Groupe d'économie Lare-Efi du développement

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Working paper

Measuring corruption: perception surveys or victimization surveys?

Towards a better comprehension of populations' perception mechanisms: Press freedom, Confidence and Gossip

By

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Abstract

While methodologies and survey techniques recorded progress over the years, corruption measurement remains a many-headed monster. Since 2003 and the first publication of Transparency International's Global Corruption Barometer, researchers have access to population's feeling about the corruption scourge across institutions. Thereby, wider room emerged for populations' perceptions in the field of corruption quantification.

In this paper, we analyze the gulf separating perceived corruption from experienced bribe situations using global household surveys in a Panel dataset.
We show that the gap between these two types of data can be wide and unevenly distributed across countries. Introducing further objective and subjective data we try to puzzle out perception mechanisms.

Résumé

Bien que les techniques d'enquête et les méthodologies se soient améliorées au fil des années, la mesure corruption demeure problématique. Depuis 2003 et la première publication du Baromètre Mondial de la Corruption par Transparency International, les chercheurs ont dorénavant accès aux perceptions des populations pour évaluer l'étendue de la corruption au sein de différentes administrations.

Dans cet article, nous analysons l'écart entre les perceptions de la corruption et l'expérience concrète de celle-ci en utilisant des données de panel issues d'enquêtes ménages menées à une échelle mondiale. Nous comparons ainsi, au sein même des populations, les écarts entre expériences et perceptions de la corruption, afin d'isoler au mieux les mécanismes à l'œuvre dans la construction des perceptions. Nous montrons alors que les écarts entre ces deux types de donnée peuvent être importants et inégalement distribués.

Keywords: Corruption, Global Corruption Barometer, Governance, CPI, Transparency International, Corruption measurement, Perception indicators, Press freedom, Econometrics, Panel Data, Household surveys.

JEL classification: O11, O17, O19

Content

I.   Introduction

Psychologists and cognitive scientists have long studied perception mechanisms and surveys design, from happiness studies [Cantril, H., (1965); Easterlin, R.A., (1974)] to corruption surveys [Bertrand, M., Mullainathan, S., (2001); Douhou, S., Magnus, J.R., Van Soest, A., (2011), Jensen, N.M., Rahman, A., (2011)].

A flourishing literature now studies corruption determinants from the existing various barometers while performing comparisons with experts' assessments, usually at a national or regional level [Attila, G. (2008); Moyal, P., Rossi, M., Rossi, T. (2004); Razafrindrakoto, M., Roubaud, F. (2006)]. A few articles have informed such comparisons at a global-scale [Roca, T. 2010a].

Yet, case studies have informed the different results provided by victimization surveys (or bribery reporting) and experts' indicators [Čábelková, I. (2001); Donchev, D., Ujhelyi, G. (2009); Olken, B., (2006); Razafrindrakoto, M., Roubaud, F. (2006); Rose, R., Mishler, W. (2010).
Nevertheless, only few papers operate cross-sectional studies to identify measurement hazards using populations' perceptions and bribery reporting [Mocan, N. (2004), Weber Abramo, C. (2008)].

The existing literature shows that experts' perceptions and victimization surveys barely agree regarding the extent of corruption, while some authors even prompted critiques of comparing these kinds of data, with some contending that there is no reason for them to be strongly correlated, as only a minority of people actually interacts with public services [Eric Uslaner, cited in Weber Abramo (2008) p.41].
Perception indicators have also been extensively criticized [see Arnt, C., Oman, C. (2006), etc.] but remain the only way to "measure the unmeasurable"[1].

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[1] Asas, Z., Faizur, R., (2008)

As summarized by Weber Abramo, C. (2008): "Corruption is hard to study empirically. Its many likely determinants interrelate in complicated ways […] As with other types of criminal activity, it is hard to observe directly, and so researchers must rely on surveys of corruption's victims, the accuracy of which is often difficult to assess."

