

Estimating the Cost of Capital Market Distortions: Evidence from Chinese Overseas IPO

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A Quote from Max Weber

- Entrepreneurs → firms, jobs, innovation → wealth & growth
- Capital market distortions in developing economies
 - Regulations in IPO system
 - Capital outflow control
 - Risk of expropriation
- *“The fortunate man is seldom satisfied with the fact of being fortunate. Beyond this, he needs to know that he has a right to his good fortune. He wants to be convinced that he deserves it. Good fortune thus wants to be legitimate fortune.”*

-- Max Weber
- Overseas IPO might be a legitimate way to **cash in** and **protect** the good fortune, but there is a cost of using this device in developing economies.

Motivating Facts on China's Overseas IPO

- China leads the world in the number and value of overseas listings
- Number: over **1600** Chinese firms
- Market capitalization: about **\$5.4** trillion
- HK and US are the top two most popular destinations

Table: Chinese firms listed in mainland China and major overseas markets by 2020

	Mainland China	Hong Kong	US
Number of firms	4,154	1,323	265
Market capitalization (local currency)	80 trillion (CNY)	35.4 trillion (HKD)	1.9 trillion (USD)
Market capitalization (USD)	12.2 trillion (USD)	4.5 trillion (USD)	1.9 trillion (USD)

Note: including dual-listing and ADRs

Why Listing Overseas?

- Existing literature on motives for offshore listing
 - Market segmentation theory (Errunza and Losq, 1985)
 - Bonding theory (Coffee, 1999, 2002; Didge et al., 2004)
 - Globalization strategy theory (Pagano et al., 2001)
- General findings: Non-US firms cross-listed in US market have lower costs of capital and **valuation premiums (15%)** compared with their domestic counterparts
- Recent overseas listing of Chinese firms seems puzzling
 - First, most overseas listed Chinese firms solely list in offshore markets
 - Second, overseas listed Chinese firms face a **valuation discount**
 - Example: The well-known A-H premium or H-A discount puzzle

Research Questions

- Why do Chinese firms choose to go IPO overseas?
- How much is valuation gap between domestic and overseas listings?
- Key challenge: **comparability**
 1. Some overseas listed firms may be ineligible for domestic listing
 - Listing requirement is more demanding in domestic exchanges
 - “Negative List”: firms with foreign investment in some sectors are not allowed to list on domestic exchanges

Relatively easy to address → Constructing a comparable sample

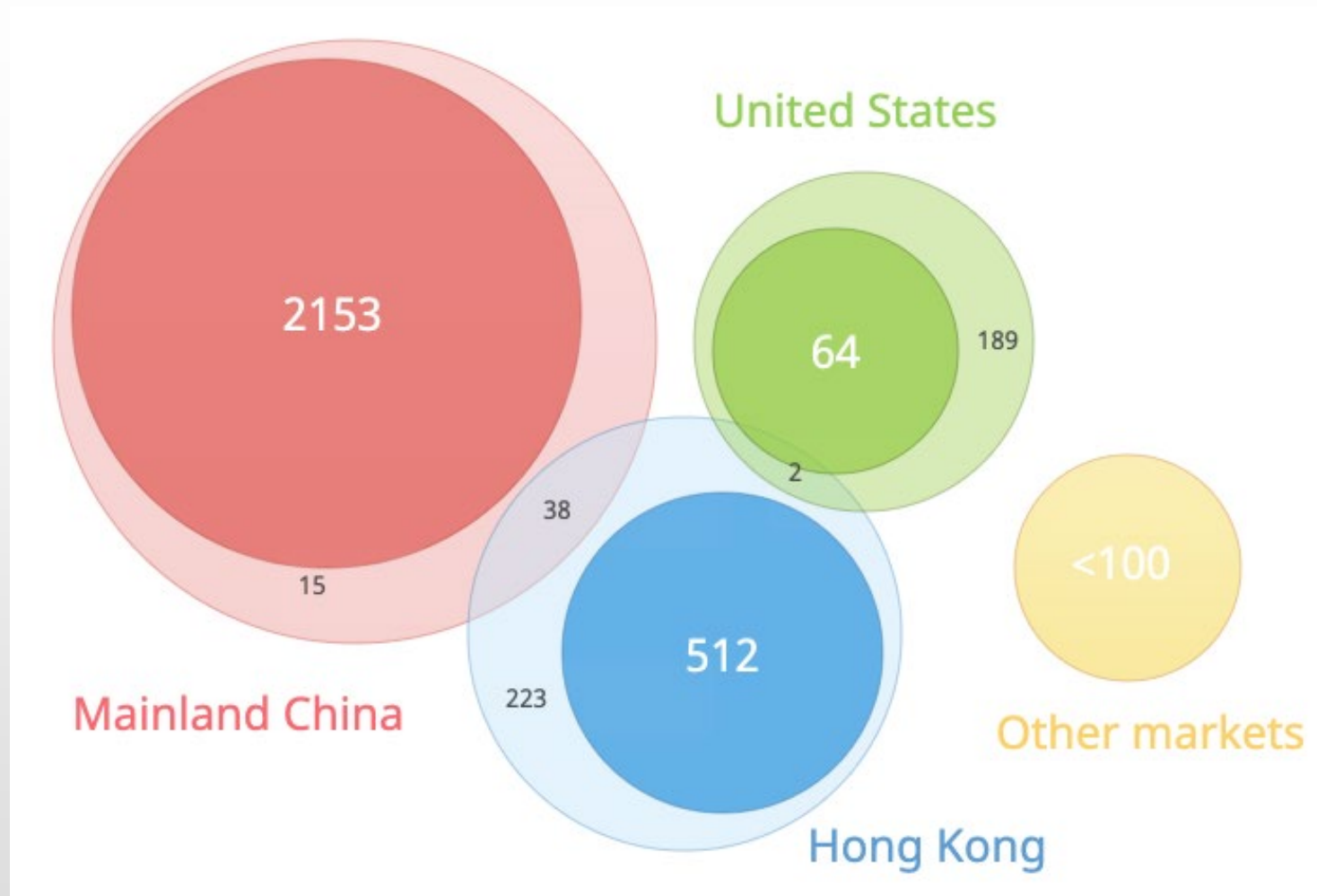
2. Overseas listing is by self-selection so the quality of domestic and overseas listed firms might be different

