Law, growth and governance: a cross-country simultaneous equations, instrumental variables approach

Prepared

for

Corporate Governance and Performance: Causation?

by

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and

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Motivation

- Hypothesized endogeneity in the country-level and firm-level performance and governance relationship
  - Levine, Loayza, and Beck (2000)
  - Hermalin and Weisbach (2003), Bhagat and Bolton (2008)

- Challenge: Finding valid exogenous instruments with a strong economic rationale
  - Larcker and Rusticus (2007, 2009)

- **Proposed solution**: Use exogenous instruments from country-level attributes in the firm-level cross-country estimation of the relationship between corporate governance and performance
  - Economic Development
  - Financial Market Development
  - Institutional Quality

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Background Literature

- Firm-level Effect of Corporate Governance on Performance
  - Gompers, Ishii, Metrick (2003) (U.S)
  - Durnev and Kim (2005) (Cross-country)
  - Many others

- Country-level Effect of
  - Financial Development on Growth (Rajan and Zingales, 1998; Levine et al, 2000)
  - Legal Environment on Financial Development (LLSV, 1997; Rajan and Zingales, 2003)
  - Other factors on Legal Environment (e.g., religion (Stulz and Williamson, 2003); political changes (Pagano and Volpin, 2005); history (Roe, 2006))

Background (con't)

- Firm Governance and Country Effects
  - Doidge et al (2007)
    - Country-level characteristics explain most of the variation in firm-level governance
  - Bhagat, Bolton, Romano (2007)
    - "One size does not fit all" domestically
  - Cheffins (1995, 2000)
    - Transplanting the Cadbury Report
    - Canada, Australia, US, Italy, India, Poland, etc
  - Paredes (2005)
    - Exporting US-style governance

Empirical Design Foundation

- Endogeneity results from:
  - Economically
    - Simultaneity of determination (e.g. price and quantity)
  - Statistically
    - Measurement error (governance indices)
    - Omitted variables (country fixed effects)
- Econometric characterization:
  - Regressor(s) are correlated with the error term
    - OLS is biased and inconsistent
    - IV estimators are also biased but asymptotically consistent
    - The tradeoff is the difference in bias against reduction in standard errors

Endogeneity
between
Governance and Performance

- **Solution**: Use 2SLS Instrumental Variables (IV) where the instruments come from cross-country estimations to correct for firm-level endogeneity in a cross-country study of the relationship between performance and governance

- **Required**: Valid instruments which are economically justified exogenous variables that are [highly] correlated with the endogenous regressors but uncorrelated with the error term in other words instruments that satisfy a series of statistical tests demonstrating that the IV estimator is an improvement over the OLS estimator

Economic Rationale

- Country-level measurements of economic development, financial market development and institutional quality create the environment in which managers choose their economic strategies and corporate governance characteristics.

- At the firm-level, the country characteristics are therefore exogenous but correlated with managerial choices.
  - No single firm determines country level institutional quality, economic development or financial market development but those factors do determine the scope of managerial choice
  - Doidge et al (2007) evidence

Endogeneity Testing Procedure

Step	Test	Result	Alt. Result	Conclusion
1	Over-identification	FTR → go to Step 2	Reject→	Use diff. IV(s)
2	Hausman	Reject → go to Step 3	FTR→	IV not an improvement over OLS
3	Weak Identification	Reject → go to Step 4	FTR→	Bias in IV estimate is potentially large
4	Under-identification	Reject → go to Step 5	FTR →	Estimator is unlikely to have achieved asymptotic consistency
5	Conclusion:	Valid IVs		

Figure 1

Country-level Instruments

- **Problem**: Country-level financial market development, economic development and institutional quality may themselves be endogenous to each other

- **Solution**: 2SLS simultaneous equations for the country-level relationship to provide predicted values of financial market development, economic development and institutional quality as instruments for the firm-level endogenous governance regressor.

Data

- Country-level
  - 1990-2007
  - ICRG for *Institutional Quality*
  - WDI and BIS for *Financial Market Development* and *Economic Development*
- Firm-level
  - 2002-2007
  - Worldscope data for *Tobin's Q*
    - All firm level financial variables
  - Riskmetrics governance score for *GovIndex*

Country-level Relationships

$Economic\ Development$

$$= \alpha + \beta_1 FinancialMarketDevelopment + \beta_2 InstitutionalQuality$$
$$+ \beta_3 FinancialMarketDevelopment * DevelopedCountryIndicator$$
$$+ \beta_4 InstitutionalQuality * DevelopedCountryIndicator$$
$$+ \beta_5 DevelopedCountryIndicator + \beta_6 GovernmentSize$$
$$+ \beta_7 Opennes\ to\ Trade + \beta_8 EthnicFractionalization + \beta_9 Inflation$$
$$+ \beta_{10} YearsOfSecondarySchooling + \sum_{i=11}^{n} \beta_i YearIndicators$$

$FinancialMarketDevelopment$

$$= \alpha + \beta_1 EconomicDevelopment + \beta_2 InstitutionalQuality$$
$$+ \beta_3 EconomicDevelopment * DevelopedCountryIndicator$$
$$+ \beta_4 InstitutionalQuality * DevelopedCountryIndicator$$
$$+ \beta_5 DevelopedCountryIndicator + \sum_{i=6}^{9} \beta_i LegalOriginIndicators$$
$$+ \beta_{10} \frac{FDI}{GDP} + \beta_{11} Opennes\ to\ Trade + \beta_{12} \frac{CrossCapitalFormation}{GDP}$$
$$+ \beta_{13} GovernmentSize + \beta_{14} Inflation + \sum_{i=15}^{n} \beta_i YearIndicators$$

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Country-level Relationships (con't)

$$
\begin{aligned}
InstitutionalQuality \\
&= \alpha + \beta_1 FinancialMarketDevelopment + \beta_2 EconomicDevelopment \\
&\quad + \beta_3 EconomicDevelopment * DevelopedCountryIndicator \\
&\quad + \beta_4 FinancialMarketDevelopment * DevelopedCountryIndicator \\
&\quad + \beta_5 DevelopedCountryIndicator + \sum_{i=6}^{9} \beta_i LegalOriginIndicators \\
&\quad + \sum_{j=10}^{14} \beta_j ReligionIndicators + \sum_{k=15}^{17} \beta_k PoliticsIndicators \\
&\quad + \sum_{i=18}^{n} \beta_i YearIndicators
\end{aligned}
$$