> "The disparities between opinions and experience follow no common pattern from country to country. If a reasonably common pattern were found, then one could uniformly "factor out" distortions in the opinion-forming processes of people in order to compare countries. The absence of such commonality reinforces the conclusion, already stemming from the analysis of the aggregated data, that the "distance" between opinions and experiences vary haphazardly from country to country and therefore, perceptions-based comparisons between countries cannot be linked to differences in the underlying material conditions." (Weber Abramo, C. (2008), p.5)

In the line with Weber Abramo's article, the purpose of this paper is precisely to assess the accuracy of populations' perceptions, comparing citizens' feeling and their experiences with bribe situations. However, we now propose a systematic analysis of the spread between perceived and experienced corruption at a global-scale, using surveys from 2006 to 2010 in a panel dataset. Moreover, contrarily to Claudio Weber Abramo, we suggest that we can identify stylized facts and a common pattern informing distortions in perception mechanisms.

The first section of this paper describes the data and methodology we use. The second section presents descriptive statistics of the variable at stake while the last part focuses on the multivariate analysis of the gulf separating populations' perceptions and actual experiences with corruption.

II.   *Data and methodology*

To perform this analysis, we gathered data from different sources, crossing objective data and perception indicators. Thus, we utilized data from the World Bank (GNI per capita, Population size, Unemployment rate), UNDP (Human Development Index), the International Foundation for Electoral Systems[2] (Election-years); and perception measures from Freedom House (Freedom of the press), Transparency International / Gallup (Global Corruption Barometers) and The Gallup World Poll (Confidence data and bribery reporting).

The Global Corruption Barometers (Transparency International) provide, since 2003, aggregated data at the national level regarding populations' perceptions of corruption across national administrations[3] (Police, Judiciary system, Public Officials & civil servants, military, Parliament & legislature, Political Parties, Private sector). Using the Global Corruption Barometers (GCB) from 2006 to 2010, we created a Populations' Perceptions of Corruption Index (PPCI) gathering populations' perceptions towards the institutions people faces the more. However, as the GCBs coverage is limited, we also introduced data from the Gallup World Poll: Populations' perceptions of corruption in Business and Government[4].

Aiming to compare perceptions to actual experiences with corruption, we collected data from the Gallup World Poll (2006 to 2010) regarding populations' reporting of bribery[5].

Subsequently, we created a gap index (GPV), measuring for each country (i) and year (j) (2006 to 2010) the gulf separating perceptions from victimization data (bribery reporting). Using a multivariate analysis, we finally attempted to inform the determinants of this gap.

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[2] http://digest.electionguide.org/
[3] http://www.transparency.org/policy_research/surveys_indices/gcb
[4] Respectively the percentage of the population stating that Business sector and Government is corrupted.
[5] The percentage of the population stating having faced bribe situation the past year.

III.   *Descriptive statistics and data analysis*

A. *Populations' perceptions of corruption across institutions*

As a first description of the Global Corruption Barometer data, we performed a factor analysis (Principal Component Analysis on the pooled dataset) to represent the correlations among the different perceptions of the population across national institutions.

