



# A New Cross-National Measure of Corruption

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# Introduction: Measuring corruption

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- Corruption is one of the major problems, especially in developing countries
- What causes corruption? What are its consequences? Debate exists in the literature.
- Studies mostly rely on cross-national perception based measures.
  - Transparency International Corruption Perception Index (TI-CPI) and World Bank Control of Corruption Index (WB-CCI)
  - Perceptions may be weakly correlated with actual corruption
    - Definition of corruption: petty vs grand, legal, cultural, norms
    - Depend on level of corruption
    - Other factors: presence of media density
    - Individual idiosyncrasies: ethical standards
    - Foreign and local respondents

# Measuring corruption: Alternatives

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## - Survey: experience-based

- Expensive
- Reticence: Knowledge or participation in a corrupt transaction, which is illegal increases reticent behavior. 74% respondents are reticent (Kraay and Murrell, 2013)
  - Country variation in degree of reticence makes it even more problematic. Gallup World Poll effective reticence 21% in Indonesia and 48% in India
  - Can these biases be corrected?

## → Use of concrete measures hard or objective data

- Golden and Picci (2005) – inventory of public infrastructure in Italy
- Glaeser and Saks (2006)– use corruption conviction US Federal level
- None at the cross-national level

# Cross-national measure of corruption based on cross-border corruption cases

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- Corruption and judicial statistics
  - “less subjective, cover longer time span, not subject to problems of sampling error and survey non-response” (Glaeser and Saks)
  - Enforcement, probability of detection also affect the number of cases
  - Judicial statistics used within country studies
    - Glaeser and Saks: corruption cases at the Federal level where assumption of probability of enforcement is relatively less problematic
- We argue that data on cross-border corruption could also sidestep these issues
  - Corruption cases involving the bribery of foreign officials by US firms is not informative of corruption level in the US, but the *distribution* of cases wrt nationality of foreign officials is informative of *relative* corruption levels abroad.
  - Spatial distribution of cases pursued in a given country to evaluate levels of corruption in other countries

# Data

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- Cross-border corruption cases: Firms headquartered in country  $i$  bribing officials in country  $j$ 
  - 1,138 cases from 1977-2012 (but only use 1998 onwards)
  - Discard Oil for Food cases
  - Coding where enforcement action was first pursued allows to control for the varying country-specific probability of enforcement of anti-bribery legislation
  - Collection of data made possible by reporting of foreign bribery cases
    - OECD Foreign Bribery Convention
      - Treats bribery of a foreign public official as if it were the bribery of a local official and impose same level of sanctions, prosecuted in home country
      - Thus, relatively same legal definition and standard of bribery in home country and same probability of enforcement and detection

<b>Country of firm's headquarter</b>	<b>Total Cases</b>	<b>Positive Cases</b>	<b>Ongoing Cases</b>
US	344	213	108
Germany	91	55	35
UK	59	26	28
France	52	37	13
Switzerland	40	33	7
Canada	21	6	7
China	19	10	9
Italy	17	2	15
Netherlands	17	8	9
Australia	16	5	11
Japan	16	10	6
Spain	15	1	10
Sweden	11	0	9
Austria	10	0	10
Portugal	9	0	7
	:	:	:
<b>TOTAL</b>	<b>816</b>	<b>432</b>	<b>322</b>

<b>Foreign country</b>	<b>Total Cases</b>	<b>Positive Cases</b>	<b>Ongoing Cases</b>
China	96	49	44
Nigeria	45	29	6
India	42	17	22
Kazakhstan	26	7	15
Brazil	22	8	11
Korea	22	16	4
Russia	21	8	8
Indonesia	20	17	3
Argentina	15	5	8
Mexico	17	5	8
Poland	16	12	1
Angola	15	10	4
Philippines	15	9	2
Libya	14	2	9
Egypt	12	6	6
	:	:	:
<b>TOTAL</b>	<b>816</b>	<b>432</b>	<b>322</b>