Country-level Relationship
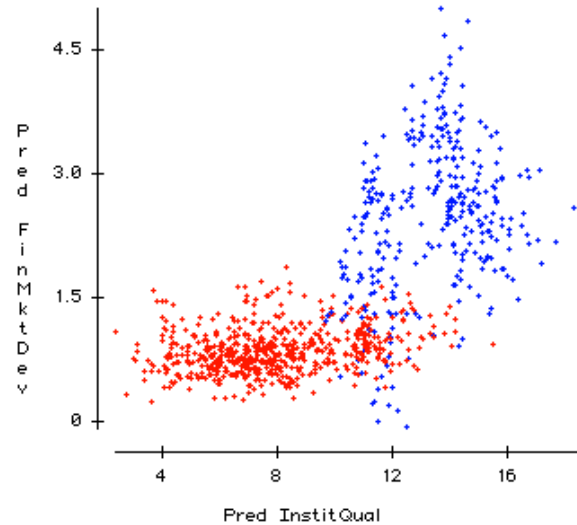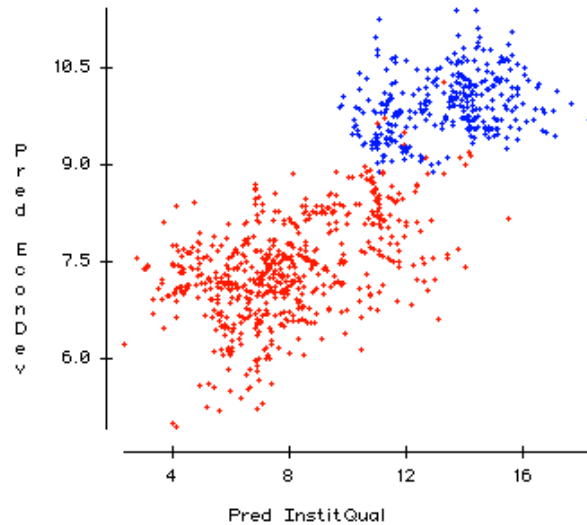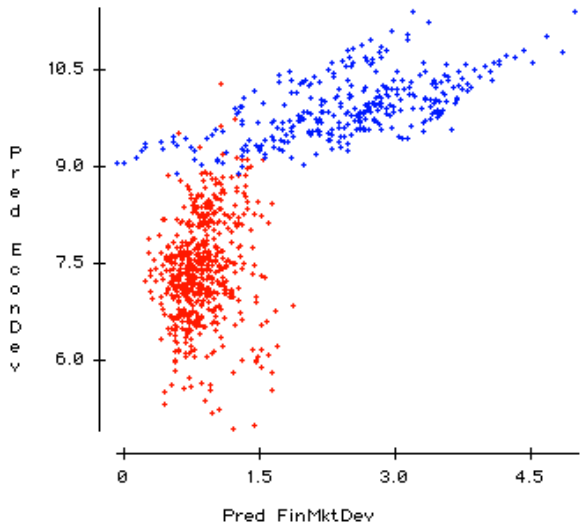
Predicted Values
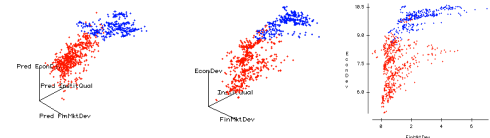
Country Level Results

		Econ. Dev.		Fin. Mkt. Dev		Instit. Qual.	
Developing	Econ. Dev.	--		0.0871		2.8568	***
	Instit. Qual.	0.3489	***	-0.0056		--	
	Fin. Mkt. Dev.	-0.6225	***	--		-1.9148	**
Developed	Econ. Dev.	--		1.9668	***	2.1482	***
	Instit. Qual.	0.0943	***	-0.0508	*	--	
	Fin. Mkt. Dev.	0.2167	***	--		-0.4334	**
Incremental Effect	Econ. Dev.	--		1.8797	***	-0.7086	
	Instit. Qual.	-0.2546	***	-0.0452		--	
	Fin. Mkt. Dev.	0.8392	***	--		1.4814	

Table 2, Panels A-C

Country-level Results

- We interpret these results as evidence that:

  – Institutional and governance quality is important for economic development and it is particularly important in countries that lack developed financial systems.

  – The effect of increased institutional quality on economic development declines as we move from less developed countries to more developed countries while the effect of financial market development on economic development increases as we move from less developed countries to more developed countries.

Firm-level Relationship

$$Tobin's Q = \alpha + \beta_1 GovIndex + \beta_2 Size + \beta_3 One-yearSales\ Growth + \beta_4 \frac{Cash}{Assets}$$

$$+ \beta_5 PercentageForeignSales + \beta_6 \frac{CapitalExpenditures}{Assets} + \beta_7 \frac{PPE}{Sales}$$

$$+ \beta_8 \frac{EBIT}{Sales} + \beta_9 \frac{Debt}{Assets} + \sum_{i=10}^{n} \beta_i Year, Industry, CountryIndicators$$

Summary of Endogeneity and Identification Test Outcomes

- Valid IVs if:

  - FTR: Over-identification test

  - R: Hausman test

  - R: Weak Instruments test

  - R: Under-identification test

Instrumental Variables Outcomes

| IV Set	Sample				
	All	All ex Japan	All ex US	All ex-UK	All ex-Big 3
Econ. Dev. Fin. Mkt.Dev. Instit. Qual.	**Valid IVs**	**Valid IVs**	**Valid IVs**	**Valid IVs**	Over-ID
Fin. Mkt.Dev. Instit. Qual.	**Valid IVs**	**Valid IVs**	**Valid IVs**	**Valid IVs**	**Valid IVs**
Econ. Dev. Fin. Mkt.Dev.	**Valid IVs**	Over-ID	**Valid IVs**	**Valid IVs**	Over-ID
Econ. Dev. Instit.Qual.	**Valid IVs**	Hausman fails	Weak IVs	Over-ID	Hausman fails

