The Role of Big 4 Auditors in the Global Primary Market:

- Does Audit Quality Matter Most When Investors Are Protected Least?

Inder Khurana, *University of Missouri*

Chenkai Ni (**presenter**), *Fudan University*

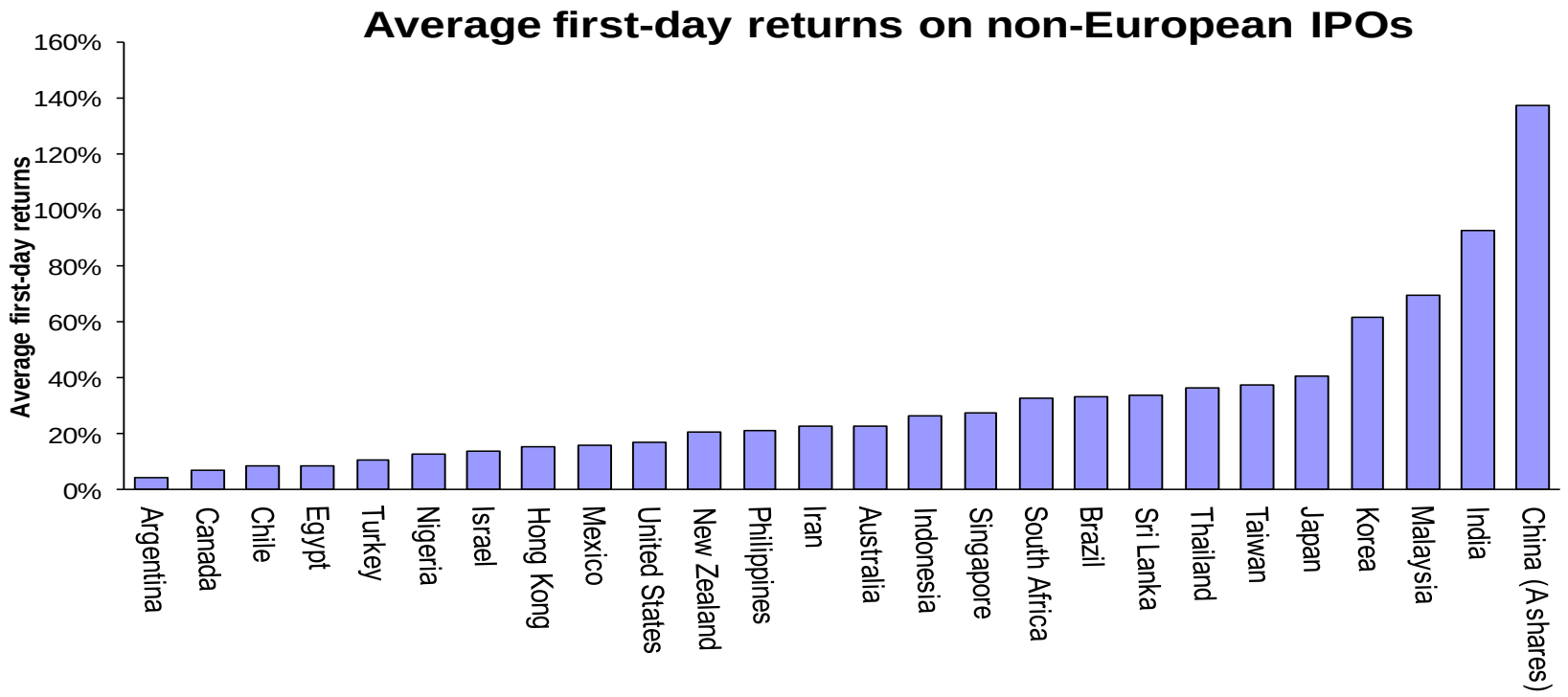
Charles Shi, *National University of Singapore*

The World-wide Prevalence of IPO Underpricing

- The stylized fact of IPO underpricing:
  - Positive return on the first trading day;
  - Significant amount of “money left on the table”;

