% and the other 44 IPOs have average underpricing of 332.8%. Faisal Alqahtani of Taibah University in Saudi Arabia and the University of Auckland supplied 2011 numbers and year-by-year numbers for 2003-2011. The 2003-2010 numbers are also published in the 2015 *Journal of Multinational Financial Management* article "Extreme IPO Underpricing and the Legal Environment in Wealthy Emerging Economies," by Ahmed S. Alanazi and Haitham A. Al-Zoubi. Dealogic is the source for 46 IPOs from 2012-2021 excluding REITs. Average initial returns were below 100% in every year from 2014-2021.

Numbers for Singapore from 1992-2001 are from Steve Dawson of the University of Hawaii. Singaporean numbers for 2002-2011, and 2013-21 are from Dealogic. For 2007 and 2012, the 14 Dealogic-listed offerings on Catalist are not included; they have a median proceeds of only US\$5 million. The South African numbers are from Page and Reyneke's Oct-Dec 1997 *Journal of Business, Finance, and Accounting* article "The Timing and Subsequent Performance of Initial Public Offerings on the Johannesburg Stock Exchange" for 1980-1991. For 1995-2004, the numbers are from Alli, Subrahmanyam, and Gleason's "Short and Long Run Performance of IPOs in Post-Apartheid South Africa." See also C. Correia and G. Holman's "An Analysis of Underpricing and Aftermarket Performance of Initial Public Offerings on the Alternative Exchange (AltX)" in the 2008 *South African Journal of Accounting Research* (Vol. 22, No. 1), pp. 97-117. For 2005-2013, the numbers are from Dealogic, and for 2007-2013 they exclude AltX offerings. (For 1995-2002, Josef Schuster reports much higher average first-day returns for South Africa.) For 2014-2018, the numbers are from Dealogic and include JSE Alternative Exchange IPOs

The updated Spanish numbers are from an ESADE working paper by Carmen Ansotegui and Jordi Fabregat and working papers by Susana Alvarez Otera. For 2005-2008, Spanish numbers for 24 IPOs are from Dealogic, with the offerings on the Mercado Alternativo Bursatil (Madrid Stock Exchange Alternative Market) excluded, since they are

small offers, with a median proceeds of only US\$4.5 million. For 2009-2021, I include the Alternative Market IPOs. Sri Lanka numbers come from the 2010 *Journal of Multinational Financial Management* “The Short-run Underpricing of Initial Public Offerings in the Sri Lankan Stock Market” by Lalith P. Samarakoon. For 2009-2018, Dealogic is the source of information.

Swedish numbers from 1991-1994 are from Josef Schuster, and for 1995-2023 are provided by Adri de Ridder and Dealogic. For Sweden, offerings on the Aktie Torget and Nordic Growth Market (typically U.S.\$1-3 million in proceeds) from 2009-2023 are excluded. For 2014-2023, IPOs on the Spotlight market are excluded. The Spotlight IPOs are typically of the same size as the Nordic Growth Market (\$1-3 million) whereas First North Stockholm IPOs are generally larger than that. For 2014-2021, 362 First North Stockholm IPOs are excluded, with an average first-day return of 9.5%. For 2022-23, they are also excluded. As with other countries, REITs and SPACs are excluded. The Swiss numbers are from a University of Basel working paper by Wolfgang Drobetz, Matthias Kammermann, and Urs Walchli, and for 2001-2006 and 2014-2018 from Dealogic. For 2007-2013, *EurIPO Factbooks* is the source. For 2022, Daniel He assisted in calculating the average initial returns, using Dealogic data.