Table 3, Panels A-D

IV Robustness

- Raw values fail the weak instruments test
- Legal Origin Fixed Effects as IVs
      fail the over-identification test
- Country Fixed Effects as IVs fail the
      over-identification test

Firm-level Governance Scores

Figure 2
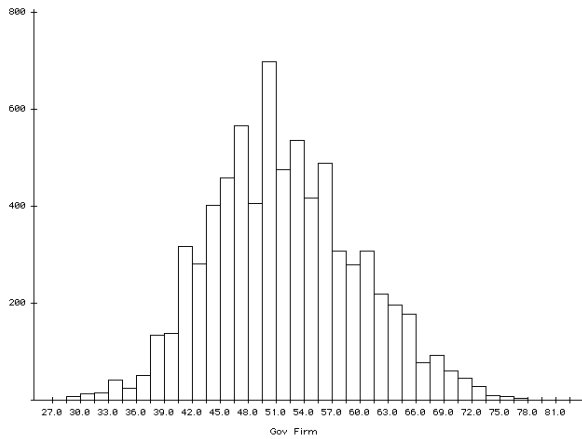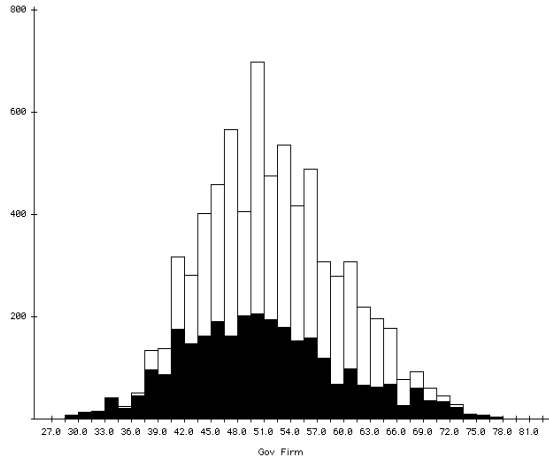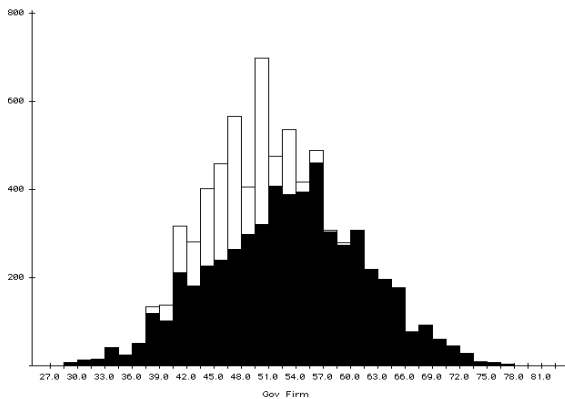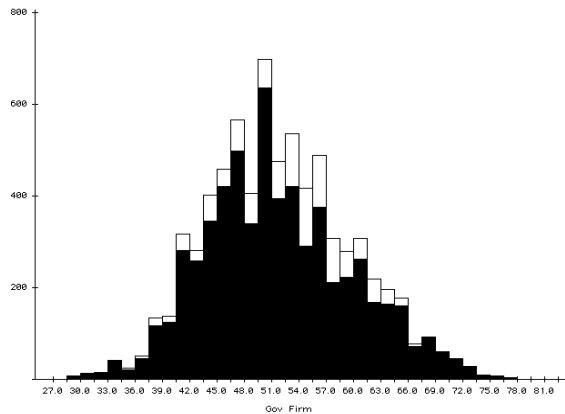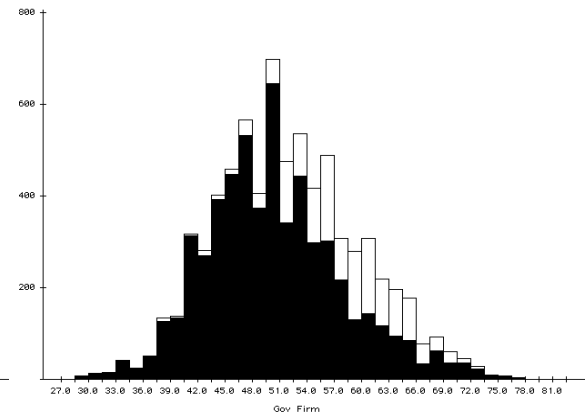
Individual Countries Governance

Japan

UK

US

Figure 2
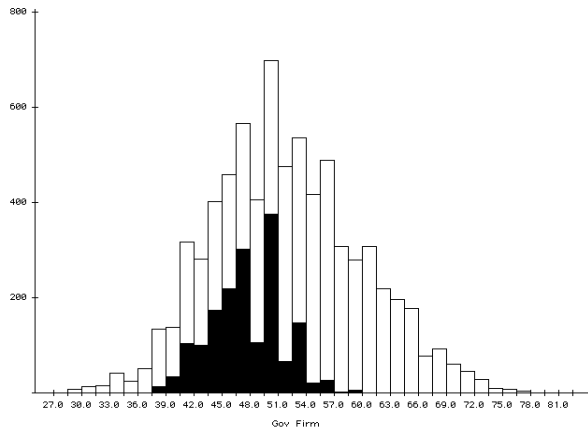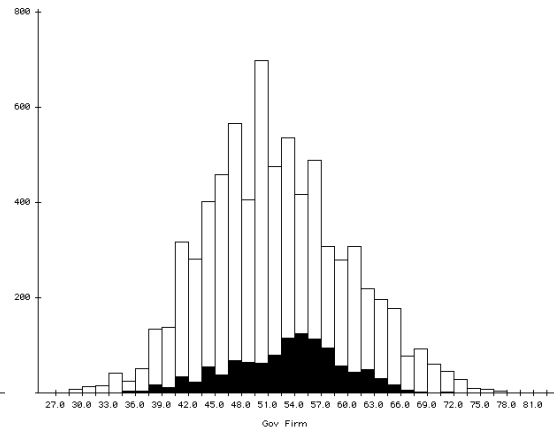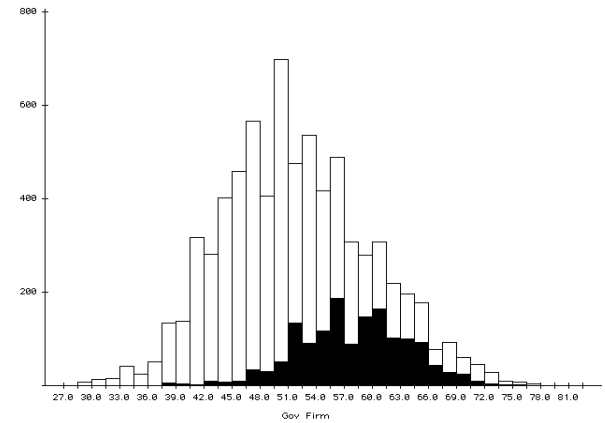
Firm-level Estimations