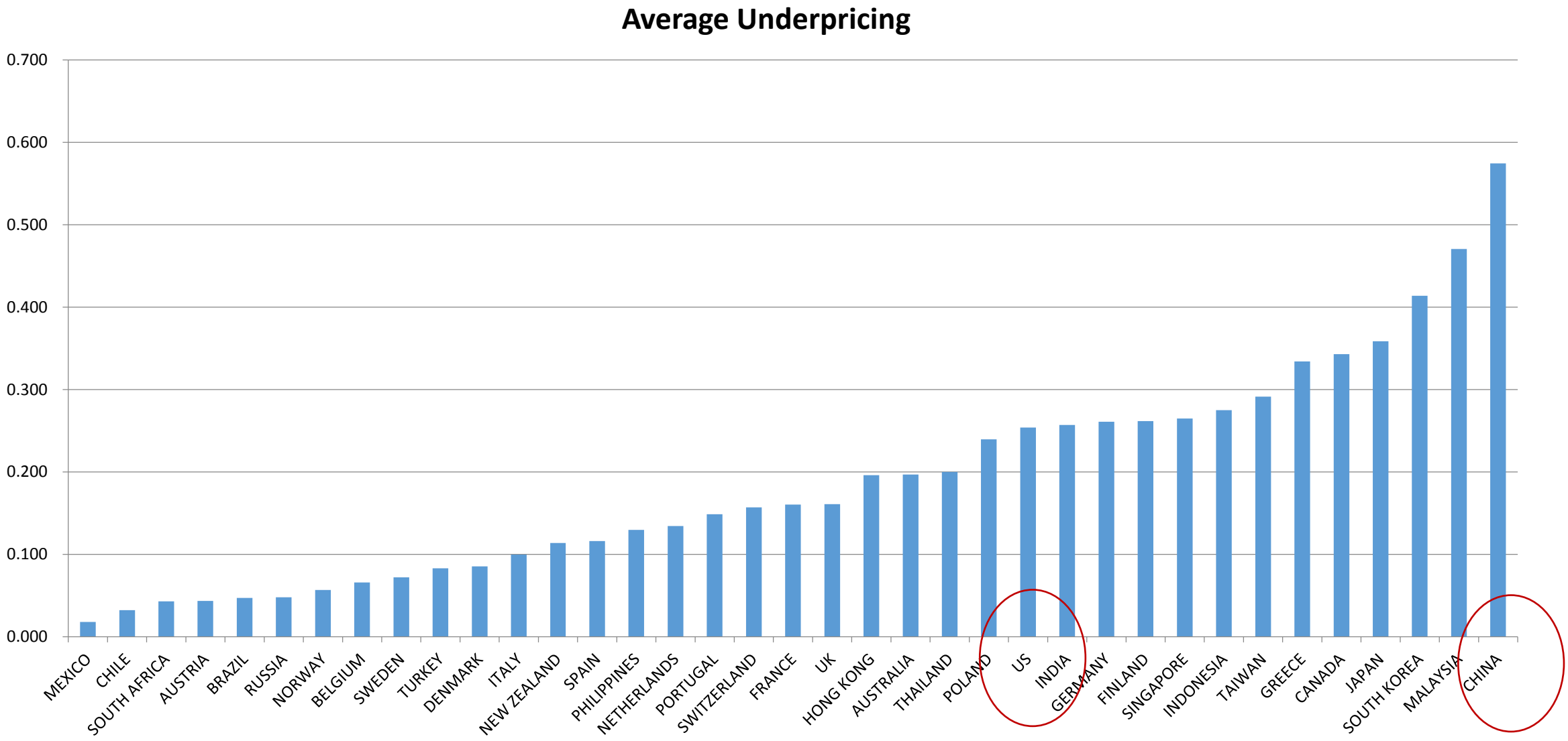
- World-wide prevalence:
  - IPO underpricing exists in all countries (statistics on Jay Ritter’s website);
  - IPO underpricing exists in all 37 countries in Boulton et al. (2011);
  - Same findings as in our study.

Country-level IPO Underpricing from Jay Ritter's Website



Source: Prof. Jay Ritter, University of Florida, December 2011

Country-level IPO Underpricing in Our Sample



Information Asymmetry as An Explanation

- Theories explaining IPO underpricing:
  - **Asymmetric information models**
  - Institutional explanations
  - Ownership and control
  - Behavior explanations
  - See **Ljungqvist (2007)** for a detailed survey of IPO underpricing.

Information Asymmetry as An Explanation

- Information asymmetry has been a key factor in various models.

- '***Winner's curse***' theory based on adverse selection:
  - Rock (1986);
  - Informed investors vs. uninformed investors;
  - The uninformed only receives shares that are relatively over-priced;
  - IPO Underpricing compensates the uninformed;
  - Info asymmetry increases the adverse selection problem, inducing higher underpricing.

- **Prediction:** A higher degree of information asymmetry is associated with more IPO underpricing.

Information Asymmetry as An Explanation

- Other theories related to information asymmetry:
  - Signaling model (Grinblatt and Hwang, 1989; Welch, 1989);
  - The principal-agent model (Baron 1982);
  - The book-building model (Benveniste and Spindt, 1989);

- **Common Prediction:** A higher degree of information asymmetry is associated with more IPO underpricing.

Reputable Intermediaries to Reduce IPO Underpricing

- Theoretical studies on the role of reputable intermediaries;

- Datar, Feltham and Hughes (1991);
  - The informational value of audits increases in audit quality;

- Titman and Trueman (1986);
  - Share value increases in the quality of auditors and investment bankers.

- **Prediction:** A reputable intermediaries (Big N auditor in our setting) increases the share valuation and decreases share discounts during issuances.