More difficult to address → A “treatment effect” conceptual framework

Treatment vs. Control Groups – ex ante comparable

- A firm is Chinese if (1) incorporated in, (2) headquartered in, (3) with a controlling shareholder in, *or* (4) with more than 55% revenue comes from Mainland China
- Treatment group (baseline): Chinese firms that (a) had an IPO in either Hong Kong or New York during 2009-2019, (b) are not listed in another stock exchange, (c) satisfy the financial requirements of Mainland stock exchanges, and (d) are not on the negative sector list.
- Control group: Chinese firms that (a) had an IPO on a Mainland Chinese stock exchange during 2009-2019, and (b) not listed on another stock exchange
- Start in 2009 - ChiNext established in 2009
- End in 2019: Before the regulatory changes in both China and US
- Data source: Wind, CSMAR, and firm IPO prospectus

Treatment, Control, and Excluded Stocks



- Firms in baseline sample could in principle be listed either at home or overseas
- In a perfect capital market, listing location would be irrelevant for firm value

Valuation by Tobin's Q

Tobin's Q	At IPO		1 st Trading day		1st Year		2nd Year		3rd Year		4th Years		5th Years	
	Mainland	Overseas	Mainland	Overseas	Mainland	Overseas	Mainland	Overseas	Mainland	Overseas	Mainland	Overseas	Mainland	Overseas
Mean	4.53	2.84	6.25	3.27	4.05	1.91	3.23	1.75	3.25	1.53	3.44	1.45	3.63	1.38
p25	2.30	1.33	3.08	1.33	2.32	0.98	1.87	0.88	1.84	0.84	1.88	0.82	2.10	0.79
p50	3.32	2.05	4.50	2.18	3.29	1.41	2.62	1.16	2.58	1.09	2.68	1.07	3.00	0.98
p75	5.52	3.29	7.27	3.59	5.05	2.22	4.00	1.85	3.83	1.70	4.13	1.59	4.43	1.47
N	2,152	523	2,152	523	2,153	576	1,963	492	1,864	414	1,431	356	1,202	315

- Note: Tobin's Q = market value of a company divided by its assets' replacement cost = (market value of equity + book value of debt)/book value of total assets
- Similar patterns for P/B ratio or P/E ratio

Puzzles and Hypotheses

- **Why in a “comparable” sample, market valuation is still systematically lower for overseas listed Chinese firms? Why they still choose to go IPO abroad?**
- Listing location is an optimal choice made by the entrepreneur
- Each firm is a set of observable and unobservable characteristics
- Each firm also faces a set of different capital market distortions
- Is it because domestic and overseas listed firms have different distribution of characteristics and on average overseas listed firms are of lower quality?
 - **Negative selection hypothesis**
- Is it because overseas listed firms face a set of capital market distortions, and the valuation discount is the willingness to pay to bypass such distortions?
 - **Capital market distortions hypothesis**

Roadmap of the Paper

- **Provide** intuitional background on China's capital control and IPO regulations
- **Model** overseas IPO as the outcome of an optimal IPO locational choice of a representative Chinese entrepreneur, facing capital market distortions
- **Consistently estimate** the motives and valuation discount of the overseas listing and the nature of selection, using an endogenous treatment effect model and control function approach
- **Validate the plausibility of the estimates** by (a) Gauging the valuation discounts from two additional and independent data sets, and (b) Providing consistent evidence using exogenous policy shocks and a DID strategy
- **Estimate** the model structurally and conduct counterfactual analyses for **welfare loss** and **reform gains** of the representative Chinese entrepreneur

Main Findings

- The observed valuation discount = entrepreneur's willingness to pay to bypass capital market distortions + firm quality differential.
- Overseas listing is in fact a **positive selection**: Overseas listed Chinese firms are on average better than their domestically listed peers.
- **Substantial (>60%) and persistent** valuation discount for overseas listings
- The discounts are greater
 - when there is a **tightening of capital outflow controls**
 - during domestic market **IPO suspension** or **PE restriction**
- A representative Chinese entrepreneur faces
 - **8.6% welfare loss due to capital outflow controls**
 - **10.7% welfare loss due to regulations in IPO system**
 - **22.1% welfare gain from capital market reforms**

Institutional Background: Capital Outflow Controls

- China has **strict capital controls** (though current account convertibility since 1996)
- Capital controls on both directions, but especially binding on outflows
 - Chinese citizens face a \$50,000 annual foreign exchange quota
 - No offshore property purchase or portfolio investment
- Capital outflow restrictions also exist in other countries
 - Malaysia (1998); India (2013); Argentina (2011)
- Finding a way around the regulations is something of a national pastime
 - For middle-class families: making money and diversifying portfolio
 - **For rich and powerful: protecting fortunes and setting a backup plan**

Consequence of Violating Capital Controls

- People caught using illegal currency-exchange services in mainland China usually are fined **30%** or more of the amount they attempted to transfer.
- If the sum is significant, those providing the service face significant jail time. Reports of sentences ranging from **one to five years** are common.
- Financial institutions with violation or negligence of forex rules – such as helping companies falsify trade documents for foreign currency purchase or failing to conduct due diligence to verify their clients' applications – are **fined and sanctioned** by SAFE.
- Overseas IPO is a legitimate way of moving wealth across border.

Capital Outflow Control – The Rich

Bloomberg



Wealth | Investing

NYC Becomes One Billionaire Family's Haven From China Property Crash

Soho China's founders shifted much of their fortune out of the country before controls tightened and the market imploded.



A pedestrian walks past the illuminated Sky Soho building in Shanghai. *Photographer: Qilai Shen/Bloomberg*



The General Motors Building in New York. *Photographer: Andrew Harrer/Bloomberg*

Zhang and Pan's story is a case study in how to be prepared. Their five-part strategy – build a successful business in China, list it on a global exchange, pay out billions of dollars in dividends, set up a family office abroad and buy up foreign real estate – means their fortune is relatively protected while other Chinese billionaires have seen their riches crumble after running foul of President Xi Jinping's clampdowns.