Sample	OLS GovIndex Coeff. Est.		IV GovIndex Coeff. Est	
All Firms	0.006	**	-0.100	***
	(0.0460)		(0.0080)	
All ex-Japan	0.010	***	-0.065	**
	(0.0030)		(0.0320)	
All ex-UK	0.007	**	-0.092	***
	(0.0330)		(0.0090)	
All ex-US	0.004		-0.116	**
	(0.2450)		(0.0210)	
All ex- Big3	0.011	**	-0.115	**
	(0.0230)		(0.0170)	

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Table 4, Panels A-E

Firm-level Results

- IV estimation offers an improvement over OLS

- In a cross-country sample, when the coefficient estimates are corrected for the endogenous relationship between firm governance and performance using the host country's legal, financial and economic environment as instruments, higher levels of governance are associated with lower levels of performance.

Robustness

- Firm-level
  - Alternative performance variable (ROA)
  - Extra controls (e.g., ownership)
  - Subset of governance indicators
  - Subset of control variables

- Country-level
  - Predicted instruments from developed countries estimations only
  - Alternative measure of institutional quality
    - Law and Order * ADRI
  - Stock market cap as the only measure of Financial Market Development

Conclusions

- Predicted Economic Development, Country Institutional Quality and Financial Market Development:
  - Have an underlying economic rationale justifying their exogeneity;
  - Function as valid instruments;
  - Address the endogeneity in the firm-level governance-performance relationship in a cross-country sample;
  - Result in IV estimators that are an improvement over OLS estimators and that differ in sign and significance.

Conclusions (con't)

- Firm governance score distributions in combination with the IV estimations suggest that there may be within-country equilibrium that are different across countries

  → "One size does not fit all" across countries

  → The "transplanting" of governance rules like that which has followed the Cadbury report may be misguided

Country-level Relationship
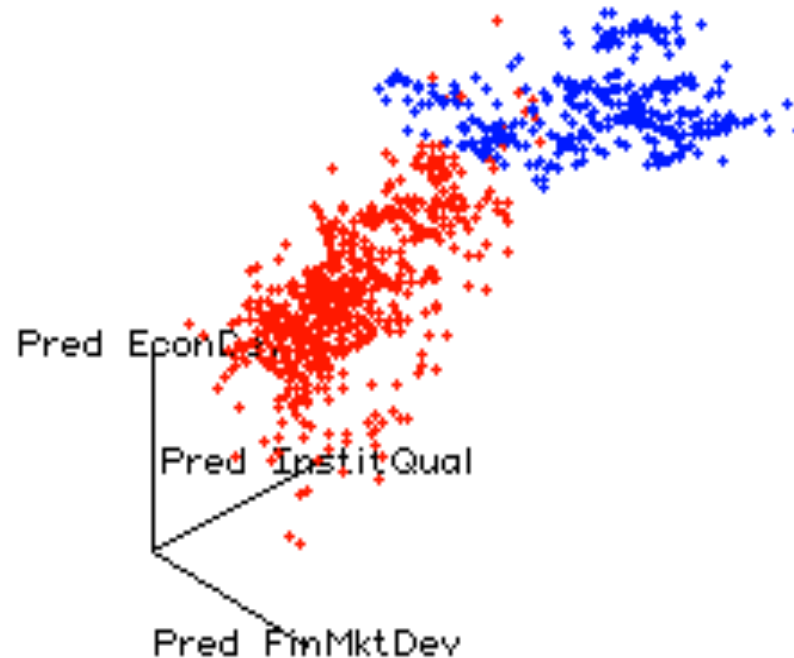
Predicted Values

Country-level Relationships
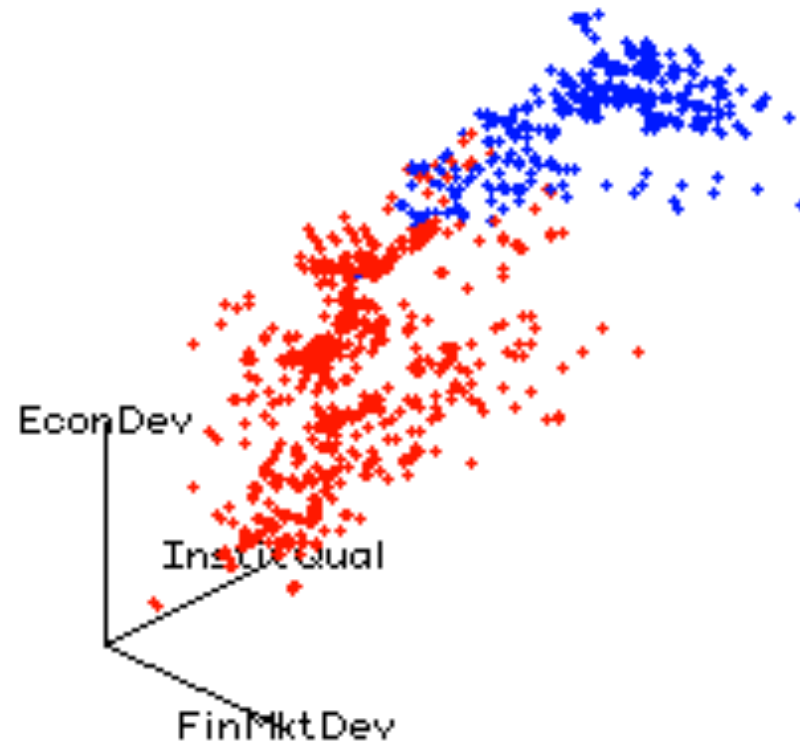
Observed Values