	Total Cases					Positive cases					Ongoing cases				
		enforced:					enforced:					enforced:			
Time period	Tot	hq	US	ot	fo	Tot	hq	us	ot	fo	Tot	hq	us	ot	fo
1998-2002	308	201	63	27	17	243	162	60	14	7	54	29	3	13	9
2003-2007	256	154	48	13	41	138	82	31	11	14	97	57	12	3	26
2008-2012	252	145	22	22	69	51	16	4	9	22	171	102	18	6	45
tot	816	500	133	60	111	432	260	95	34	43	322	188	33	21	80

## An illustration: Cases first pursued in the headquarters country. 1998-2012

Note.

The total number of cases first pursued in the US is 307, and in DE is 46.

HQ	FO	(1) Cases, first pursued in HQ	(2) Cases, as % of total n. cases first pursued in HQ	(3) Exports HQ→ FO, as % of tot exports of HQ	Ratio Col. (2) / Col. (3)
US	China	64	20.8%	9.2%	2.25
US	Italy	5	1.6%	1.2%	1.27
Germany	China	4	8.7%	4.0%	2.15
Germany	Italy	1	2.2%	6.7%	0.32



# The PACI

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$$PACI_z = \frac{\sum_{i=1}^N cases\_obs\_HQ_{i,z}}{\sum_{i=1}^N E(cases\_obs\_HQ_{i,z})} \cdot 100$$

Comparison between actual no. of corrupt transactions in  $z$  and the expected no. if the spatial distribution of cases reflect bilateral trade shares between  $i$  and  $z$ .

$$E(cases\_obs\_HQ_{i,z}) = \frac{X_{iz}}{\sum_{j=1}^N X_{ij}} \cdot \sum_{j=1}^N cases\_obs\_HQ_{i,j}$$

# Assumptions

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## Assumption 1

The probability that a corrupt transaction involving firms from country  $i$  and public officials in country  $j$  is observed and first pursued in country  $i$ , does not depend on the identity of the foreign country  $j$ : (non discrimination)

$$pr\_obs\_HQ_{i,j} = pr\_obs\_HQ_i$$

## Assumption 2

The total number of corruption occurrences involving country  $i$ 's firms and country  $j$ 's officials,  $corr\_exch_{i,j}$ , is determined by the probability of that a firm proposes a bribe and the probability that official in  $j$  accepts and the number of transactions:

$$corr\_exch_{i,j} = pr\_corr\_HQ_i \cdot pr\_corr\_FO_j \cdot transactions_{ij}$$

## Assumption 3:

Bilateral transactions are proportional to the value of exports from country  $i$  to country  $j$ ,  $x_{ij}$ , according to a constant factor  $k$ :

$$cases\_obs\_HQ_{i,j} = pr\_obs\_HQ_i \cdot pr\_corr\_HQ_i \cdot pr\_corr\_FO_j \cdot k \cdot x_{ij}$$

→ probability that a cross border transaction involving  $z$  is corrupt/ weighted average of probabilities for all countries

# Measures of dispersion

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1. imprecision with which we estimate the index of corruption in countries with little foreign trade; *prob of zero cases*

$$\text{Pr\_zero\_cases}_z^{PACI} = \prod_{i=1}^N (\text{Pr\_cases\_obs\_HQ}_{i,z} = 0 / \text{Pr\_corr\_FO}_z = \text{Pr\_corr\_FO}_{AVG})$$

2. degree of coherence of the information on the level of corruption of country z coming its different trading partners; *coefficient of variation*: Std. dev/ ave.

$$\text{Dispersion}_z^{PACI} = \frac{\sqrt{\frac{1}{(N-1)} \sum_{i=1}^N (\text{cases\_obs\_HQ}_{i,z} - E(\text{cases\_obs\_HQ}_{i,z} / PACI_z))^2}}{\frac{1}{N} \sum_{i=1}^N \text{cases\_obs\_HQ}_{i,z}}$$