Related Literature – U.S. Empirical Evidence

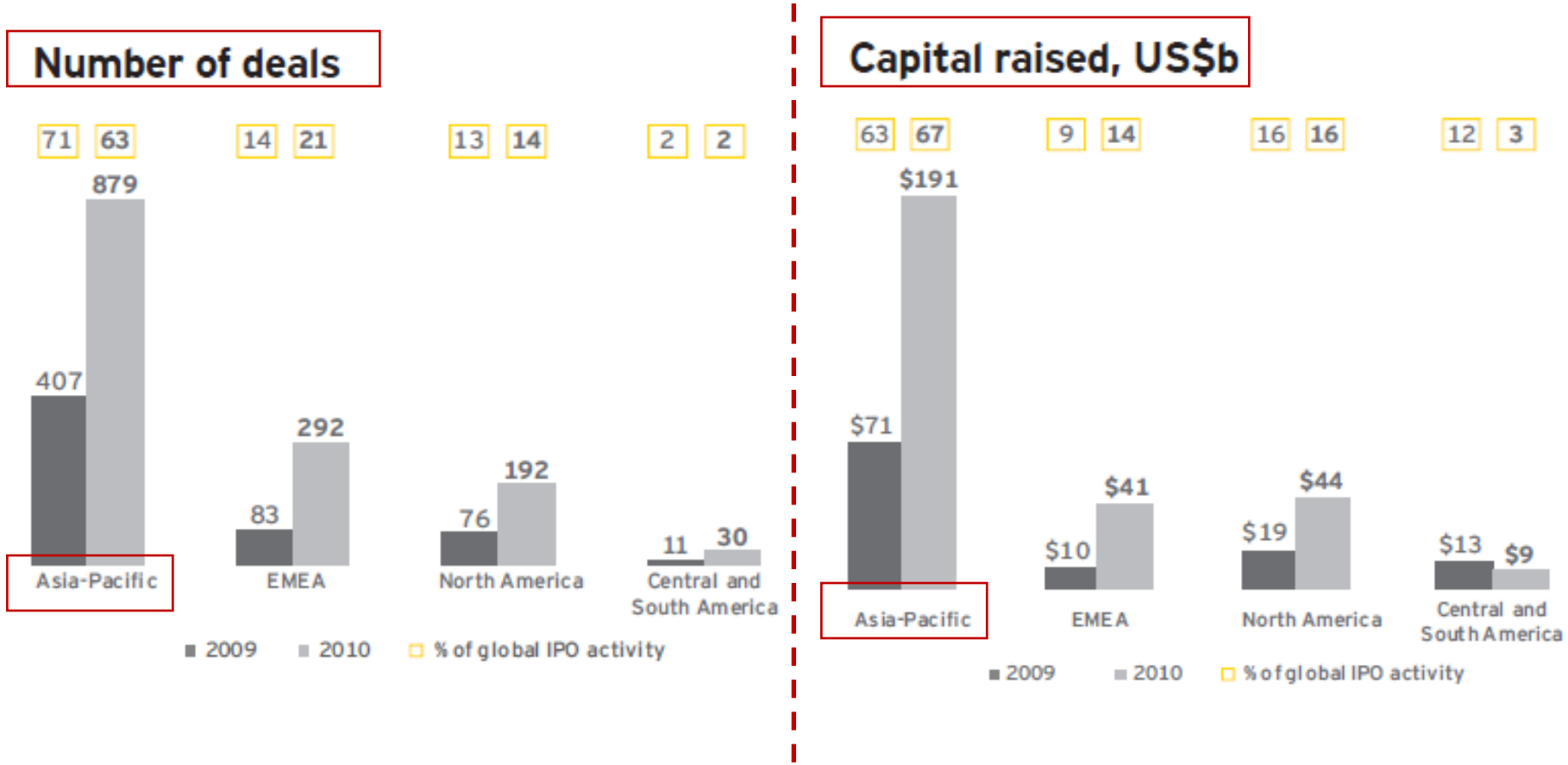
- Overall inference:
  - Higher quality audits during IPOs reduce IPO underpricing;
  - Specific to earlier sample periods;
  - Balvers et al. (1988); Beatty (1989); Hogan (1997); Willenborg (1999).