Country-level Relationships
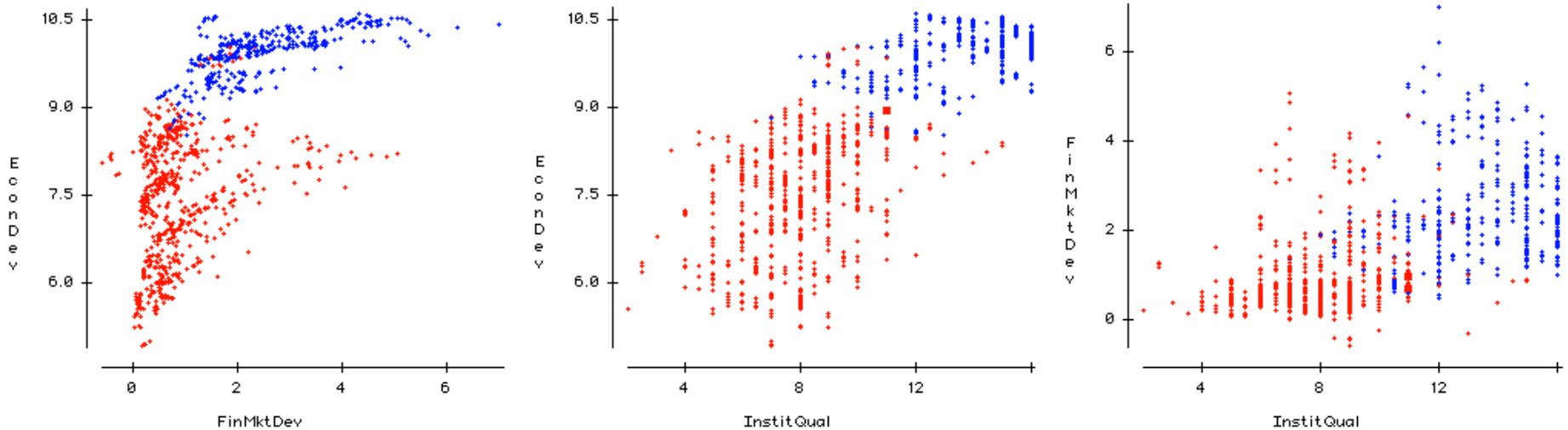
Observed Values

Country-level Estimation

Economic Development Equation	Coeff. Est.	p-value	
Institutional Quality Index	0.3489	0.000	***
Financial Market Development	-0.6225	0.000	***
Institutional Quality Index * Developed Countries indicator	-0.2546	0.000	***
Financial Market Development * Developed Countries indicator	0.8392	0.000	***
Developed Countries indicator	2.5330	0.000	***
Government Size	0.0385	0.000	***
Openness to Trade	0.1795	0.012	**
Ethnic Fractionalization	-0.7142	0.000	***
Inflation	0.0156	0.161	
Years of Secondary Schooling	-0.0825	0.015	**
Year Fixed Effects, Constant	Y		
Developed Country Institutional Quality Coeff. Est. ($\beta_1+\beta_3$)	0.0943	0.0006	***
Developed Country Financial Market Dev. Coeff. Est. ($\beta_2+\beta_4$)	0.2167	0.0000	***

Table 2, Panel A

Country-level Estimation

Financial Market Development Equation	Coeff. Est.	p-value	
Economic Development	0.0871	0.465	
Institutional Quality	-0.0056	0.954	
Economic Development * Developed Countries indicator	1.8797	0.000	***
Institutional Quality * Developed Countries indicator	-0.0452	0.626	
Developed Countries indicator	-16.6356	0.000	***
French Legal Origin	-0.2239	0.026	**
German Legal Origin	-0.1776	0.085	*
Scandinavian Legal Origin	-0.7448	0.000	***
Socialist Legal Origin	-0.5424	0.003	***
Foreign Direct Investment / GDP	-0.4416	0.393	
Openness to Trade	0.3175	0.000	***
Gross Capital Formation / GDP	1.2375	0.087	*
Government Size	0.0015	0.855	
Inflation	0.0012	0.896	
Year Fixed Effects, Constant	Y		
Developed Country Economic Dev Coeff. Est. ($\beta_1+\beta_3$)	1.9668	0.0000	***
Developed Country Institutional Quality Coeff. Est. ($\beta_2+\beta_4$)	-0.0508	0.0759	*

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Table 2, Panel B

Country-level Estimation

Institutional Quality Equation	Coeff. Est.	p-value	
Financial Market Development	-1.9148	0.012	**
Economic Development	2.8568	0.000	***
Financial Market Development * Developed Countries indicator	1.4814	0.039	**
Economic Development * Developed Countries indicator	-0.7086	0.239	
Developed Countries indicator	4.4004	0.366	
French Legal Origin	-2.0054	0.000	***
German Legal Origin	-0.9267	0.011	**
Scandinavian Legal Origin	0.0701	0.893	
Socialist Legal Origin	-1.7657	0.005	***
Buddhist Religion	-0.5905	0.089	*
Catholic Religion	-1.0945	0.004	***
Muslim Religion	0.4894	0.127	
Orthodox Religion	-1.2666	0.011	**
Other Religion	-0.3102	0.338	
Right Politics	-0.3164	0.300	
Center Politics	-0.4287	0.205	
Left Politics	0.3282	0.153	
Year Fixed Effects, Constant	Y		
Developed Country Financial Market Dev. Coeff. Est. ($\beta_1+\beta_3$)	-0.4334	0.0124	**
Developed Country Economic Dev. Coeff. Est. ($\beta_2+\beta_4$)	2.1482	0.0000	***