# PACI

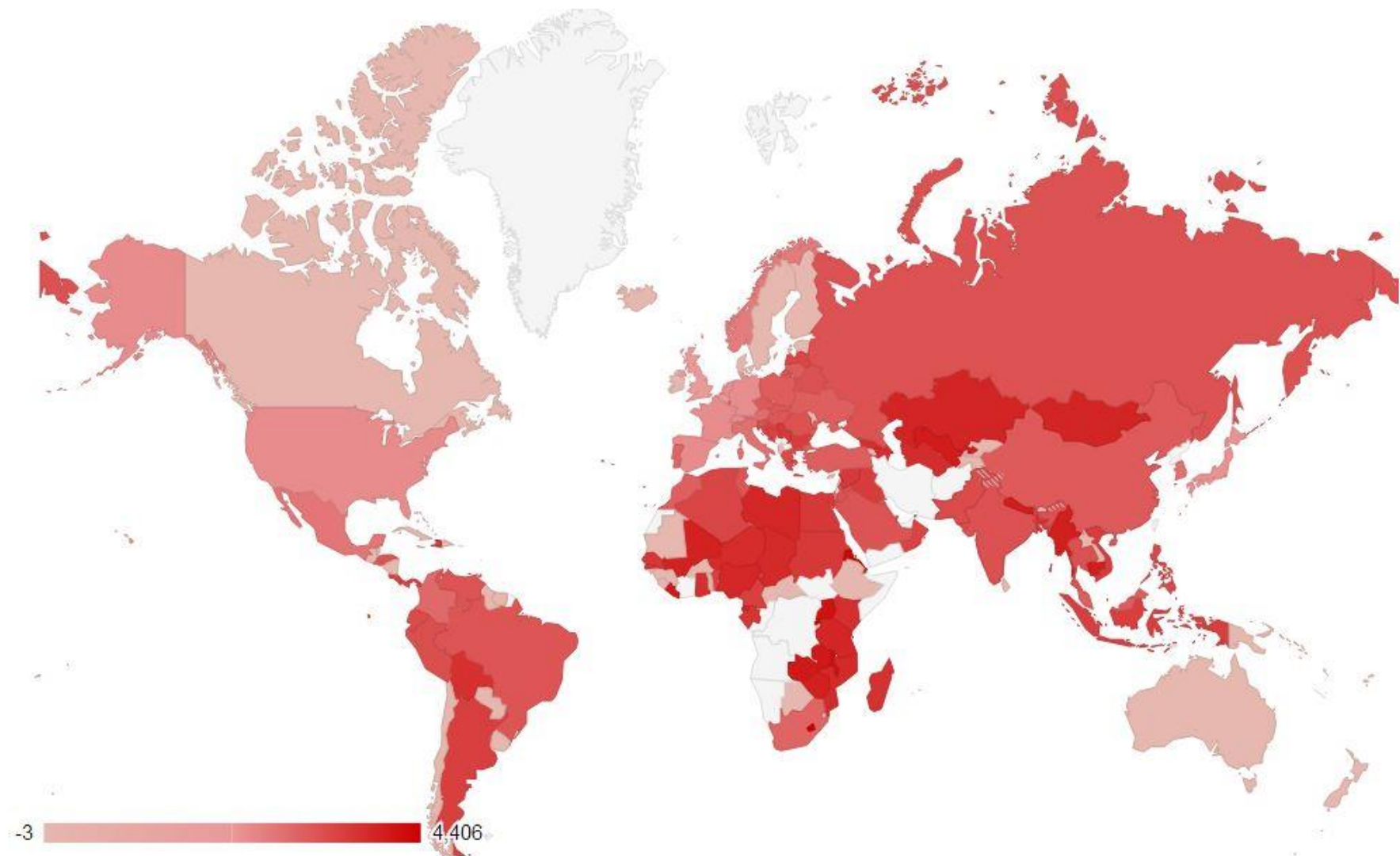
Country	ISO	PACI	Pseudo SE	Pr_zero	Rank	RD WB CCI	RD TI CPI	Country		PACI	Pseudo SE	PR zero	Rank	Rank WB CCI	Rank TI CPI
Finland	FI	0.000	4.901	0.033	1	0	0	Austria	AT	56.169	3.592	0.000	23	14	15
Denmark	DK	0.000	3.073	0.006	2	0	0	Colombia	CO	73.778	9.736	0.066	24	-27	-20
Sweden	SE	0.000	2.323	0.001	3	-2	-1	Portugal	PT	84.131	10.615	0.028	25	5	5
Ireland	IE	0.000	1.507	0.001	4	-10	-12	South Africa	ZA	91.773	6.730	0.013	26	-2	-10
Australia	AU	0.000	1.651	0.000	5	-2	-2	Luxembourg	LU	92.093	18.888	0.338	27	14	16
Canada	CA	0.000	0.082	0.000	6	-5	-6	El Salvador	SV	106.391	13.832	0.391	28	-36	-12
United Kingdom	UK	3.036	0.543	0.000	7	-3	-2	Morocco	MA	123.176	14.352	0.197	29	-27	-31
Belgium	BE	4.480	0.873	0.000	8	-9	-9	Malaysia	MY	124.491	12.179	0.002	30	-8	1
Japan	JP	7.057	0.978	0.000	9	-10	-9	Turkey	TR	131.103	15.347	0.001	31	-14	-18
Netherlands	NL	8.315	1.130	0.000	10	2	0	Ukraine	UA	131.207	25.209	0.218	32	-46	-47
Germany	DE	9.074	1.352	0.000	11	-1	-2	Lithuania	LT	133.812	26.083	0.474	33	-6	-1
United St. of America	US	9.797	1.030	0.000	12	-3	-2	Poland	PL	140.782	20.725	0.002	34	-6	-19
France	FR	9.934	1.944	0.000	13	-3	-2	Kuwait	KW	158.301	16.904	0.283	35	10	0
Spain	ES	9.983	1.975	0.000	14	-4	-5	Trinidad and Tobago	TT	163.236	14.447	0.542	36	-11	-10
Switzerland	CH	10.581	2.018	0.000	15	11	10	China	CN	163.447	23.576	0.000	37	-38	-22
Singapore	SG	16.373	1.716	0.000	16	13	13	Slovakia	SK	166.042	17.861	0.164	38	9	1
Taiwan	TW	19.786	2.644	0.000	17	-7	-7	Czech Republic	CZ	170.155	15.540	0.009	39	9	1
Norway	NO	24.454	4.318	0.017	18	12	12	Hungary	HU	174.817	10.952	0.032	40	14	9
Israel	IL	27.104	5.006	0.025	19	-4	-2	Tunisia	TN	215.041	25.456	0.395	41	-7	8
Mexico	MX	35.462	1.162	0.000	20	-35	-28	Brazil	BR	217.255	15.684	0.000	42	-10	-5
Italy	IT	44.965	4.593	0.000	21	-20	-9	Venezuela	VE	233.422	8.908	0.032	43	-51	-55
Korea	KR	46.787	3.611	0.000	22	-5	-10	Qatar	QA	235.724	18.564	0.280	44	22	19
								Honduras	HN	239.167	26.010	0.433	45	-37	-39