Right Moves

What's saved their personal fortune was the decision to list Soho on the Hong Kong stock exchange in 2007 rather than in China, said four people familiar with the matter, who asked not to be identified discussing private information. Goldman Sachs Group Inc., who Zhang worked for in London after earning a master's degree in development economics at the University of Cambridge, handled the listing.



Capital Outflow Control – The Powerful

Ant Group is connected to former Hangzhou party secretary's corruption case - FT

Reuters



- In October 2020, Ant Group was set to raise US\$34.5 billion in the world's largest IPO at the time simultaneously in SSE and HKEX
- Suspended 2 days before scheduled IPO
- Reported: Zhou Jiangyong and family invested 500m RMB in Ant Group before its IPO and a 520m RMB was returned after the IPO suspension

Institutional Background: The IPO Approval System

- The security market regulation takes a heavy-handed paternalistic approach that, until recently, includes demanding listing pre-conditions and a long review process (Allan, et al. 2023; Tian, 2020; Qian, et al. 2022)
- Features of the IPO approval system
 - **Long IPO waiting period**
 - **Long IPO lock-up period for major shareholders**
 - **Constraints on IPO issue price**
- Sometimes IPOs are **suspended** for reasons not related to the merit of the firm or the entrepreneur.
- **Overseas IPO is an alternative way of raising capital in a timely fashion.**

Comparing Waiting Periods in the Two Markets

	China	HK & US
IPO system	Administrative Approval	Registration
Regime	“Merit-based”	Disclosure-based
Philosophy	Paternalistic approach to protect investors and foster national development	Trusting adult investors to make responsible decisions as long as the disclosure is accurate
Practice	New listings to be cleared by regulators on a case-by-case basis	New listings to be registered with regulators as long as meeting disclosure requirements
Duration of wait	1-5 years	0.5-1 years

Comparing IPO Lock-up Periods in Two Markets

- An IPO lock-up period = the period after IPO during which insiders are not allowed to sell down shares
- Lock-up periods apply to insiders such as a company's founders, owners, early investors, managers, and employees
- The purpose of an IPO lock-up period is to prevent insiders from inundating the market with large numbers of shares after IPO
- Typical lock-up period
 - **Mainland China: 1-3 years**
 - **Hong Kong and US: typically, 0.5 year**

Constraints on IPO Issue Price in Mainland China

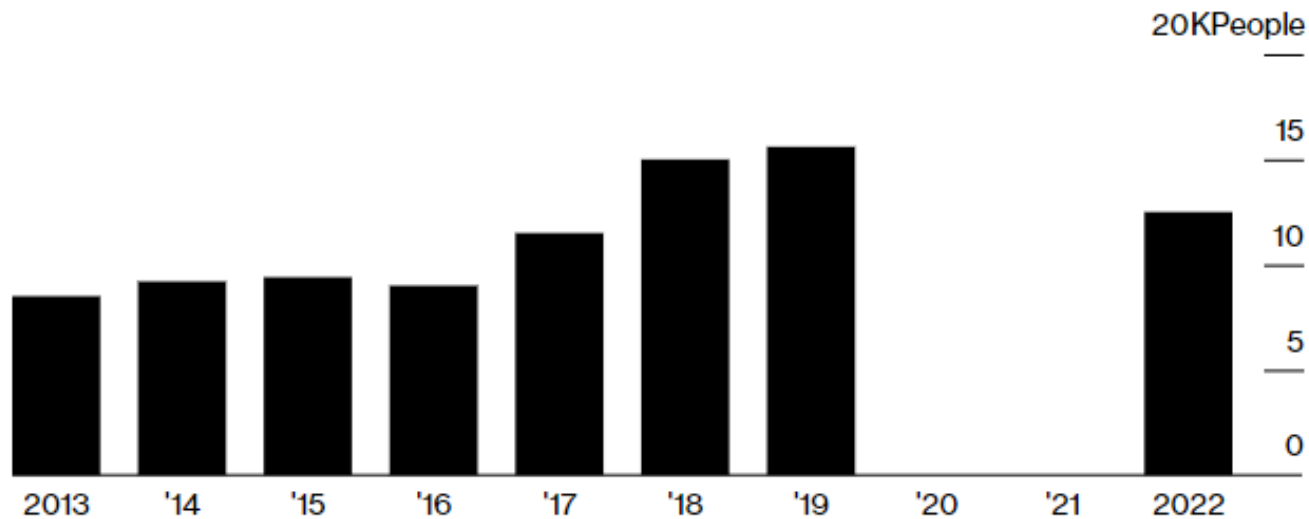
Period	Rules or Reforms	IPO PE Restrictions
Before July 1997	Window guidance	$12 \leq PE \leq 15$
July 1997 – Nov 2001	CSRC followed “Security Law”	No PE restrictions
Nov 2001 – Dec 2004	CSRC issued “Notice”	$PE \leq 20$
Dec 2004 – June 2009	Book building reform	$PE \leq 30$
June 2009 – April 2012	CSRC issued “Guiding Opinions”	No PE restrictions
April 2012 – Oct 2012	CSRC issued “Further Notice”	$PE < 125\%$ industry average
Oct 2012 – April 2014	IPO suspension	No IPO
April 2014 – next reform	Window guidance	$PE \leq 23$
June 2019 – present	Establishment of STAR	No PE restrictions
June 2020 – present	IPO reform for ChiNext	No PE restrictions
Feb 2023 – present	IPO reform for main board	No PE restrictions

Institutional Background: Concerns on Security of Property Rights

- Future changes in tax rate for “common prosperity”
- Unanticipated penalty or criminal investigation under anti-corruption
- Crackdowns on ideologically out-of-favor industries
- Recent trend in wealth management sector in [Hong Kong](#) vs [Singapore](#)

High-Net-Worth People Leaving China

China saw a net outflow of 10,800 wealthy individuals in 2022



Source: New World Wealth, global data intelligence partner of Henley & Partners

NOTE: Movement of high-net-worth individuals was negligible (less than 500 per year) for China in 2020 and 2021

An IPO Locational Choice Model

- Inspired by Borjas (1987, 1988)'s international immigration model.
- Suppose there are two markets: domestic 0 and overseas 1.
- Consider a Chinese entrepreneur who chooses where to go IPO.
- What are the benefits and costs of listing in the two markets?
- Key trade-off:
 - An overseas IPO is a legitimate way of raising capital timely and keeping wealth outside border; but the wealth raised is less.
 - A domestic IPO raises more wealth; but the process is long, and the cost of converting onshore wealth to offshore wealth is high.