Table 2, Panel C

Table 4 Panel A: Overall Sample

Estimation	OLS	1st Stage	2nd Stage
Dependent Variable:	Tobin's Q	Governance	Tobin's Q
Variable	Coeff. Est.	Coeff. Est.	Coeff. Est.
Gov Index	0.006 **		-0.100 ***
	(0.0460)		(0.0080)
Size	-0.216 ***	0.307 ***	-0.182 ***
	(0.0000)	(0.0000)	(0.0000)
One Year Sales Growth	0.007 ***	-0.002	0.006 ***
	(0.0000)	(0.6170)	(0.0000)
Cash to Assets	2.293 ***	1.561 ***	2.469 ***
	(0.0000)	(0.0040)	(0.0000)
Percent Foreign Sales	0.613 ***	-0.215	0.595 ***
	(0.0000)	(0.4460)	(0.0000)
Capital Expenditures to Assets	2.437 ***	1.251	2.580 ***
	(0.0000)	(0.3330)	(0.0000)
PPE to Sales	-0.111 ***	-0.005	-0.113 ***
	(0.0000)	(0.9230)	(0.0000)
EBIT to Sales	1.750 ***	0.502	1.822 ***
	(0.0000)	(0.2190)	(0.0000)
Debt to Assets	0.227	1.137 ***	0.355 **
	(0.1180)	(0.0000)	(0.0180)
ADR	0.359 ***	1.483 ***	0.512 ***
	(0.0000)	(0.0000)	(0.0000)
Economic Development Instrument		9.350 ***	
		(0.0000)	
Financial Development Instrument		8.664 ***	
		(0.0000)	
Institutional Quality Instrument		0.470	
		(0.5150)	
Constant, Country, Industry, Year Indicators	Y	Y	Y
N	7314		
R-squared/ Partial R-squared	33.61	0.0097	

Table 4 Panel B: Overall Sample ex Japan

Estimation	OLS	1st Stage	2nd Stage
Dependent Variable:	Tobin's Q	Governance	Tobin's Q
Variable	**Coeff. Est.**	**Coeff. Est.**	**Coeff. Est.**
Gov Index	0.010 ***		-0.065 **
	(0.0030)		(0.0320)
Size	-0.254 ***	0.472 ***	-0.218 ***
	(0.0000)	(0.0000)	(0.0000)
One Year Sales Growth	0.006 ***	-0.001	0.006 ***
	(0.0000)	(0.7740)	(0.0000)
Cash to Assets	2.267 ***	1.387 **	2.380 ***
	(0.0000)	(0.0300)	(0.0000)
Percent Foreign Sales	0.694 ***	-0.250	0.679 ***
	(0.0000)	(0.4220)	(0.0000)
Capital Expenditures to Assets	2.277 ***	1.995	2.432 ***
	(0.0000)	(0.1490)	(0.0000)
PPE to Sales	-0.118 ***	0.072	-0.115 ***
	(0.0000)	(0.2220)	(0.0000)
EBIT to Sales	1.782 ***	0.006	1.798 ***
	(0.0000)	(0.9890)	(0.0000)
Debt to Assets	0.107	1.674 ***	0.236
	(0.5730)	(0.0000)	(0.2150)
ADR	0.425 ***	1.473 ***	0.531 ***
	(0.0000)	(0.0000)	(0.0000)
Economic Development Instrument		1.590	
		(8.4384)	
Financial Development Instrument		9.543 ***	
		(0.0000)	
Institutional Quality Instrument		-1.139	
		(0.1470)	
Constant, Country, Industry, Year Indicators	Y	Y	Y
N	5605		
R-squared/ Partial R-squared	0.2533	0.0158	

Table 4 Panel C: Overall Sample ex USA

Estimation	OLS	1st Stage	2nd Stage
Dependent Variable:	Tobin's Q	Governance	Tobin's Q
Variable	Coeff. Est	Coeff. Est	Coeff. Est
Gov Index	0.004		-0.116 **
	(0.2450)		(0.0210)
Size	-0.196 ***	0.239 ***	-0.166 ***
	(0.0000)	(0.0000)	(0.0000)
One Year Sales Growth	0.006 ***	0.001	0.006 ***
	(0.0000)	(0.7910)	(0.0000)
Cash to Assets	2.209 ***	0.912	2.329 ***
	(0.0000)	(0.1230)	(0.0000)
Percent Foreign Sales	0.505 ***	-0.242	0.482 ***
	(0.0000)	(0.4130)	(0.0000)
Capital Expenditures to Assets	2.363 ***	1.106	2.510 ***
	(0.0000)	(0.4070)	(0.0000)
PPE to Sales	-0.095 ***	-0.037	-0.101 ***
	(0.0000)	(0.5340)	(0.0000)
EBIT to Sales	1.549 ***	0.661	1.648 ***
	(0.0000)	(0.1310)	(0.0000)
Debt to Assets	0.284 *	0.722 **	0.378 **
	(0.0760)	(0.0240)	(0.0230)
ADR	0.343 ***	1.620 ***	0.533 ***
	(0.0000)	(0.0000)	(0.0000)
Economic Development Instrument		6.491 ***	
		(0.0000)	
Financial Development Instrument		8.454 ***	
		(0.0000)	
Institutional Quality Instrument		0.394	
		(0.5910)	
Constant, Country, Industry, Year Indicators	Y	Y	Y
N	6184		
R-squared/ Partial R-squared	0.2922	0.0134	