Country		PACI	Pseudo SE	Pr_zero	Rank	RD WB CCI	RD TI CPI
Saudi Arabia	SA	242.439	22.404	0.005	46	-3	-8
Jordan	JO	243.096	43.412	0.663	47	12	20
Russian Federation	RU	247.858	25.325	0.001	48	-37	-46
Romania	RO	248.097	34.736	0.089	49	-5	-12
Slovenia	SI	256.003	27.805	0.310	50	29	27
Belarus	BY	258.200	49.376	0.679	51	-40	-30
Thailand	TH	269.053	30.999	0.012	52	2	7
India	IN	281.452	21.186	0.000	53	-9	-12
Peru	PE	318.676	36.204	0.285	54	-3	4
Greece	GR	344.656	38.489	0.055	55	22	16
Ecuador	EC	364.359	31.576	0.439	56	-25	-36
Pakistan	PK	367.443	59.826	0.337	57	-43	-48
Brunei	BN	408.515	96.385	0.783	58	21	30
Philippines	PH	450.541	18.712	0.070	59	-14	-32
Latvia	LV	461.958	52.022	0.649	60	26	19
Afghanistan	AF	502.132	87.605	0.819	61	-51	-27
Iran	IR	520.407	45.083	0.215	62	-5	-4
Algeria	DZ	526.699	33.827	0.219	63	-2	-11
Costa Rica	CR	540.679	51.888	0.228	64	32	22
Oman	OM	560.208	77.058	0.585	65	29	43
Bosnia	BA	565.299	91.213	0.838	66	13	2
Croatia	HR	574.016	49.984	0.419	67	25	11
Panama	PA	635.977	44.612	0.533	68	8	16
Yemen	YE	649.220	99.887	0.735	69	-17	-8
Benin	BJ	676.352	109.330	0.863	70	-23	-1
Macedonia	MK	679.688	133.146	0.863	71	3	-5
Congo	CG	684.171	103.282	0.864	72	-26	-23
Cameroon	CM	712.286	149.332	0.869	73	-28	-30