Big N and IPO Underpricing

- Important to put the questions under a cross-country IPO setting because:
  - (1) IPO underpricing exists in almost all countries around the world;
  - (2) Substantial variation in both country-level underpricing and institutional qualities that may shape the role of auditors;

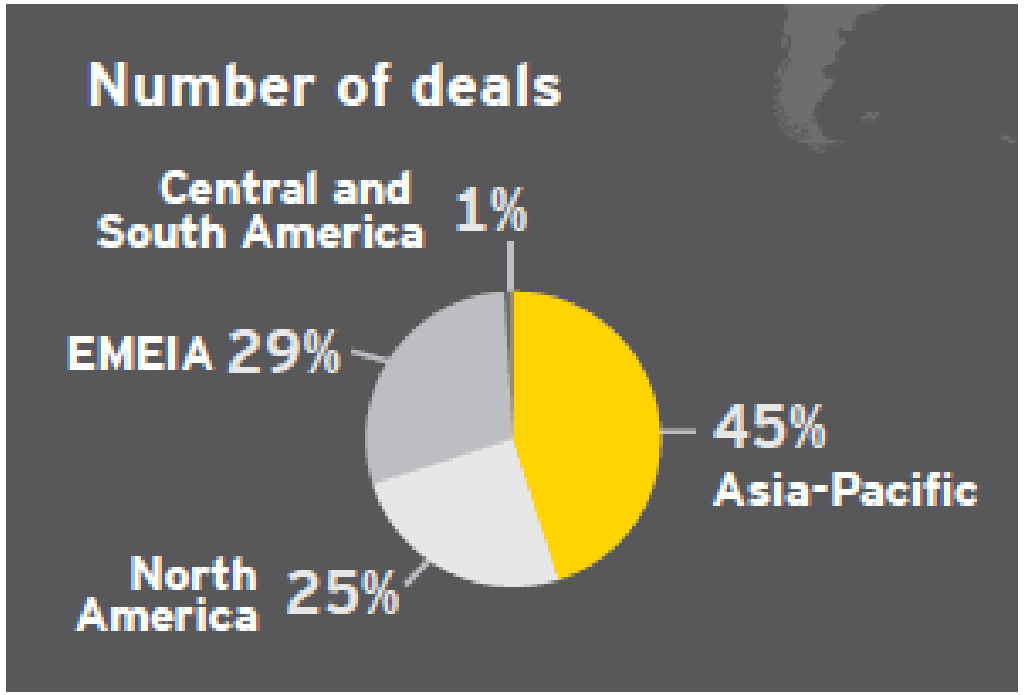
- **Hypothesis 1:** Employing a Big N auditor is associated with lower IPO underpricing around the world.

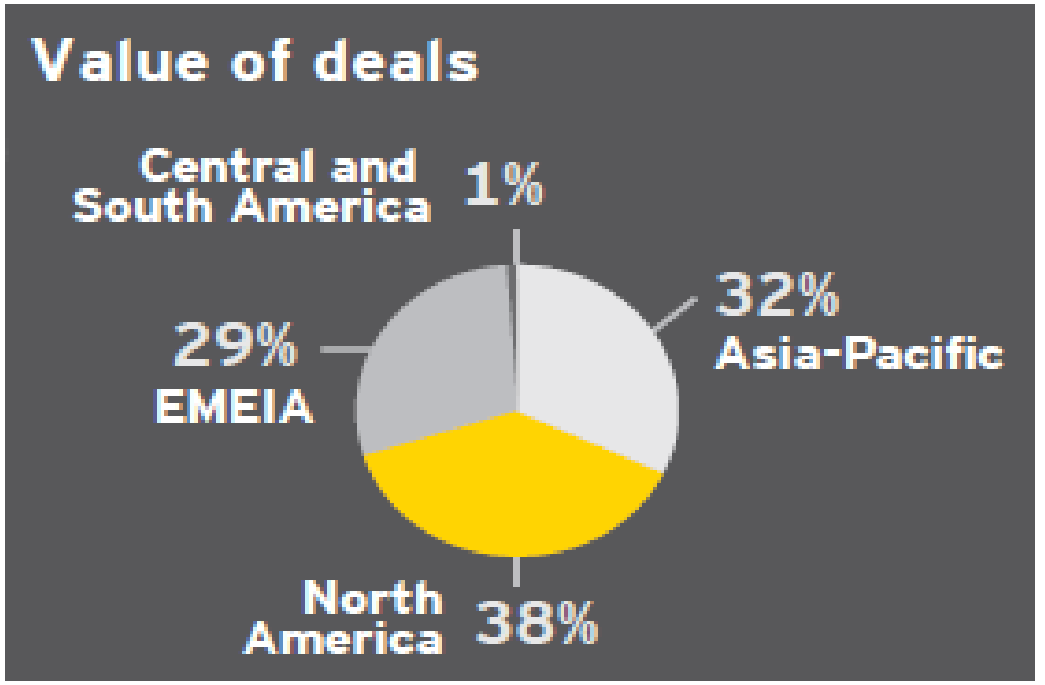
Global IPOs by Region – 2009 & 2010



Source: Global IPO Report 2011

Global IPOs by Region – 2014 (our sample-ending year)





Source: Global IPO Report 2014

The Role of Institutional Quality

- **The role of institutional quality:** Does Big N matter the most when investors are protected the least?

- Theoretical foundation – Datar et al. (1991)
  - The informational value of high quality audits increases in the riskiness of an IPO firm.