Table 4 Panel D: Overall Sample ex UK

Estimation	OLS	1st Stage	2nd Stage
Dependent Variable:	Tobin's Q	Governance	Tobin's Q
Variable	Coeff. Est.	Coeff. Est.	Coeff. Est.
Gov Index	0.007 **		-0.092 ***
	(0.0330)		(0.0090)
Size	-0.212 ***	0.331 ***	-0.179 ***
	(0.0000)	(0.0000)	(0.0000)
One Year Sales Growth	0.006 ***	-0.001	0.006 ***
	(0.0000)	(0.8260)	(0.0000)
Cash to Assets	2.428 ***	2.157 ***	2.652 ***
	(0.0000)	(0.0000)	(0.0000)
Percent Foreign Sales	0.547 ***	-0.057	0.550 ***
	(0.0000)	(0.8610)	(0.0000)
Capital Expenditures to Assets	2.894 ***	2.180	3.128 ***
	(0.0000)	(0.1160)	(0.0000)
PPE to Sales	-0.121 ***	0.016	-0.123 ***
	(0.0000)	(0.8070)	(0.0000)
EBIT to Sales	1.866 ***	-0.386	1.856 ***
	(0.0000)	(0.4240)	(0.0000)
Debt to Assets	0.097	0.877 **	0.197
	(0.4810)	(0.0340)	(0.1970)
ADR	0.304 ***	1.516 ***	0.448 ***
	(0.0000)	(0.0000)	(0.0000)
Economic Development Instrument		10.220 ***	
		(0.0000)	
Financial Development Instrument		9.884 ***	
		(0.0000)	
Institutional Quality Instrument		1.260 *	
		(0.0860)	
Constant, Country, Industry, Year Indicators	Y	Y	Y
N	6184		
R-squared/ Partial R-squared	0.2922	0.0134	

Table 4 Panel E: Overall Sample ex Japan, UK, USA

Estimation	OLS	1st Stage	2nd Stage
Dependent Variable:	Tobin's Q	Governance	Tobin's Q
Variable	Coeff. Est.	Coeff. Est.	Coeff. Est.
Gov Index	0.011 **		-0.115 **
	(0.0230)		(0.0170)
Size	-0.247 ***	0.463 ***	-0.188 ***
	(0.0000)	(0.0000)	(0.0000)
One Year Sales Growth	0.005 ***	0.006	0.005 ***
	(0.0090)	(0.2730)	(0.0050)
Cash to Assets	2.521 ***	0.972	2.564 ***
	(0.0000)	(0.2940)	(0.0000)
Percent Foreign Sales	0.428 ***	-0.124	0.437 ***
	(0.0000)	(0.7680)	(0.0010)
Capital Expenditures to Assets	2.361 ***	3.428 **	3.011 ***
	(0.0000)	(0.0280)	(0.0000)
PPE to Sales	-0.109 ***	0.098	-0.102 ***
	(0.0000)	(0.2410)	(0.0000)
EBIT to Sales	1.676 ***	-1.033 *	1.573 ***
	(0.0000)	(0.0950)	(0.0000)
Debt to Assets	-0.251	0.670	-0.147
	(0.3780)	(0.2830)	(0.6360)
ADR	0.339 ***	1.698 ***	0.566 ***
	(0.0000)	(0.0000)	(0.0000)
Economic Development Instrument		--	
		--	
Financial Development Instrument		11.334 ***	
		(0.0000)	
Institutional Quality Instrument		-0.841	
		(0.3000)	
Constant, Country, Industry, Year Indicators	Y	Y	Y
N	3009		
R-squared/ Partial R-squared	0.2514	0.0116	

Table 3 Panel A: Multiple Instruments *EconomicDevelopment, FinancialMarketDevelopment, InstitutionalQuality*

Test	All Countries	All ex-Japan	All ex-US	All ex-UK	All ex-Big 3
Over Identification	2.915	4.526	2.373	3.5220	5.0690 *
	(0.233)	(0.104)	(0.305)	(0.1719)	(0.0793)
Hausman	8.846 ***	4.969 **	7.573 ***	8.541 ***	3.133 *
	(0.003)	(0.026)	(0.006)	(0.0035)	(0.0767)
Weak Identification F-test CV = 12.83	24.568 **	33.301 **	15.783 **	27.957 **	24.651 **
Under Identification	63.647 ***	91.741 ***	40.825 ***	70.4440 ***	67.1360 ***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Conclusion:	Valid IVs	Valid IVs	Valid IVs	Valid IVs	Over-Identified

Table 3 Panel B: Multiple Instruments *FinancialMarketDevelopment, InstitutionalQuality*

Test	All Countries	All ex-Japan	All ex-US	All ex-UK	All ex-Big 3
Over Identification	0.369	0.9252	1.0703	1.586	0.039
	(0.5434)	(0.3292)	(0.1919)	(0.2079)	(0.843)
Hausman	10.597 ***	8.68 ***	7.409 ***	8.825 ***	7.665 ***
	(0.0011)	(0.0032)	(0.0065)	(0.003)	(0.0056)
Weak Identification F-test CV = 11.59	13.709 **	21.953 **	13.605 **	15.516 **	20.876 **
Under Identification	24.982 ***	40.804 ***	23.019 ***	27.198 ***	37.703 ***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Conclusion:	Valid IVs	Valid IVs	Valid IVs	Valid IVs	Valid IVs

Table 3 Panel C: Multiple Instruments *FinancialMarketDevelopment, EconomicDevelopment*

Test	All Countries	All ex-Japan	All ex-US	All ex-UK	All ex-Big 3
Over Identification	0.994 (0.319)	4.486** (0.034)	0.006 (0.941)	0.569 (0.451)	4.911** (0.027)
Hausman	8.425*** (0.004)	4.436** (0.035)	7.036*** (0.008)	9.516*** (0.002)	2.940*** (0.086)
Weak Identification F-test CV = 11.59	36.754**	49.132**	23.580**	40.943**	37.017**
Under Identification	63.639*** (0.000)	88.473*** (0.000)	40.807*** (0.000)	69.684*** (0.000)	67.039*** (0.000)
Conclusion:	Valid IVs	Over-Identified	Valid IVs	Valid IVs	Over-Identified

Table 3 Panel D: Multiple Instruments *InstitutionalQuality,*
EconomicDevelopment

| Test	All Countries	All ex-Japan	All ex-US	All ex-UK	All ex-Big 3
Over Identification	1.988	0.119	2.427	2.896*	0.200
	(0.159)	(0.731)	(0.119)	(0.088)	(0.655)
Hausman	5.645**	1.757	4.870**	5.343**	0.030
	(0.018)	(0.185)	(0.027)	(0.021)	(0.863)
Weak Identification F-test CV = 11.59	22.512**	33.614**	10.428	24.533**	18.503**
Under Identification	43.439***	65.855***	20.206***	47.038***	36.287***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Conclusion:	Valid IVs	Hausman fails	Weak Instruments	Over-Identified	Hausman fails