Notations

- Q : Tobin's Q ; q : log of Tobin's Q
- r : discount rate
- T : waiting period for IPO approval + lock-up period
- e : official exchange rate, 1 USD = e RMBs
- τ : iceberg transaction cost for converting RMB into dollars onshore
 - 1 USD onshore = $e(1 + \tau)$ RMBs
- δ : discount rate for onshore wealth, which reflects her preference for holding wealth abroad, due to:
 - insecurity of domestic property rights
 - other reasons such as international portfolio diversification
 - 1 USD offshore = $(1 + \delta)$ USD onshore

Valuation in Home and Overseas Market

- The wealth generated in local currency from 1 unit of ownership after IPO in the two markets are, respectively,

$$Q_0 \text{ and } Q_1/e$$

- The PV of the wealth after discounting the delays in waiting and lock-up periods are, respectively

$$\frac{Q_0}{(1+r)^{T_0}} \text{ and } \frac{1}{e} \frac{Q_1}{(1+r)^{T_1}}$$

- The PV of the wealth from IPO in market 0 that has been **converted to US dollars** but is still onshore:

$$\frac{1}{e(1+\tau)} \frac{Q_0}{(1+r)^{T_0}}$$

- The PV of the wealth from IPO in market 0 that has been **converted to US dollars** and **moved offshore**:

$$\frac{1}{e(1+\tau)(1+\delta)} \frac{Q_0}{(1+r)^{T_0}}$$

Decision Rule for IPO location

- Expected utility of the entrepreneur from the two IPO locations are:

$$U_0 = \ln \left[\frac{1}{e(1+\tau)(1+\delta)} \frac{Q_0}{(1+r)^{T_0}} \right] \quad \text{and} \quad U_1 = \ln \left[\frac{1}{e} \frac{Q_1}{(1+r)^{T_1}} \right]$$

- She chooses an overseas IPO if and only if $U_1 > U_0$

$$t = I[U_1 \geq U_0]$$

- Apply log-linearization and denote $d = r(T_0 - T_1)$

- The decision rule nails down to going an overseas IPO iff:

$$q_1 - q_0 \geq -c$$

- Where

$$c = d + \tau + \delta$$

- C is the net cost faced the entrepreneur from a combination of **IPO and lockup regulation (d)**, **capital control (τ)**, and **expropriation risk (δ)**

Distributional Assumptions

- Suppose the Tobin's Q in the home market (0) is:

$$q_0 = \mu_0 + \varepsilon_0$$

- The Tobin's Q facing the same entrepreneur in the overseas market (1) is:

$$q_1 = \mu_1 + \varepsilon_1$$

- The cost of capital market distortions can be written as

$$c = \mu_c + \varepsilon_c$$

- where μ_0 , μ_1 and μ_c are **potential means of population** valuation and cost
- **Idiosyncratic** ε_0 , ε_1 and ε_c follow a tri-variate normal distribution

$$\begin{pmatrix} \varepsilon_0 \\ \varepsilon_1 \\ \varepsilon_c \end{pmatrix} \sim N \left\{ \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma_0^2 & \rho_{01}\sigma_0\sigma_1 & \rho_{0c}\sigma_0\sigma_c \\ \rho_{01}\sigma_0\sigma_1 & \sigma_1^2 & \rho_{1c}\sigma_1\sigma_c \\ \rho_{0c}\sigma_0\sigma_c & \rho_{1c}\sigma_1\sigma_c & \sigma_c^2 \end{pmatrix} \right\}$$

Propositions (from the treatment effect framework)

- c_m : cost facing the marginal entrepreneur m
- S_0 and S_1 : quality difference btw treated and population in 0 and 1 market
- **Prop 1**: probability of overseas listing $\frac{\partial P}{\partial \mu_1} > 0$, $\frac{\partial P}{\partial \mu_0} < 0$ and $\frac{\partial P}{\partial \mu_c} > 0$
- **Prop 2**: average treatment effect on the population $ATE = -c_m$
- **Prop 3**: average treatment effect on the treated $ATET = ATE + (S_1 - S_0)$
- **Prop 4**: effect of self-selection $SB = \frac{S_0}{1-P}$
- **Prop 5**: observed group mean difference $GMD = ATET + SB$
- **GMD is the sum of ATET (distortion hypothesis – our story), and the SB (negative selection hypothesis – our competing hypothesis)**
- Apply the model to data to back out P, ATE, ATET, SB and GMD.

Empirical Specification

- An endogenous treatment effect model

$$(1) \quad t_i = 1\{X_i\alpha_1 + Z_i\alpha_2 + v_i > 0\}$$

$$(2) \quad y_i = t_i y_{i1} + (1 - t_i) y_{i0}$$

$$(3) \quad y_{i1} = X_i\beta_{11} + \varepsilon_{i1}$$

$$(4) \quad y_{i0} = X_i\beta_{10} + \varepsilon_{i0}$$

$$(5) \quad \begin{pmatrix} \varepsilon_{i0} \\ \varepsilon_{i1} \\ v_i \end{pmatrix} \sim N \left\{ \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma'_0{}^2 & \rho'_{01}\sigma'_0\sigma'_1 & \rho'_{0v}\sigma'_0 \\ \rho'_{01}\sigma'_0\sigma'_1 & \sigma'_1{}^2 & \rho'_{1v}\sigma'_1 \\ \rho'_{0v}\sigma'_0 & \rho'_{1v}\sigma'_1 & 1 \end{pmatrix} \right\}$$