Figure 1. Populations' perceptions of corruption accros institutions: Principal Component Analysis
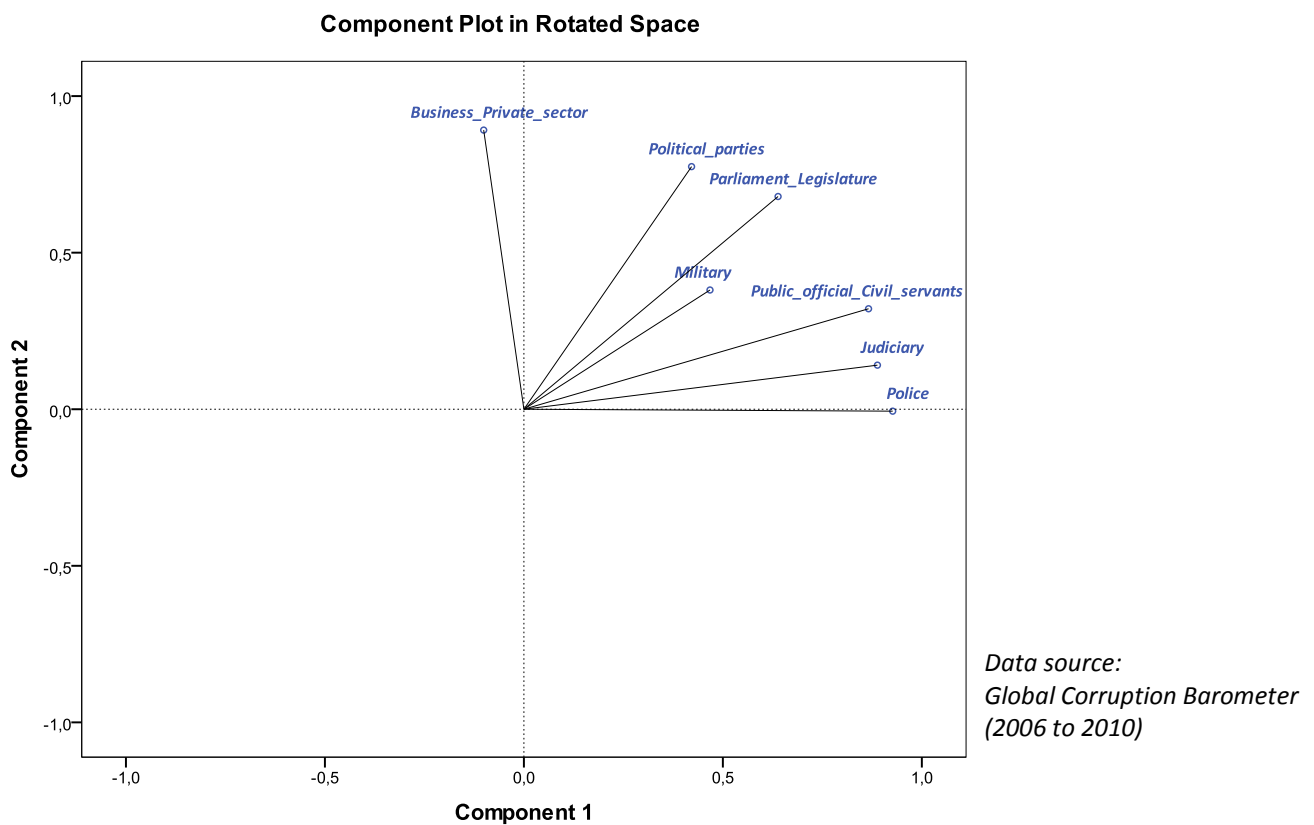
Extracting two components, one can observe that populations' perceptions of corruption in Business and corruption in the Police are the most divergent. This representation seems to provide a robust picture in line with intuition. Thereby, perceptions of corruption in the police, the judiciary system and civil servants appear very close, so as perceptions of corruption in government and political parties. Populations' evaluation of corruption in the military seems not surprisingly the less correlated with the other dimensions.

If this first analysis seems to provide a coherent picture, it does not however, give any clue about the consistency of these perceptions to describe the reality of corruption. As reminded by the existing literature, perceptions often embody a strong internal coherence.

In order to inform a first comparison between victimization surveys and populations' perceptions, we constructed a correlation matrix confronting Bribery reporting (Gallup World Poll) and perceptions of corruption in the institutions people faces the more:

Table 1. Correlations Matrix (data: 2009)

		Populations' perception of corruption in...				
		Government	Police	Business Private sector	Public officials Civil servants	Judiciary
Victimization surveys	Pearson Correlation Sig. (2-tailed) N	.427** .000 126	.413** .000 73	-.074 .536 73	.264* .024 73	.390** .001 73
Government	Pearson Correlation Sig. (2-tailed) N		.698** .000 81	-.012 .912 81	.628** .000 81	.689** .000 81
Police	Pearson Correlation Sig. (2-tailed) N			-.076 .482 87	.736** .000 87	.753** .000 87
Business & Private sector	Pearson Correlation Sig. (2-tailed) N				.224* .037 87	.080 .461 87
Public officials & Civil servants	Pearson Correlation Sig. (2-tailed) N					.794** .000 87
Judiciary	Pearson Correlation Sig. (2-tailed) N					

Populations' perception of corruption in... (row label along left side)

**Correlation is significant at the 0.01 level (2-tailed). * at the 0.05 level (2-tailed).

Table 1 shows that populations' perceptions are not much correlated with bribe situations. Perceptions of corruption in Government and the Police are the most associated with victimization surveys. However, one can argue that people are not likely victim of bribery from government members, thus, we should consider that corruption in government is a proxy for corruption in the other administrations. It seems likely that the behavior of government officials reflects the one of civil servants; exemplary government would likely not tolerate a corrupted administration.