Specific Endogeneity Tests

- Detection
  - Test for improvement of IV estimator over OLS estimator
    - Hausman (1978)
- Relationship Identification
  - Overidentification
    - Sargan J test
  - Weak Identification
    - Kleibergen-Paap Wald F statistic with the Stock and Yogo critical values
  - Underidentification
    - Kleibergen-Paap LM statistic

Endogeneity Testing Procedure

Figure 1

Endogeneity Testing Procedure
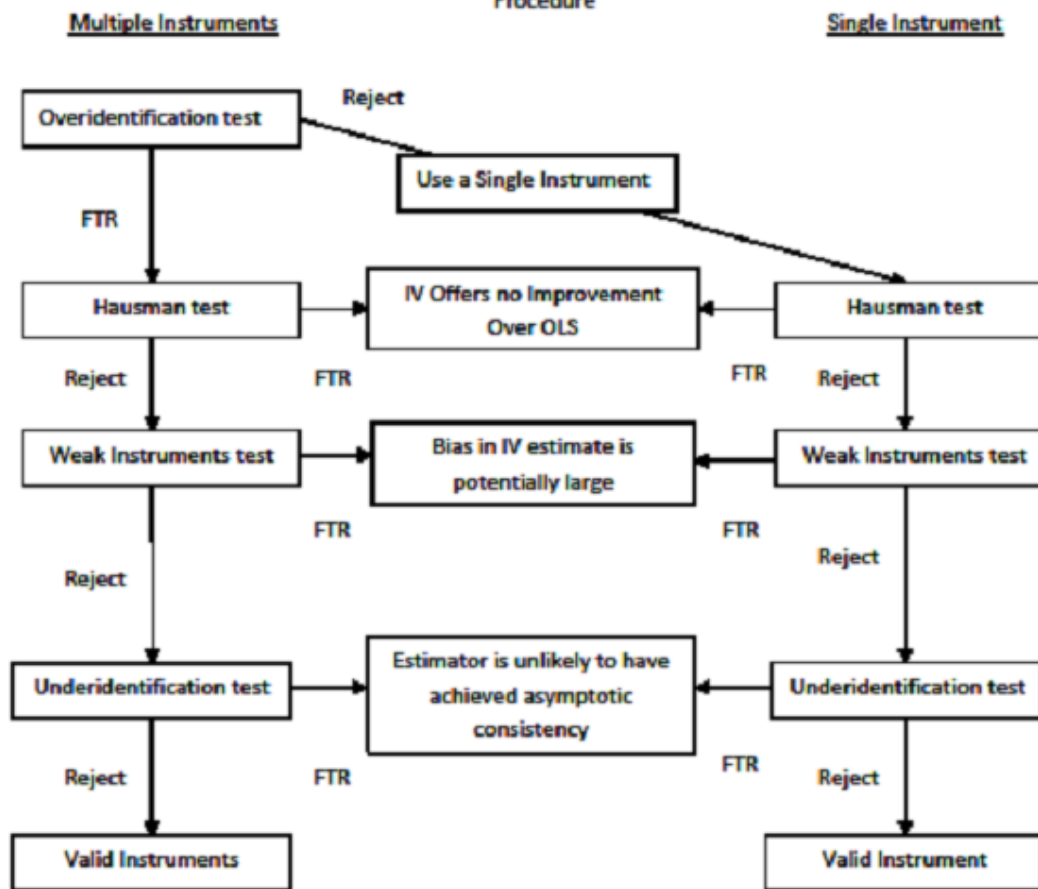
Endogeneity Tests and Conclusions

Test	Valid IV(s) if:	Conclusion if:
Over-identification (J test)	FTR and	Reject: Use diff. IV(s)
Hausman (robust SE version)	Reject and	FTR: IV not an improvement over OLS
Weak Identification (Kleiburgen-Paap Wald)	Reject and	FTR: Bias in IV estimate is potentially large
Under-identification (Kleiburgen-Paap LM)	Reject	FTR: Estimator is unlikely to have achieved asymptotic consistency

Figure 1

Country-level Results

- Higher institutional and governance quality is associated with higher levels of economic growth in developing counties
  - Incremental effect for developed countries is lower but still positive
- Greater financial market development is associated with lower levels of economic development in developing countries
  - Incremental effect for developed countries is positive

Table 2, Panel A

- Higher economic development is associated with greater financial market development in developed countries vis-à-vis developing countries and for developed countries overall
- The level of institutional quality does not seem to have a significant effect on *FinancialMarketDevelopment* in developing or developed countries.
  - The origin of the legal system does have an impact

Table 2, Panel B

- Higher levels of financial market development are associated with a lower level of institutional quality for developing and developed countries with a lower impact on developed.
- Higher levels of economic development are associated with higher levels of institutional quality in developing countries (2.8568) and developed countries with the magnitude of the effect diminishing as we move from the developing classification to the developed classification
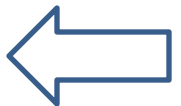
Table 2, Panel C

Empirical Design Outcomes

- Determine if *Economic Development*, *Financial Market Development* and/or *Institutional Quality* are valid instruments for firm-level governance in the performance-governance relationship

- Assess the cross-country evidence on the relationship between governance and performance

Instrument Identification

- If the number of exogenous instruments is exactly equal to the number of endogenous regressors, the relationship is said to be just identified.

- **Overidentification** occurs when the number of exogenous instruments is greater than the number of endogenous regressors

  - There is potential for a combination of exogenous instruments to serve as a better instrument than any single instrument alone

Instrument Identification (con't)

- **Underidentification** occurs when the exogenous instrumental variables, sample size, etc in combination are not strong enough to achieve asymptotic consistency

- Instruments are said to be **weak instruments** when the correlation between the instrument(s) and the endogenous regressor is low enough that the bias in the IV estimator is particularly large