Country		PACI	Pseudo SE	Pr zero	Rank	RD WB CCI	RD TI CPI
Argentina	AR	758.380	34.228	0.138	74	8	2
Indonesia	ID	771.134	71.228	0.097	75	-15	-25
Viet Nam	VN	847.251	98.604	0.307	76	-8	-7
Iraq	IQ	879.072	109.339	0.505	77	-36	-25
Bulgaria	BG	880.925	90.900	0.452	78	34	35
Serbia	RS	986.975	108.122	0.603	79	18	17
Syrian Arab Republic	SY	993.677	98.935	0.669	80	1	23
Egypt	EG	1042.357	71.320	0.316	81	12	26
Sudan	SD	1043.116	141.505	0.826	82	-29	-25
Senegal	SN	1172.681	110.206	0.843	83	37	25
Gabon	GA	1282.609	140.093	0.791	84	13	14
Côte d'Ivoire	CI	1316.462	115.333	0.796	85	-20	-24
Haiti	HT	1322.406	80.269	0.797	86	-24	-27
Bahrain	BH	1340.288	179.296	0.689	87	56	61
Madagascar	MG	1541.492	315.927	0.937	88	45	15
Bolivia	BO	1698.260	136.430	0.889	89	6	3
Ghana	GH	1744.195	155.411	0.751	90	32	39
Georgia	GE	1834.977	185.225	0.849	91	32	-6
Kenya	KE	1857.055	167.168	0.724	92	-3	-14
Bangladesh	BD	1860.802	177.201	0.724	93	-14	-22
Azerbaijan	AZ	1982.937	168.353	0.817	94	-2	-7
Turkmenistan	TM	2108.595	281.971	0.910	95	-14	-17
Niger	NE	2156.377	435.470	0.955	96	16	3
Chad	TD	2438.516	499.616	0.960	97	-11	-17
Mozambique	MZ	2453.064	374.126	0.922	98	28	23
Libya	LY	2685.393	212.317	0.594	99	7	10
Equatorial Guinea	GQ	2707.104	404.723	0.895	100	-15	-8