As suggested by the previous factor analysis, corruption in Business and Private sector is only correlated with corruption in Public officials and Civil Servants (though not strongly).

To investigate the gap between experiences and perceptions, we first aggregated perceptions data computing a Populations' Perceptions of Corruption Index (PPCI).

As the Global Corruption Barometer is not available for each country - it covered 88 countries in 2010 to 63 in 2006 - we calculated the PPCI using also the Gallup World Poll data. Ideally, the PPCI would gather the following 5 dimensions for each year and country: Corruption in Public Officials and Civil servants (GCB); Corruption in the Local Police (GCB); Corruption in the judiciary system (GCB); Corruption in business (Gallup WP) and Corruption in Government (Gallup WP).
Nevertheless, to maximize our sample size, we considered reasonable to calculate our index if at least two dimensions were available:

$$PPCI_{i,j} = \sum 1/n \times \text{Populations' Perception of Corruption in dimension } d_{i,j}$$

n= number of dimension according to data availability (with 2<n<5)
Country: i
Year: j

B. Comparison across continents and case studies

In order to give a first taste of the distribution of the PPCI among continents, but also to inform the role of variables that likely influence it, we draw the following chart:

Figure 2. Comparison among continents

Data source: Gallup World Poll, Transparency International GCB, Freedom House. (2009)
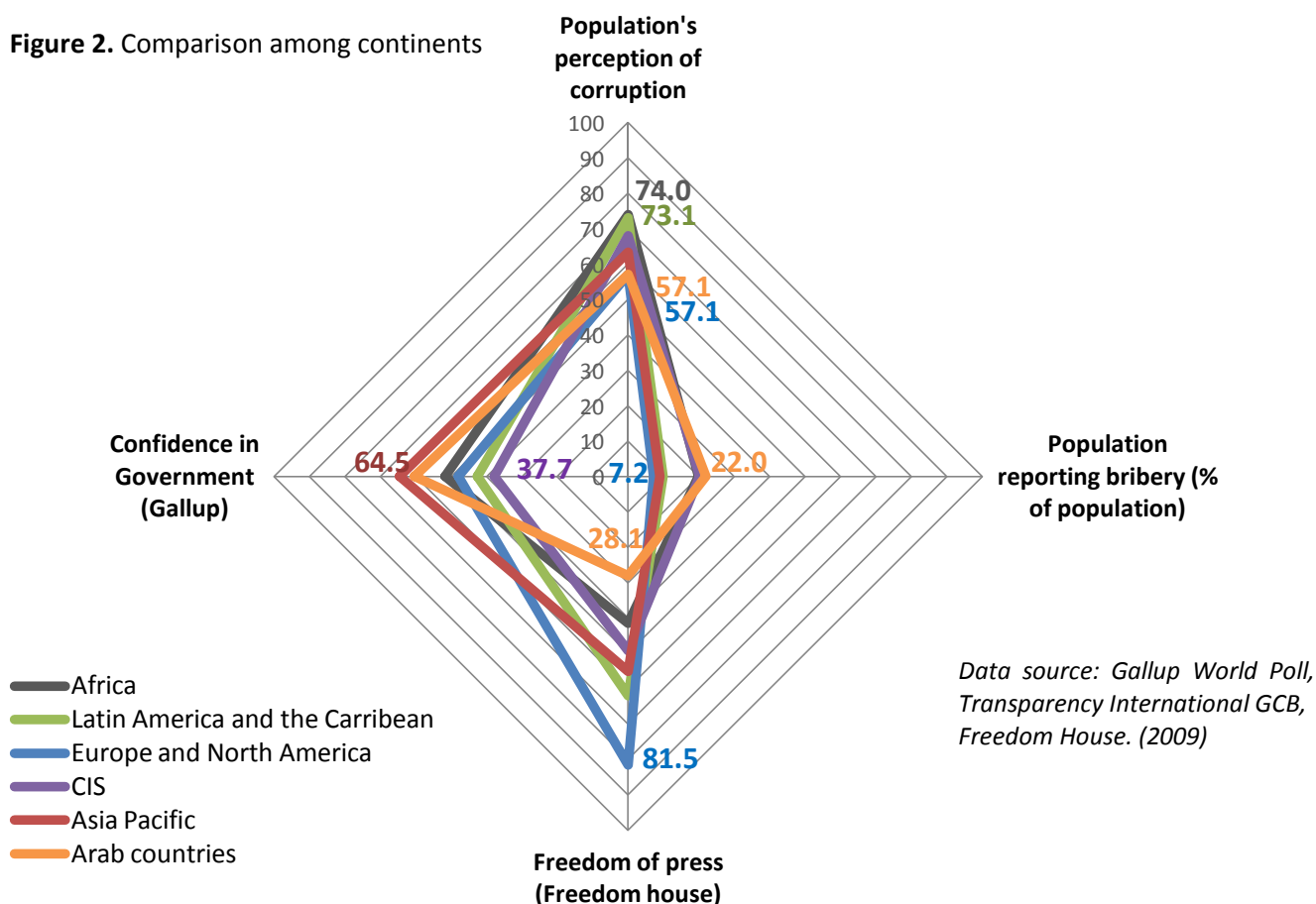
Figure 2 shows that the gap between experience and perceptions of corruption is not evenly distributed. For instance, if Arab States citizens report bribe situations the more, they also perceive corruption the less (tie with Europe and North America). On the other hand, Latin America reports a low level of bribery within victimization surveys while perceives one of the widest scopes of corruption. We displayed in Table 2. The descriptive statistics we computed supporting this representation.