- Investor protection shapes the perceived riskiness of IPO firms.
  - Weak legal regime induce greater perceived information risk and agency conflict between the controlling shareholder and minority shareholders;
  - Claessens et al. (2010); Leuz et al. (2003); Engelen and Van Essen (2010).

The Role of Institutional Quality

- Institutional quality and equity valuation;

- Weak institutional quality tends to lower stock market liquidity, increase cost of capital and lower equity valuation (La Porta et al., 1997);

- IPO shares are discounted more in weak institutions (Banerjee et al. 2011; Engelen and Van Essen, 2010).

- **Hypothesis 2:** The effect of Big N auditors in reducing IPO underpricing is greater in countries with weak institutions.

Data

- IPO Data:
  - SDC, 1995-2014 IPO Flag = 'Yes';
  - *Exclude*: units/rights/spin off/privatization/deposits/close end fund/ limited partnership/financial;
  - Bloomberg data for adjustment on issue dates and issue prices:
    - *Issue date could be any date during the registration period;*
    - *Issue prices rounding errors.*

- Auditor data and identification:
  - IPO Auditor full names, approximately 40% from SDC, 60% from Bloomberg;
  - Big 4 operate in many countries through local affiliates;
    - *Big 4 websites for all countries' local affiliates' names;*
    - *Manually identify the auditor names to Big 4/affiliate.*
  - ***Final sample***: 14,029 from 37 countries.

Variables and Empirical Specification

- Multivariate regression:

  - Dependent Var: ***UNDPRC*** = (1st trading day price – offering price)/offering price;
    - Using 15th trading days' price as the post-IPO price for France, Greece and Taiwan due to trading limits (Boulton et al. 2011);

  - Variable of Interest: ***BIGN*** **=** Dummy variable that equals one if an IPO firm employs a Big N auditor, and zero otherwise.

Variables and Empirical Specification

- Multivariate regression including following control variables and fixed effects:

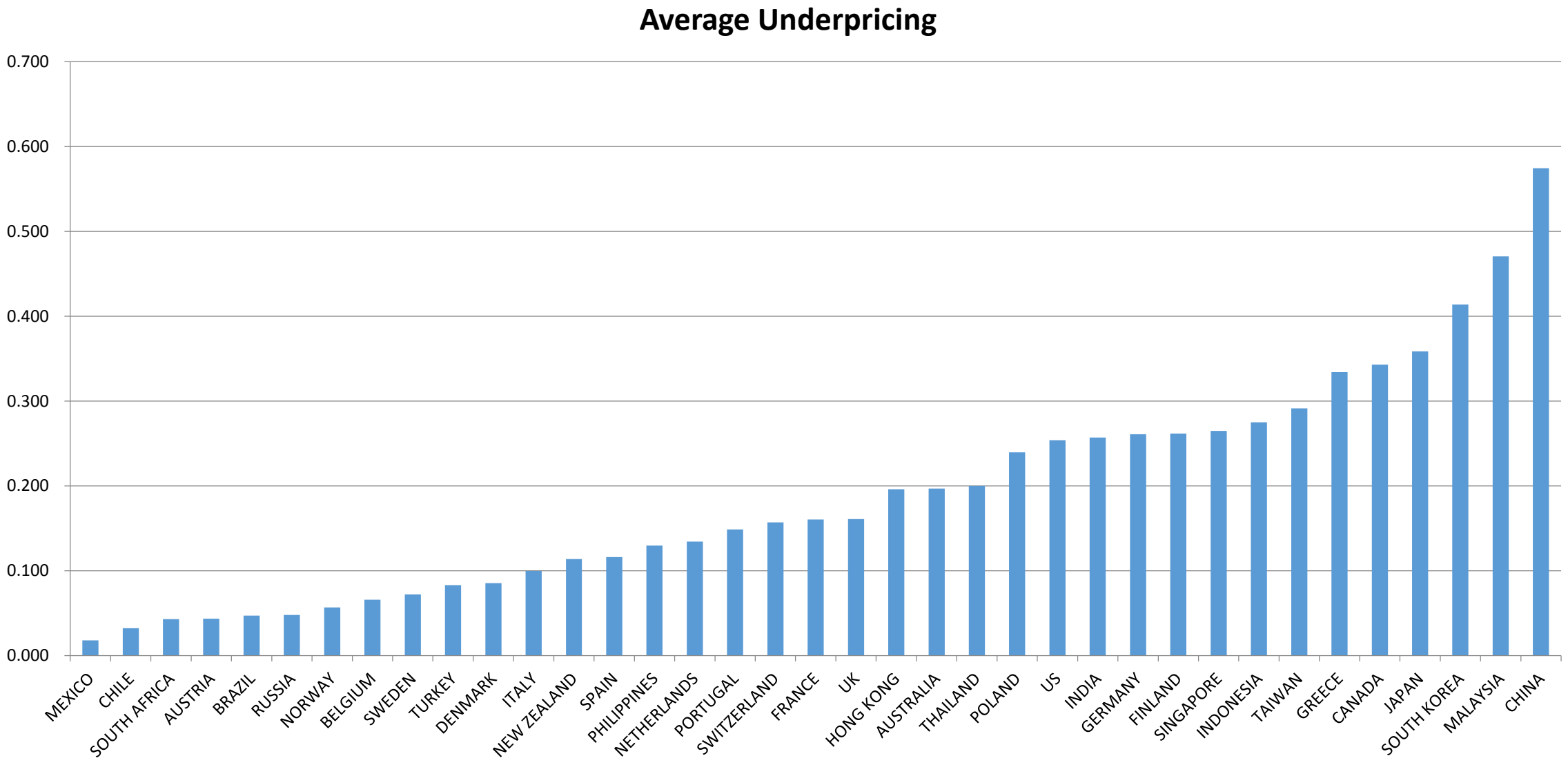
  - [1] deal attributes: underwritter reputation (***UNDERWRITTER***), offering size (***OFFERSIZE***), integer offering price (***INTEGER***), bookbuilding methodology (***BOOKBLDG***), firm commitment pricing mechanism (***FIRMCOMM***), carveout dummy (***CARVEOUT***);