- t_i : treatment indicator – **1 for overseas IPO and 0 for domestic listing**
- y_i : market valuation – Tobin's Q, PB ratio, PE ratio
- X_i : observable firm characteristics – from literature + our new hypothesis
- Z_i : instrumental variable for identification
- v_i : unobserved factors which may affect listing location choice
- ε_i : unobserved factors which may affect market valuation

Empirical Strategies

- Maintain the same structures as the theory model
- Control for observable firm characteristics
- Estimate the model using control function approach
- Exploit two IVs to address the endogeneity
- Estimate a general and a simplified model

Probit Model

Probit Model	Overseas listing
Age	0.034***
Log(total asset)	-0.157***
ROA(%)	0.036***
Sales growth rate (%)	0.007***
Leverage (%)	0.024***
Intangible assets ratio (%)	0.015***
State ownership percentage (%)	0.003
Independent director ratio (%)	0.071***
CEO=Chairman	0.323***
Top5 ownership percentage (%)	0.008**
Controlling shareholder dummy	0.340***
Import and export ratio (%)	-0.001
Strategic investor dummy	0.750***
Foreign reserve growth rate (%)	-0.011
Exchange rate growth(%)	0.199***
Foreign ownership percentage (%)	0.011***
Operating cash flow ratio(%)	-0.025***
PE regulation	0.018
Expected relative waiting days	0.362***
Log(relative market index)	0.432***
Industry, Year, Province	YES
Observations	2,729

- Firm fundamentals
- Bonding hypothesis
- Globalization hypothesis
- Capital controls
- IPO regulations

Decomposition from Valuation Model - 1-Year post IPO

	Estimates	Observable	Unobservables
$E[Y_0 t=0]$: observed	4.05		
$E[Y_1 t=1]$: observed	1.91		
$E[Y_1 t=0]$: predicted	3.08		
$E[Y_0 t=1]$: predicted	5.69		
ATE = $E[Y_1] - E[Y_0]$	-1.56***		
Valuation discount for population: ATE/$E[Y_0]$	-35%		
ATET = $E[Y_1 t=1] - E[Y_0 t=1]$	-3.78***		
Value discount for treated: ATET/$E[Y_0 t=1]$	-66%		
$\mu_0 = (1-P) * E[Y_0 t=0] + P * E[Y_0 t=1]$	4.40***		
$\mu_1 = (1-P) * E[Y_1 t=0] + P * E[Y_1 t=1]$	2.83***		
$S_0 = E[Y_0 t=1] - \mu_0$	1.29***	0.84**	0.45***
$S_1 = E[Y_1 t=1] - \mu_1$	-0.92***	-0.51**	-0.41**
GMD = $E[Y_1 t=1] - E[Y_0 t=0]$: observed	-2.15***		
ATET = $E[Y_1 t=1] - E[Y_0 t=1]$: estimated	-3.78***	-2.92***	-0.86***
SB = $E[Y_0 t=1] - E[Y_0 t=0]$: estimated	1.63***	1.06***	0.57***

- Significant treatment effect due to capital market distortions
- Positive selection in domestic market and due to both observables & unobservables

Valuation Discount K periods after IPO

	Tobin's Q						
	At IPO	1-Day	1-Year	2- Year	3-Year	4-Year	5-Year
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ATE	-1.58*** (0.35)	-3.25*** (0.63)	-1.56*** (0.40)	-1.01*** (0.40)	-1.37** (0.25)	-1.88*** (0.23)	-2.42*** (0.19)
E[Y0]	4.42	6.12	4.40	3.32	3.20	3.36	3.66
ATE/E[Y0]	-36%	-54%	-36%	-30%	-42%	-56%	-66%
ATET ATE	-1.12*** (0.41)	-2.23*** (0.72)	-3.78*** (0.39)	-1.93*** (0.33)	-1.47*** (0.33)	-1.60*** (0.41)	-2.30*** (0.38)
E[Y0 t=1]	3.96	5.59	5.69	3.68	3.00	3.05	3.74
ATET/E[Y0 t=1]	-28%	-42%	-66%	-52%	-49%	-52%	-61%
Observations	2,675	2,675	2,729	2,455	2,278	1,787	1,517

Is such a substantial valuation discount sensible? Let's check...

Validity Check #1: Price gaps in dual listed stocks

- About 100 stocks are simultaneously listed in HK and Mainland stock exchanges
- For the dual listed stocks, the H share price discounts can be directly observed without fancy econometrics
- (1) Such stocks have no more wait for IPO and no more lockup in the two markets (although seasonal offerings in the A share market are still subject to approval)
- (2) A portion of the wealth is subject to capital controls and expropriation risk (Both dividends and capital gains from selling down shares in the A-share market are still subject to capital controls and expropriation risk.)
- Implication of our model:
- H-share discounts for dual-listed firms can be considered a lower bound estimate of the cost on the entrepreneurs

Validity Check #1: The H share discounts in dual listed stocks

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Sample	AH dual- listed	other overseas listed	AH dual- listed	other overseas listed	AH dual- listed	other overseas listed	AH dual- listed	Other overseas listed	AH dual- listed	Other overseas listed
K'th year after H share IPO	1st Year		2nd Year		3rd Year		4th Year		5th Year	
Valuation discount	-22%	-59%	-24%	-48%	-28%	-39%	-36%	-47%	-40%	-59%
# firms	29		30		31		38		35	

Validation check #2: Home coming stocks

- A subset of previously overseas listed firms have chosen to delist in the offshore market and re-list in the A share market
- A rough estimate of their overseas haircut is the difference between their last offshore value and their first onshore value
 - This can be done without fancy econometrics
- Note: this is also a self-selected group
- Interpreted by our model:
 - Coming home for those firms if $c < q_0 - q_1$