# The PACI

Country	PACI	Pseudo-S.E.	Pr zero	Country Rank	Rank difference WB CCI	Rank difference TI CPI
Nigeria	2753.113	172.999	0.202	101	-1	-9
Djibouti	3017.412	512.072	0.967	102	25	34
Tanzania	3032.193	425.489	0.876	103	27	34
Kazakstan	3175.626	217.250	0.500	104	7	24
Mongolia	3264.273	608.289	0.970	105	33	42
Mali	3728.458	352.223	0.948	106	43	39
Zimbabwe	4076.816	837.928	0.952	107	1	25
Burma	4164.303	886.369	0.976	108	-6	-3
Nepal	4774.961	855.104	0.979	109	35	19
Cambodia	4822.404	773.506	0.940	110	6	14
Uzbekistan	5144.979	532.195	0.907	111	8	12
Sao Tome and P.	5609.297	352.414	0.982	112	23	34
Zambia	6285.890	557.955	0.938	113	26	28
Liberia	6399.922	899.955	0.896	114	15	10
Uganda	9018.875	801.283	0.925	115	27	28





## Spearman Rank Correlations between different indexes of corruption

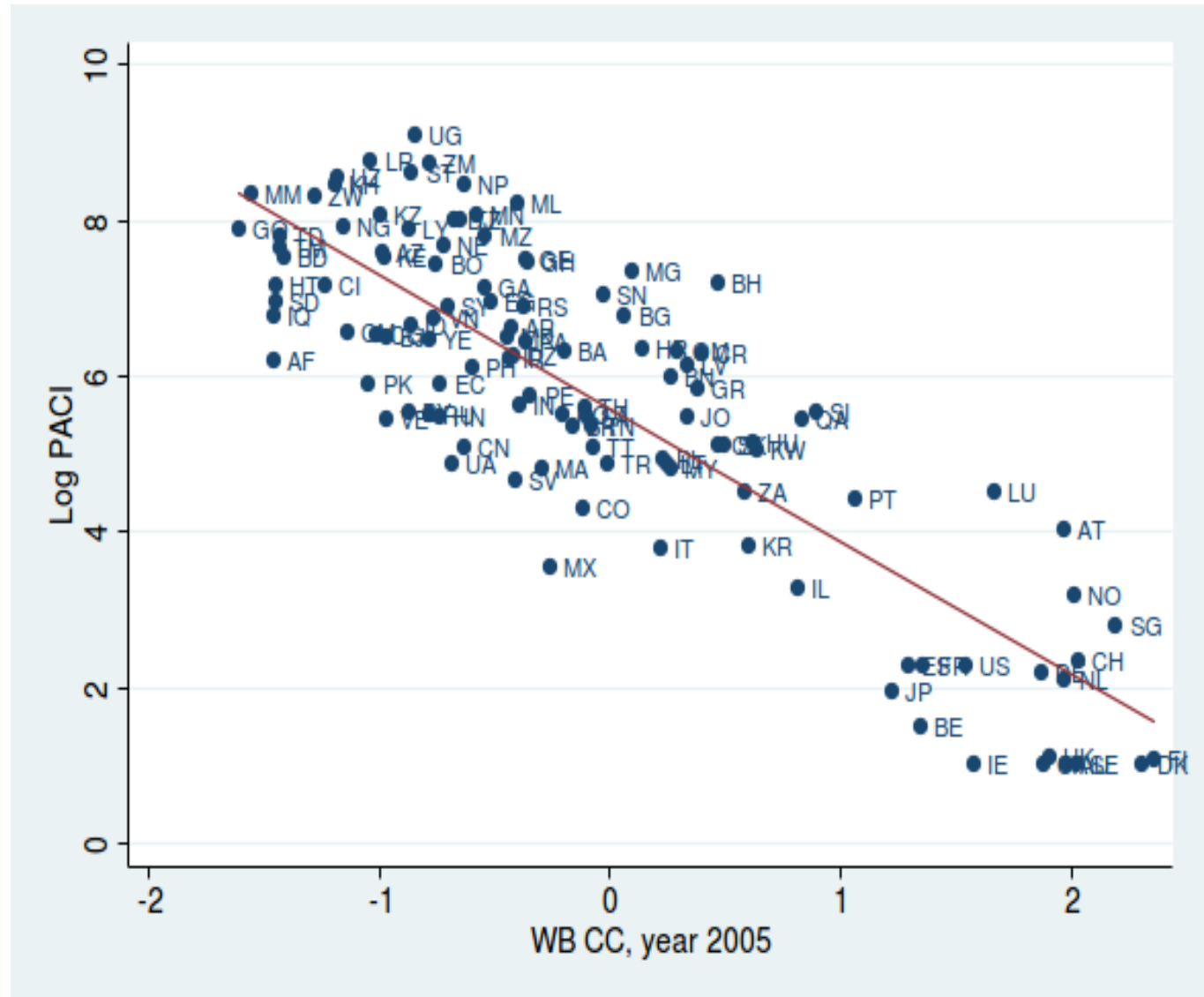