  - [2] market conditions: local market return during 3 months prior to the IPO (***MKTRUNUP***), number of IPOs issued during the recent year (***IPOVOLUME***), indicator for the U.S. IPOs during its tech bubble period of 1999-2000 (***BUBBLE***);

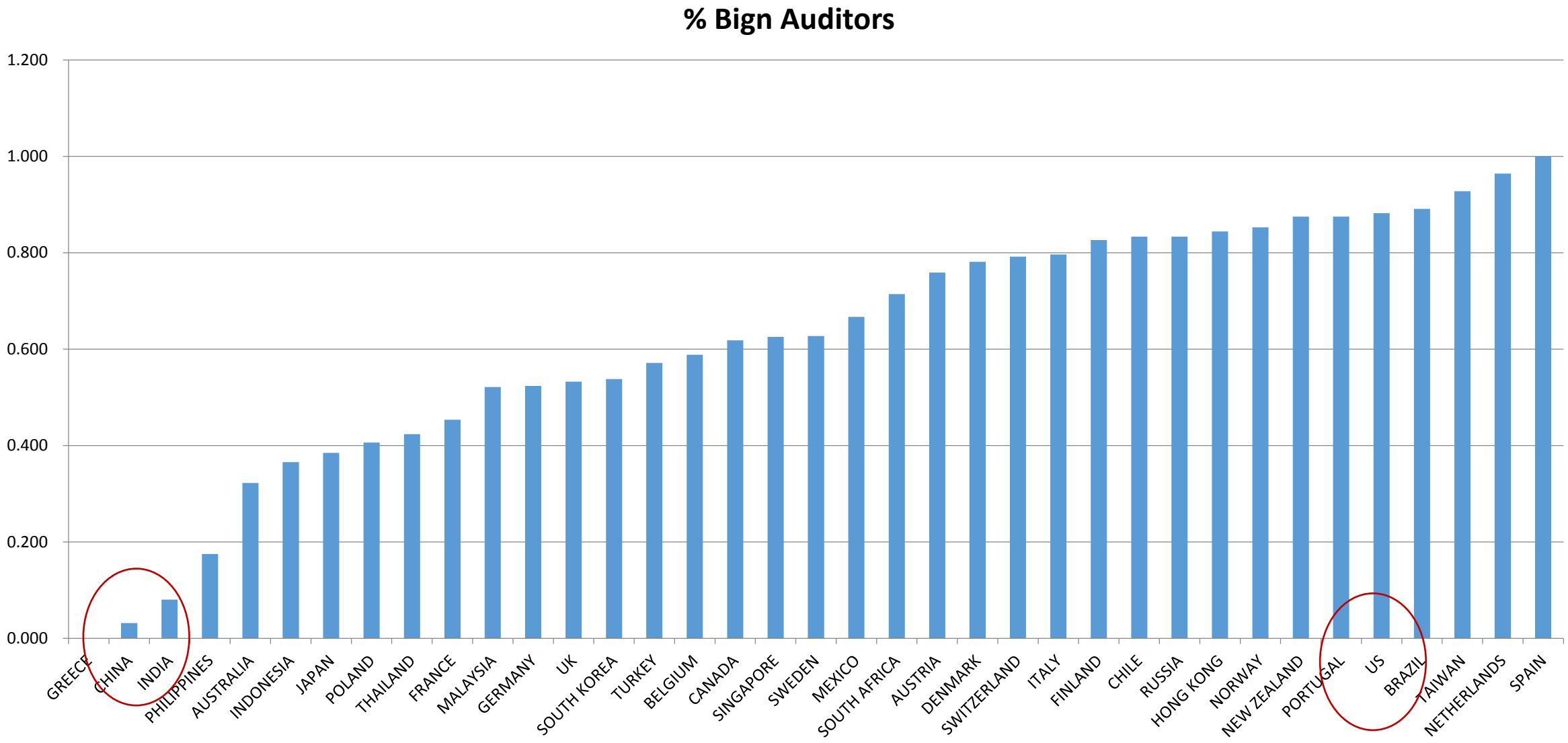
  - [3] country attributes: GDP size (***LOGGDP***);

  - Fixed effects for Industry, Year and Country.