Validity Check #2: The “Home Coming” Stocks

Overseas Code	Year of delisting	Firm names in domestic market	domestic Code	Year of relisting	Tobin's Q 1 year after relisting	Tobin's Q 1 year before delisting	Valuation discount-Tobin's Q
CHA.N	2021	China Telecom	601728.SH	2021	0.91	0.75	-17.01%
CHL.N	2021	China Mobile	600941.SH	2022	1.13	0.94	-17.21%
XUE.N	2016	Xueda Education	000526.SZ	2016	1.98	1.51	-23.79%
CEO.N	2021	CNOOC	600938.SH	2022	1.20	0.88	-27.00%
MY.N	2016	Ming Yang Smart Energy	601615.SH	2019	1.39	0.88	-36.66%
MONT.O	2014	Montage Technology	688008.SH	2019	12.76	7.96	-37.64%
QIHU.N	2016	360 Total Security	601360.SH	2018	5.33	2.98	-44.12%
TSL.N	2017	Trina Solar	688599.SH	2020	2.47	0.95	-61.69%
GA.N	2014	Giant Network	002558.SZ	2016	11.52	2.99	-74.00%
0963.HK	2017	Bloomage Biotech	688363.SH	2019	11.52	2.43	-78.94%
FMCN.O	2013	Focus Media	002027.SZ	2016	10.44	2.00	-80.87%
JASO.O	2018	JA Solar Technology	002459.SZ	2018	4.04	0.77	-80.92%
YTEC.O	2012	Yusys Technologies	300674.SZ	2018	4.11	0.76	-81.45%
MR!.N	2016	Mindray	300760.SZ	2018	8.98	1.63	-81.90%
0597.HK	2011	CR Micro	688396.SH	2020	5.73	0.96	-83.29%
PWRD.O	2015	Perfect World	002624.SZ	2015	12.87	1.23	-90.43%
CTFO.O	2012	China TransInfo Technology	002373.SZ	2013	10.07	0.92	-90.91%
Average					6.26	1.80	-71.32%
Median					5.33	0.96	-82.04%

Validation #3: Policy shocks

- Capital control regulations
 - **Tightening of capital outflow control after 2017** ($\tau > 0 \Rightarrow ATE \downarrow$)
- Regulations in IPO system
 - **IPO suspension between 2012 and 2014** ($d > 0 \Rightarrow ATE \downarrow$)
 - **PE restriction between March 2014 and June 2020** ($q_0 \downarrow \Rightarrow$
change in marginal entrepreneur $\Rightarrow ATE \downarrow$)

DIDs Results for Policy Distortions

Dependent	Tobin's Q 1- year post IPO			
	(1)	(2)	(3)	(4)
Overseas listing	-2.845*** (0.319)	-2.490*** (0.335)	-2.219*** (0.326)	-2.083*** (0.363)
Capital control	1.018*** (0.362)			0.960*** (0.364)
Overseas listing*Capital controls	-0.676** (0.396)			-0.728*** (0.435)
IPO suspension		0.258 (0.271)		0.347 (0.300)
Overseas listing*IPO suspension		-1.669*** (0.325)		-1.550*** (0.380)
PE restriction			-0.804 (0.503)	-1.074** (0.531)
Overseas listing*PE restriction			-0.986*** (0.202)	-0.695*** (0.249)
Observations	2,729	2,729	2,729	2,729

Firm Heterogeneity

- Exploit firm heterogeneity to highlight impact of policy distortions
- Some firms are more impatient and risk averse ($ATE \downarrow$)
 - **High operating risk** vs low operating risk
 - **High intangible assets** vs low intangible assets
- Some firms may have more leeway to bypass capital controls ($ATE \uparrow$)
 - **High state ownership** vs low state ownership
- Certain investors may be more eager to move wealth offshore ($ATE \downarrow$)
 - **High foreign ownership** vs low foreign ownership

DIDs Results for Firm Heterogeneity

Dependent	Tobin's Q 1- year post IPO					
	(1)	(2)	(3)	(4)	(5)	(6)
Overseas listing	-2.908*** (0.324)	-2.308*** (0.370)	-2.216*** (0.411)	-2.630*** (0.319)	-1.632*** (0.508)	-0.686 (0.529)
Overseas listing*SOE dummy	0.703*** (0.235)				0.075 (0.256)	0.093 (0.231)
Overseas listing*High foreign ownership		-0.909*** (0.249)			-0.892*** (0.290)	-0.862*** (0.277)
Overseas listing*High operating risk			-0.717*** (0.191)		-0.614** (0.197)	-0.843*** (0.195)
Overseas listing*High intangible assets				-0.381* (0.218)	-0.245 (0.219)	-0.132 (0.213)
Overseas listing*Capital control						-0.708* (0.428)
Overseas listing*IPO suspension						-1.408*** (0.383)
Overseas listing*PE restriction						-0.921*** (0.259)
Observations	2,729	2,729	2,698	2,729	2,698	2,698

Triple DIDs Results

Dependent	Tobin's Q 1- year post IPO		
	(1)	(2)	(3)
Overseas listing	-2.313*** (0.405)	-1.910*** (0.472)	-2.346*** (0.347)
Overseas listing*Capital controls*High foreign ownership	-1.443* (0.791)		
Overseas listing*IPO suspension*High operating risk		-1.604*** (0.518)	
Overseas listing*IPO suspension*High intangible assets			-1.025* (0.543)
Observations	2,729	2,729	2,729

Recall from the Theoretical Model

- The utility of the entrepreneur from IPO in the two markets are

$$U_0 = \ln \left[\frac{1}{e(1+\tau)(1+\delta)} \frac{Q_0}{(1+r)^{T_0}} \right] \quad \text{and} \quad U_1 = \ln \left[\frac{1}{e} \frac{Q_1}{(1+r)^{T_1}} \right]$$