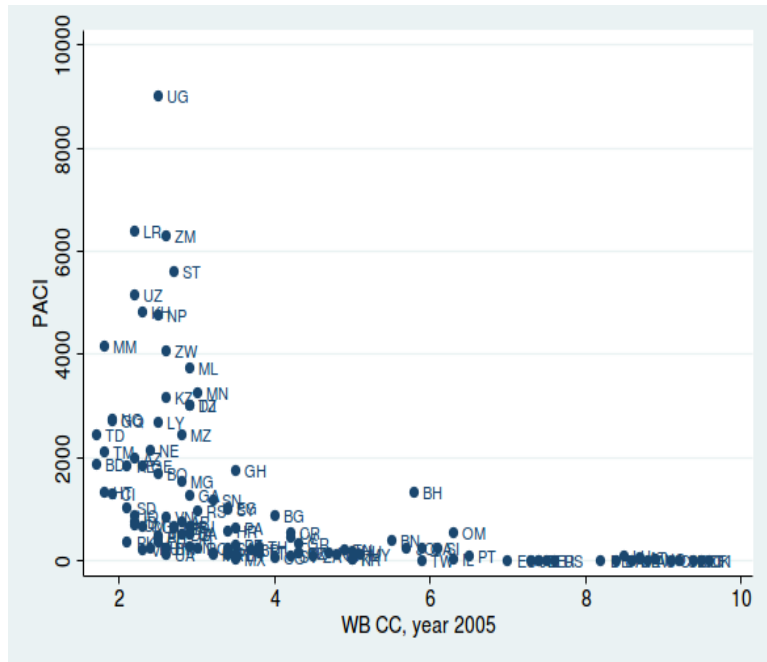
	PACI <sub>1</sub>	PACI <sub>2</sub>	PACI <sub>3</sub>	PACI <sub>4</sub>	TI-CPI	WB-CC
PACI <sub>1</sub>	1					
PACI <sub>2</sub>	0.861 (115)	1				
PACI <sub>3</sub>	0.934 (115)	0.806 (115)	1			
PACI <sub>4</sub>	0.797 (115)	0.935 (115)	0.859 (115)	1		
TI-CPI	-0.787 (115)	-0.706 (115)	-0.743 (115)	-0.675 (115)	1	
WB-CC	-0.781 (114)	-0.692 (114)	-0.718 (114)	-0.642 (114)	-0.956 (114)	1
TI-GCB	0.772 (54)	0.717 (54)	0.753 (54)	0.715 (54)	-0.795 (54)	-0.763 (54)

1: All cases, all administrations (the same values shown in Table 5; our preferred index)

2: All cases, with the exclusion of health and telecom administration.

3: Only “positive” and “ongoing” cases, all administrations.

4: Only “positive” and “ongoing” cases, with the exclusion of health and telecom administrations.