Country-level IPO Underpricing



Country-level Big N Auditors Percentage



Main Effect – Big 4 and IPO Underpricing

Variables	Underpricing
BIGN	-0.042***
OFFERSIZE	-0.043***
UNDERWRITTER	0.030***
INTEGER	-0.011
BOOKBLDG	0.046***
FIRMCOMM	-0.040***
CARVEOUT	-0.023
MKTRUNUP	0.792***
IPOVOLUME	-0.466***
BUBBLE	0.442***
LOGGDP	-0.327***
Country, Industry and Year Effects	YES
Observations	14,029
R^2	0.219

Findings:

- Hiring a Big N auditor reduces IPO underpricing;
- Economic magnitude: 4.2% reduction;
- Sample mean of underpricing = 30.7%

Weak *vs.* Strong Institutions

	Rule of Law			Investor Protection			English Legal Origin	
Variables	Weak	Strong		Weak	Strong		No	Yes
BIGN	**-0.095*** **	0.009		**-0.046*** **	0.011		**-0.086*** **	-0.011
	(-5.607)	(0.657)		**(-3.272)**	(0.704)		**(-4.999)**	(-0.802)
Year Fixed Effects	YES	YES		YES	YES		YES	YES
Industry Fixed Effects	YES	YES		YES	YES		YES	YES
Country Fixed Effects	YES	YES		YES	YES		YES	YES
Observations	6,922	7,107		6,244	5,923		6,016	8,013
R^2	0.251	0.166		0.145	0.171		0.284	0.158

Findings:

- The effect of Big N auditors on reducing IPO underpricing is concentrated in weak institutions.

Info Environment in Weak *vs.* Strong Institutions

- Do weak institutions present more information risk to induce a greater impact of Big N auditors?

- Country-level earnings quality measures in Leuz et al. (2003) and Bhattarcharya et al. (2003):
  - E_MGT: Annual rank of a country's average earnings management scores using four different E-M measures as in Leuz et al. (2003);
  - E_OPA: Annual rank of a country's average earnings opacity scores using three different opacity measures as in Bhattarcharya et al. (2003);
  - A higher value of E_MGT and E_OPA indicates worse information environment.

- We perform a comparison of E_MGT and E_OPA of weak vs. strong institutions.

Info Environment in Weak *vs.* Strong Institutions

Earnings Management dimensions considered in Leuz et al. (2003) and Bhattarcharya et al. (2003):

- EM1: country median of the firm-level standard deviations of earnings over the cash flow from operations, multiplied by minus one;
- *EM2*: correlations between change in accrual and cash flow, multiplied by minus one;
- EM3: country-median of absolute accrual over absolute cash flows;
- EM4: number of firms reporting small losses divided by total number of firms reporting small losses and small profits;
- EM5: the median value of total accrual divided by total assets.

Info Environment in Weak *vs.* Strong Institutions

	Earnings Management (E_MGT)				Earnings Opacity (E_OPA)		
Statistics	Weak	Strong	Diff.		Weak	Strong	Diff.
Mean	26.46	10.05	16.41***		25.88	11.80	14.09***
Min	4	1.25			5.33	1	
25%	21.5	4.5			22	6.67	
Median	25.75	8.75			25.33	10.33	
75%	31.75	12.25			31.67	15.33	
Max	36.75	30.5			36.33	29.67	
OBS	6922	7107			6922	7107	

- Weak (Strong) countries are those with Rule of Law index lower (higher or equal to) the median;
- **Finding:** Weak institutions have worse information environment.

Info Environment as A Mediating Mechanism?

	Earnings Management (E_MGT)			Earnings Opacity (E_OPA)	
VARIABLES	More	Less		High	Low
BIGN	-0.076***	0.012		-0.077***	0.003
	(-4.941)	(0.829)		(-4.763)	(0.200)
Year Fixed Effects	YES	YES		YES	YES
Industry Fixed Effects	YES	YES		YES	YES
Country Fixed Effects	YES	YES		YES	YES
Observations	7,528	6,501		6,996	7,033
R^2	0.238	0.172		0.240	0.164

- The split is performed on whether a country's earnings management (earnings opacity) is more than or less than the median value;
- **Finding:** The effect of Big N auditors in reducing IPO underpricing is concentrated in countries with worse information environment.