- Decision rule $q_1 - q_0 \geq -c$, where

$$c = \tau + d + \delta$$

$$q_0 = \mu_0 + \varepsilon_0$$

$$q_1 = \mu_1 + \varepsilon_1$$

$$c = \mu_c + \varepsilon_c$$

$$\begin{pmatrix} \varepsilon_0 \\ \varepsilon_1 \\ \varepsilon_c \end{pmatrix} \sim N \left\{ \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma_0^2 & \rho_{01}\sigma_0\sigma_1 & \rho_{0c}\sigma_0\sigma_c \\ \rho_{01}\sigma_0\sigma_1 & \sigma_1^2 & \rho_{1c}\sigma_1\sigma_c \\ \rho_{0c}\sigma_0\sigma_c & \rho_{1c}\sigma_1 & \sigma_c^2 \end{pmatrix} \right\}$$

- The entrepreneur welfare depends on 9 primitive parameters

$$(\mu_0, \mu_1, \mu_c, \sigma_0, \sigma_1, \sigma_c, \rho_{01}, \rho_{0c}, \rho_{1c})$$

Simulated Method of Moments Estimation

parameter	estimate	s.e.	targeted moments	data	simulated
μ_0	1.500	0.028	$E[Y_{i0}]$	4.40	4.74
μ_1	0.663	0.052	$E[Y_{i1}]$	2.83	2.24
μ_c	0.322	0.085	$P[t_i = 1]$	0.21	0.23
σ_0	0.333	0.013	$E[\varepsilon_{i0} t_i = 0]$	-0.12	-0.12
σ_1	0.540	0.037	$E[\varepsilon_{i1} t_i = 1]$	-0.41	-0.48
σ_c	1.172	0.031	$sd[\varepsilon_{i0} t_i = 0]$	1.71	1.57
ρ_{01}	0.229	0.614	$sd[\varepsilon_{i1} t_i = 1]$	1.81	0.98
ρ_{0c}	0.584	0.089	$corr[v_i, \varepsilon_{i0} t_i = 0]$	0.15	0.13
ρ_{1c}	-0.775	0.058	$corr[v_i, \varepsilon_{i1} t_i = 1]$	-0.23	-0.15
			untargeted moments	data	simulated
			$E[Y_{i0} t_i = 0]$	4.05	4.62
			$E[Y_{i1} t_i = 1]$	1.91	1.76

Illustrative Interpretation of the Cost Components

- We model $c = \tau + d + \delta$
- We estimate $c = \mu_c + \varepsilon_c$, where $\mu_c = 0.32$ and $\varepsilon_c \sim N(0, 1.17^2)$
- Assume $\mu_c = \tau + d$ is common for all, and $\delta = \varepsilon_c$ is individual specific.
- As $T_0 = 4, T_1 = 1$, and assume $r = 6\%$, then $d = r(T_0 - T_1) = 18\%$
- $\tau = \mu_c - d = 0.32 - 0.18 = 0.14$
- For a marginal entrepreneur, $c_m = q_0 - q_1 = 0.56$
- Then $\delta_m = c_m - \mu_c = 0.56 - 0.32 = 0.24$
- The marginal entrepreneur would be willing to pay
 - a fee of 18% (d) to shorten IPO and lockup periods to overseas levels,
 - a fee of 14% (τ) to convert RMB asset to onshore dollar asset,
 - and another fee of 24% (δ) to move the asset from onshore to offshore.

Welfare Loss and Counterfactual “Reform Dividends”

	τ	T_0	T_1	d	μ_c	P (t = 1)	expected U	Δ in U %
Baseline	0.14	4	1	0.18	0.32	0.23	1.21	NA
Reforms (reducing C)								
IPO reform	0.14	1	1	0.00	0.14	0.16	1.36	12.0%
CA liberalization	0.00	4	1	0.18	0.18	0.17	1.32	9.4%
both reforms	0.00	1	1	0.00	0.00	0.12	1.48	22.1%
What if raising c?								
Ban overseas listing	0.14	4	30.00	-1.56	-1.42	0.00	1.12	-7.8%
Complete capital control	1.00	4	1	0.18	1.18	0.69	0.74	-38.7%

- welfare loss due to regulation in IPO system: $(1.21-1.36)/1.36 = -10.7\%$
- welfare loss due to capital outflow control: $(1.21-1.32)/1.32 = -8.6\%$
- welfare loss due to capital market distortions: $(1.21-1.48)/1.48 = -18.1\%$

Counterfactual Analyses: Decomposition

welfare loss	18.00%	28.50%	0%
$\mu_c = 0$	$U_0 = 1.784$	$U_0 = 0.610$	$U_1 = 0.300$
identity	always $t_i = 0$	$t_i = 0$ if $\mu_c = 0$ switchers $t_i = 1$ if $\mu_c = 0.32$	always $t_i = 1$
$\mu_c = 0.32$	$U_0 = 1.462$	$U_1 = 0.436$	$U_1 = 0.300$
proportion	76.8%	11.6%	11.5%

Note: home listing overseas listing

- welfare loss for always overseas listing: 0%
- welfare loss for switchers: $(0.436 - 0.610) / 0.610 = -28.5\%$
- welfare loss for always domestic listing: $(1.462 - 1.784) / 1.784 = -18.0\%$