The updated Taiwanese numbers are from Hsuan-Chi Chen of the University of New Mexico and Yao-Min Chiang of NTU. Published numbers for smaller samples are contained in a 1997 *Journal of Financial Studies* article by Lin and Sheu and a Hong Kong University of Science and Technology working paper by Gwohorng Liaw, Yu-Jane Liu, and John Wei for 52 auctions from 1995-1998. For the auctions, the average first-day return of 15.06% is computed as an average of the quantity-weighted average price paid in the discriminatory auction tranche and the fixed price paid for the other tranche. Each tranche has a 50% weight. Chiang, Qian, and Sherman (2010 *Review of Financial Studies*) also report numbers for auctions. The 2007-2023 Taiwanese numbers are from Yao-Min Chiang of National Taiwan University, and include the numbers in Chang, Chiang, Qian, and Ritter’s 2017 *Review of Financial Studies* article “Pre-Market Trading and IPO Pricing: Evidence” for 188 bookbuilt IPOs for 2006-2010. For 2014-2023, there are 443 IPOs that mainly use auctions. Both Taiwan Stock Exchange and Gre Tai operating company IPOs are included. For 2023, 2 Taiwan Innovation Board IPOs are included.

Thai numbers are from a working paper by Ravi Lonkani (Payap University) and Sunti Tirapat (Chulalongkorn University), for 2000-2006 from Dealogic, and for 2007 from Manapol Ekkayokkaya and Pengniti’s Chulalongkorn University paper “Governance Reforms and IPO Underpricing,” which covers 1990-2007. The source of 2008 numbers for Thailand is Chaiporn Vithessonthi’s “What Explains the Initial Return of Initial Public Offerings after the 1997 Asian Financial Crisis? Evidence from Thailand”, a 2013 University of Otago working paper available on SSRN. For 2009-2021, I use Dealogic data, after excluding 7 fund IPOs, for 226 IPOs on the Stock Exchange of Thailand (110) and the Market for Alternative Investment (116). For IPOs with a first-day return of 200%, the price limit, the initial return is calculated using the one-week price. The average initial return is 32.0% for the 110 SET IPOs and 64.8% for the 116 MAI IPOs before November 2018, and this pattern has continued since then. The average deal value (no inflation adjustment, in U.S. dollars), is \$12.0 million for MAI IPOs and \$88.2 million (with two missing proceeds) for SET IPOs. The Tunisian numbers are from Bruce Hearn of the University of Sussex.

The Turkish numbers are from Halil Krymaz’s June 2000 *Journal of Multinational Financial Management* article “The Initial and Aftermarket Performance of IPOs in an Emerging Market: Evidence from Istanbul Stock Exchange” for 1990-1996, and for 1997-2004 from Prof. Banu Durukan of Dokuz Eylul University. The Turkish numbers have been calculated with assistance from Prof. Ozgur Ince of the University of South Carolina. For 2005-2008, the Turkish numbers are from Guray Kucukkocaoglu, based on the Baskent University working paper with Ozge Sezgin “IPO Mechanism Selection by Using Classification and Regression Trees (CART).” See also Recep Bildik and Mustafa K. Yilmaz “The Market Performance of Initial Public Offerings on the Istanbul Stock Exchange” on pp. 49-75 of the 2008 *Bankacilik ve Finansal Piyasalar*, where slightly lower average first-day returns are given for 1990-2000. The 2009-2011 numbers are from Dealogic. The 2012-2013 numbers are from Orhan Emre Elma of Adana Science and Technology University. The 2014-2020 numbers are from Basak Tanyeri, Belma Ozturkkal, and Dogan Tirtiroglu’s “Turkish IPOs in a changing regulatory and economic environment” in the *Borsa Istanbul Review*, with the 2019 average initial return corrected for the effect of price limits. The 2021 numbers are from the extended study of Tanyeri, Ozturkkal, and Tirtiroglu, with 27 out of 49 IPOs for which 10% daily price limits are binding using 1-week returns, and another 7 IPOs for which these price limits were still binding after 1 week (77% 6-day returns from the offer price, generally with very low volume), using 1-month returns. The 2021 IPO count excludes IPOs on

the Borsa Istanbul BIST SubMarket, where IPOs with proceeds of less than approximately \$5 million are listed, as well as REITs and one ADR. Cem Demiroglu of Koc University and the Borsa Istanbul have provided a list of IPOs and first-day returns for all IPOs from 1990-2021. Recep Bildik of Istanbul Ticaret University provided 2022 data, but I have used the Dealogic data for 26 IPOs, and for 45 operating company IPOs in 2023. For 2023, the equally weighted returns are computed using the return from the offer price to the first closing price for which 10% daily price change limits are not binding. In many cases, if the first-day return is 10%, the one-week return from the offer price is used, and if this number is approximately 61% (five 10% upward moves), the two-week price is used. If this number is about 158% (ten 10% upward moves), a one-month price is used.