Propensity Score Matching

- To mitigate the concern of self-selection issue;

- First stage to model the likelihood of choosing a Big N auditor;

prob(*BIGN*=1) = α_0 + α_1**OFFERSIZE* + α_2**UNDERWRITER* + α_3**LOGAT* + α_4**LEV* + α_5**ROA* + α_6**ATURN* + α_7**LOSS* + α_8**RETENTION* + Country Effects + Industry Effects + Year Effects + ε; (2)

- Matched a (BIGN=1) IPO with a (BIGN=0) IPO based on they having closest predicted first-stage probabilities.

Propensity Score Matching (PSM) – 2nd Stage

	Baseline specification				Controlling for first stage determinants		
	Pooled Sample	Weak Institution	Strong Institution		Pooled Sample	Weak Institution	Strong Institution
VARIABLES	(1)	(2)	(3)		(4)	(5)	(6)
BIGN	-0.023***	-0.074***	-0.004		-0.025***	-0.077***	-0.008
	(-2.658)	(-3.732)	(-0.448)		(-3.046)	(-3.867)	(-0.822)
Industry Effects	YES	YES	YES		YES	YES	YES
Year Effects	YES	YES	YES		YES	YES	YES
Country Effects	YES	YES	YES		YES	YES	YES
Observations	7,280	2,052	5,228		7,280	2,052	5,228
R^2	0.150	0.195	0.183		0.183	0.225	0.229

- PSM analyses provide consistent findings as in OLS analyses.

Sensitivity Analyses

	Pooled	Weak	Strong		Pooled	Weak	Strong
Variables	(1)	(2)	(3)		(4)	(5)	(6)
BIGN	-0.034***	-0.113***	-0.017		-0.033**	-0.095***	-0.025
LOGAT	-0.036***	-0.055***	-0.043***		-0.044***	-0.061***	-0.051***
LOGSALE	0.007*	0.001	0.016**		0.012***	0.005	0.020***
LEV	-0.092***	-0.049	-0.114***		-0.056***	0.031	-0.089***
ROA	0.000	-0.006	-0.002		0.002	0.017	-0.001
ATURN	-0.007***	-0.006	-0.025***		-0.006***	-0.008	-0.022**
LOSS	-0.001	-0.038	0.017		-0.013	-0.032	0.008
RETENTION					0.116***	0.247**	0.146***
Original Controls	YES	YES	YES		YES	YES	YES
Industry, Year and Country Effects	YES	YES	YES		YES	YES	YES
Observations	8,198	3,967	4,231		6,753	3,524	3,229
R^2	0.296	0.353	0.237		0.262	0.326	0.206

- Add additional pre-IPO firm fundamentals: size (*LOGAT*, *LOGSALE*), leverage (*LEV*), profitability (*ROA*, *LOSS*), asset turnover (*ATURN*);
- Further add ownership retention (*RETENTION*), i.e. the percentage of secondary shares retained by the management.

Sensitivity Analyses

	Pooled	Weak	Strong		Pooled	Weak	Strong		Pooled	Weak	Strong
Variables	(1)	(2)	(3)		(4)	(5)	(6)		(7)	(8)	(9)
BIGN	-0.042***	-0.095***	0.008		-0.042***	-0.094***	0.007		-0.042***	-0.094***	0.007
	(-4.044)	(-5.609)	(0.643)		(-4.091)	(-5.578)	(0.568)		(-4.095)	(-5.563)	(0.552)
RULE OF LAW	-0.148**	-0.193**	-0.233**						-0.151**	-0.195**	-0.238**
	(-2.486)	(-2.526)	(-2.106)						(-2.525)	(-2.531)	(-2.150)
E_MGT					0.002	0.000	0.005**		0.003*	0.001	0.005**
					(1.606)	(0.093)	(1.984)		(1.690)	(0.286)	(2.022)
Original Controls	YES	YES	YES		YES	YES	YES		YES	YES	YES
Industry Effects	YES	YES	YES		YES	YES	YES		YES	YES	YES
Year Effects	YES	YES	YES		YES	YES	YES		YES	YES	YES
Country Effects	YES	YES	YES		YES	YES	YES		YES	YES	YES
Observations	14,029	6,922	7,107		14,029	6,922	7,107		14,029	6,922	7,107
R^2	0.219	0.252	0.167		0.219	0.251	0.167		0.219	0.252	0.167

- Add additional time-varying country-level variables: rule of law index (*RULE OF LAW*), earnings management (*E_MGT*).

Summary and Discussions

- Findings:
  - Employing a Big N auditors significantly reduces IPO underpricing around the world.
  - Such an effect becomes stronger in countries with weaker investor protection.

- Contributions:
  - Our study suggests a private mechanism for IPO firms to reduce the cost of capital and the implication is more important for weak institutions.
  - We also contribute to the international auditing literature by documenting that Big N auditors are perceived to provide higher quality audits across the globe, likely due to their reputation-protection concern.