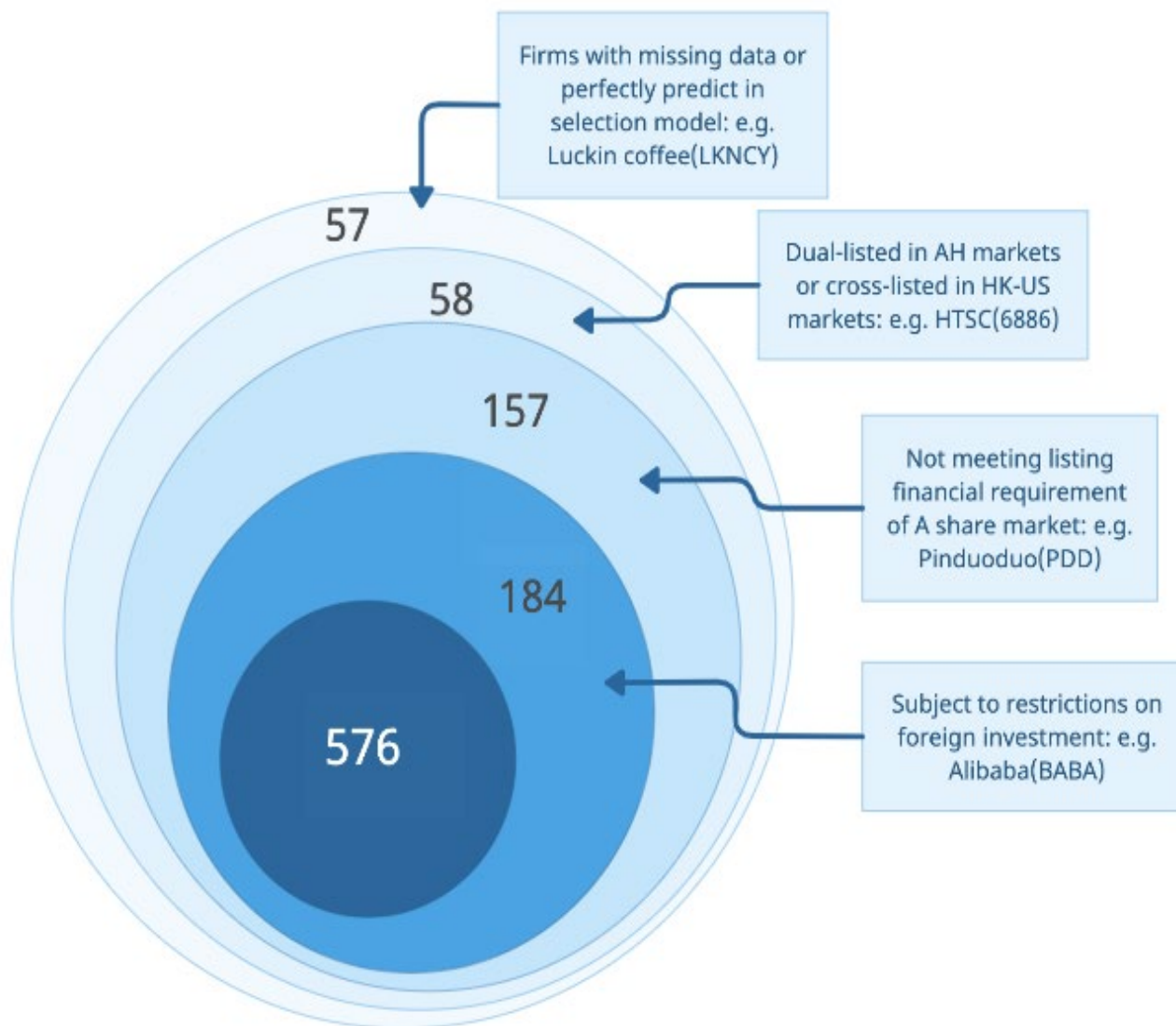
Conclusion

- The market anomaly of going overseas IPO despite of a large valuation discount by Chinese entrepreneurs could be an optimal choice, once taking into count the hidden cost they face.
- On average, overseas listed Chinese firms are of higher quality.
- The valuation discount may be viewed as a “willingness to pay” by the entrepreneurs to circumvent a package of capital market distortions.
- **How costly are such distortions?**
 - On average overseas listed Chinese firms give up 60% valuation.
 - Entrepreneurs that have chosen to list at home also suffer from capital market distortions.
- Capital market reforms to the same efficiency level as HK or US could improve the entrepreneurial welfare by 22%.

Robustness Checks

- Alternative samples vs benchmark sample of qualified firms
- Alternative valuation measure: Price/Book ratio
- Relative market sentiment measured in 6- or 24 months before IPO
- Excluding real estate, financial, or technology firms
- Including risk, liquidity and floating market cap measure in valuation
- Excluding pre-IPO factors in valuation
- Alternative approaches: IV, IPWRA, and matching

Treatment Group: 576 stocks



Estimates from Extended Samples

Valuation Equation in the Simple Model across Different Sample

Dependent	Tobin's Q			
	(1) 1st Year Benchmark sample	(2) 1st Year +Restricted	(3) 1st Year +Restricted & Prohibited	(4) 1st Year +Negative list & Unqualified firms
Variables				
ATE	-2.72*** (0.35)	-2.80*** (0.27)	-2.94*** (0.24)	-3.18*** (0.33)
E[Y0]	4.17	4.22	4.27	4.45
ATE/E[Y0 t=1]	-65%	-66%	-69%	-71%
ATET	-2.72*** (0.35)	-2.80*** (0.27)	-2.94*** (0.24)	-3.18*** (0.33)
E[Y0 t=1]	4.62	4.71	4.89	5.37
ATET/E[Y0 t=1]	-59%	-59%	-60.00%	-59%
Observations	2,729	2,857	2,913	3,072

Notes:

1. The outcome models are estimated with the treatment models simultaneously.
2. Standard errors are reported in parenthesis. ***, **, * indicate statistical significance at 1%, 5%, and 10% level.

Estimates from Extended Samples

Valuation Equation in Simple Model with Multiple Location and Mode

	Listing Location	Listing Mode
US listing	-3.107*** (0.410)	
HK listing	-2.674*** (0.254)	
Listing with VIE		-3.277*** (0.372)
Listing without VIE		-2.803*** (0.245)
$E[y_{i0}/t_{i(\text{US listing})}=1]$	5.322	
$E[y_{i0}/t_{i(\text{HK listing})}=1]$	4.580	
$E[y_{i0}/t_{i(\text{with VIE})}=1]$		5.729
$E[y_{i0}/t_{i(\text{without VIE})}=1]$		4.665
$ATET/E[y_{i0}/t_{i(\text{US listing})}=1]$	58.38%	
$ATET/E[y_{i0}/t_{i(\text{HK listing})}=1]$	58.38%	
$ATET/E[y_{i0}/t_{i(\text{with VIE})}=1]$		-57.20%
$ATET/E[y_{i0}/t_{i(\text{without VIE})}=1]$		-60.09%

Notes:

1. The outcome models are estimated with the treatment models simultaneously.
2. Standard errors are reported in parenthesis. ***, **, * indicate statistical significance at 1%, 5%, and 10% level.