Numbers for the U.A.E. for 2003-2010 come from Table 2 in the 2015 *Journal of Multinational Financial Management* article “Extreme IPO Underpricing and the Legal Environment in Wealthy Emerging Economies,” by Ahmed S. Alanazi and Haitham A. Al-Zoubi. Numbers for 2011-2021 come from Dealogic. In 2003-2010, the average initial return was 270.1%, and since then the average has been 3.8%.

The U.K. numbers for 2000-2006 and 2012 are from Mario Levis of the Cass Business School of City University. UK numbers from 2007-2009 have been supplied by Silvio Vismara using *EurIPO Factbook* information, and Dealogic is the source for the 2010-11 numbers. For 2013-2016, “Why IPO Issuers Prefer the AIM When They Can List for Less on the Main Market?” by John Doukas and Hafiz Hoque is the source for 253 IPOs. For 2017-2020, Arif Khurshed of the University of Manchester is the source of information. David Chambers and Elroy Dimson have numbers going back to the beginning of the 1900s in “IPO underpricing over the very long-run.” *Journal of Finance* 2009, 64(3): 1407-1443.

The U.S. numbers are from Ibbotson, Sindelar, and Ritter’s 1994 *Journal of Applied Corporate Finance* article for 1960-1979, and from Jay Ritter’s website for 1980-2021. The 1980-2021 numbers define IPOs to be CRSP-listed operating companies, with the following exclusions: closed-end funds, REITs, SPACs, natural resource limited partnerships, bank and S&L offerings, small best effort offerings, units, ADRs, and IPOs with an offer price below \$5 per share. Data comes from multiple sources, including IPOscoop.com, SDC, and Dealogic.

For Vietnam, the source for 69 IPOs from 2005-2012 with market-adjusted abnormal returns in Table 2 was Thi Hai Ly Tran, Dat Chi Le, and Thi Phuong Thao Hoang’s 2015 *International Journal of Business and Emerging Markets* article “The Underpricing and Long-run Underperformance of Initial Public Offerings: Evidence from Vietnam”. Nguyen Tan An Nguyen, Trung Quoc Trinh, and Trang Thi Ninh published an article in JABES (in Vietnamese) with an EW average of 33.3% for 167 IPOs from 2005-2017. For the 2005-2012 time period, they have a larger sample size (93 IPOs) but a higher abnormal mean initial return of 62.6%, compared to the 49.1% reported by Tran, Le, and Hoang (2015). Tan sent me the year-by-year numbers.

The numbers for some countries represent the average first-day return on IPOs for which the company is headquartered in that country. For Belgium, for example, during 1991-1999, 61 companies went public, for which first-day return information is available on 41 IPOs. Of the 61 IPOs, 39 went public on the Brussels Stock Exchange, 3 on Nasdaq, 9 on Easdaq, and 10 on Euro.NM. Of the 3 Nasdaq IPOs by Belgian companies (Lernout et Hauspie, Xiekon, and ICOS Vision Systems), only Xiekon was an American Depositary Share (ADS) issue. The other 2 Nasdaq IPOs have been included in the U.S. totals, resulting in double-counting. The U.S. numbers exclude ADS issues, but in general include other foreign firms going public in the U.S. Many larger Canadian companies and Israeli tech companies went public in the U.S. in the 1990s. The Israeli numbers in the table are based on Israeli companies going public in Israel.

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