Variable	Dependent variable			
	WB-CCI (Treisman 2007 Table 3 Column 4)	Ln(Paci) (All cases, all administrations)	WB-CCI (Treisman 2007 Table 4 Column 8)	Ln(Paci) (All cases, all administrations)
Ln GDP per capita recent year	1.095*** (0.107)	-2.065*** (0.218)	0.518*** (0.072)	-1.099*** (0.201)
Democratic since 1995			0.091 (0.192)	-1.323*** (0.480)
FH Press Freedom			0.015*** (0.003)	-0.002 (0.007)
Newspaper circulation 1996			0.001 (0.001)	-0.002 (0.002)
Presidential democracy			-0.074 (0.048)	0.006 (0.144)
Former British colony			0.304* (0.174)	-0.078 (0.379)
Former French colony			0.266* (0.147)	-0.586*** (0.246)
Former colony of other power, except ES, PT			-0.052 (0.149)	-0.383 (0.333)
British legal tradition			0.038 (0.258)	-0.912* (0.459)
French legal tradition			0.04 (0.175)	-0.549 (0.367)
German legal tradition			0.298 (0.325)	-0.841 (0.592)
Scandinavian legal tradition			0.135 (0.388)	-1.882** (0.920)

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German legal tradition			0.298 (0.325)	-0.841 (0.592)
Scandinavian legal tradition			0.135 (0.388)	-1.882** (0.920)
Percent protestant 1980			0.007 (0.004)	0.010 (0.011)
Percent catholic 1980			-0.000 (0.002)	-0.006 (0.005)
Percent muslim 1980			0.003 (0.002)	-0.000 (0.005)
Constant	-9.603*** (1.035)	23.433*** (2.038)	-4.171*** (0.725)	16.349*** (1.813)

## Bribe Payer's Index

Country	ISO	BPI	Pr_zero	Rank diff, WB CCI
Portugal	PT	0.000	0.753	6.47
Bulgaria	BG	0.000	0.673	
Slovakia	SK	0.000	0.436	
Norway	NO	0.000	0.342	
Denmark	DK	0.000	0.337	
Hungary	HU	0.000	0.255	
Poland	PL	0.000	0.233	
Finland	FI	0.000	0.218	
Belgium	BE	0.000	0.024	7.22
Korea	KR	24.012	0.000	5.83
Japan	JP	27.957	0.000	7.1
Italy	IT	30.803	0.002	5.94
Sweden	SE	38.860	0.076	7.62
Turkey	TR	46.096	0.114	5.23
Australia	AU	47.689	0.015	7.59
Argentina	AR	48.345	0.126	7.3
Germany	DE	89.071	0.000	7.34
Canada	CA	92.218	0.013	7.46
Spain	ES	94.297	0.014	6.63
United St. of America	US	102.513	0.000	7.22
Netherlands	NL	105.907	0.009	7.28
France	FR	121.359	0.001	6.5
Switzerland	CH	171.184	0.030	7.81
Austria	AT	222.063	0.105	7.5
United Kingdom	UK	253.290	0.006	7.39
Czech Republic	CZ	338.839	0.229	

# Conclusion

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- New cross national measure of corruption based on new set of judicial statistics on occurrence of corruption
  - Particular informational content allows to control for cross country variability in the probability of detection of corruption
- Narrow definition of corruption: propensity of public officials to accept bribe from firms
  - Also informative of general level of corruption in the country
  - Allows for easy interpretation vs perception and subjective based measure
    - Based on clear assumptions
- Open data would lead to development of corruption and governance measures based on hard data

# Discussion of Assumptions

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1. In the real world, countries may apply a discriminatory policy when pursuing cross-border corruption cases
  - Target heavy trade partners, strategic trade policy
  - Results: Existence of bilateral agreements modest (McLean). See also Choi and Davis
  - However, include all countries as reference hence heterogeneity
2. Sector-specific characteristics of certain corrupt transactions
  - Ex. Different exposure to trade
  - How to address: consider sectoral decomposition but data problems
3. Exports vs FDI
4. Differences in the size and scope of the public sector

# Conclusion

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- PACI has high rank correlation with WB CCI and TI CPI
  - Allow to understand different measures
  - Complementarity
- Contribute to understanding of causes and consequences of corruption



End.

Thank you for your attention.

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