Table 2. Descriptive statistics: continents comparison

Continent	Populations' perception of corruption*	Population reporting bribery (% population)	Freedom of press (Freedom house)	Confidence in Government (Gallup)	Accepting bribe never justifiable (% population. WVS)	Sample size for "Accepting bribe..."
Africa	74.0	19.8	41.6	51.7	65.0	(N=11)
Latin America and the Caribbean	73.1	9.9	61.9	42.5	75.4	(N=12)
Europe and North America	57.1	7.2	81.5	48.0	77.3	(N=25)
CIS	68.0	20.2	49.3	37.7	66.1	(N=24)
Asia Pacific	63.4	9.1	55.1	64.5	73.0	N=14)
Arab countries	57.1	22.0	28.1	60.3	90.4	(N=9)

*Mean perceptions of corruption in: Government; Police; Business; Private sector; Public officials; Civil servants; Judiciary

Aiming to evaluate the weight of tolerance towards corruption, we introduced data from the World Value Surveys (WVS), describing the share of the population stating that "accepting bribe is never justifiable"; however, the coverage of the WVS appears too limited to provide rigorous interpretations.

The literature describing perception mechanisms shows that populations tend to report more systematically the situations interpreted as unfair [Douhou, S., Magnus, J.R., Van Soest, A., (2011)]. Thereby, we would expect higher bribery reporting in countries where populations find bribery the less justifiable. One may argue that in countries very sensitive towards corruption, people would be reluctant to give a reliable answer to the bribery question. Nevertheless, the data we use deals with people facing bribe situation, not with respondents' actual acceptation to give /or asking for bribe.

Observing tolerance vis-à-vis bribe situations, we are not able to determine any significant trends. Nevertheless, this first description seems to uncover some evidence in regards to the role of confidence. A low confidence in government seems to be associated with wider gaps between experience and perceptions. The influence of press freedom seems more controversial.

To inform these assumptions we constructed a Gap Index this way: $GPV_{i,j} = PPCI_{i,j} - \text{Bribery report}_{i,j}$
The following representation crosses the GPV and the Human Development Index:

Figure 3. Gap between population's Perceptions and Victimization (GPV)
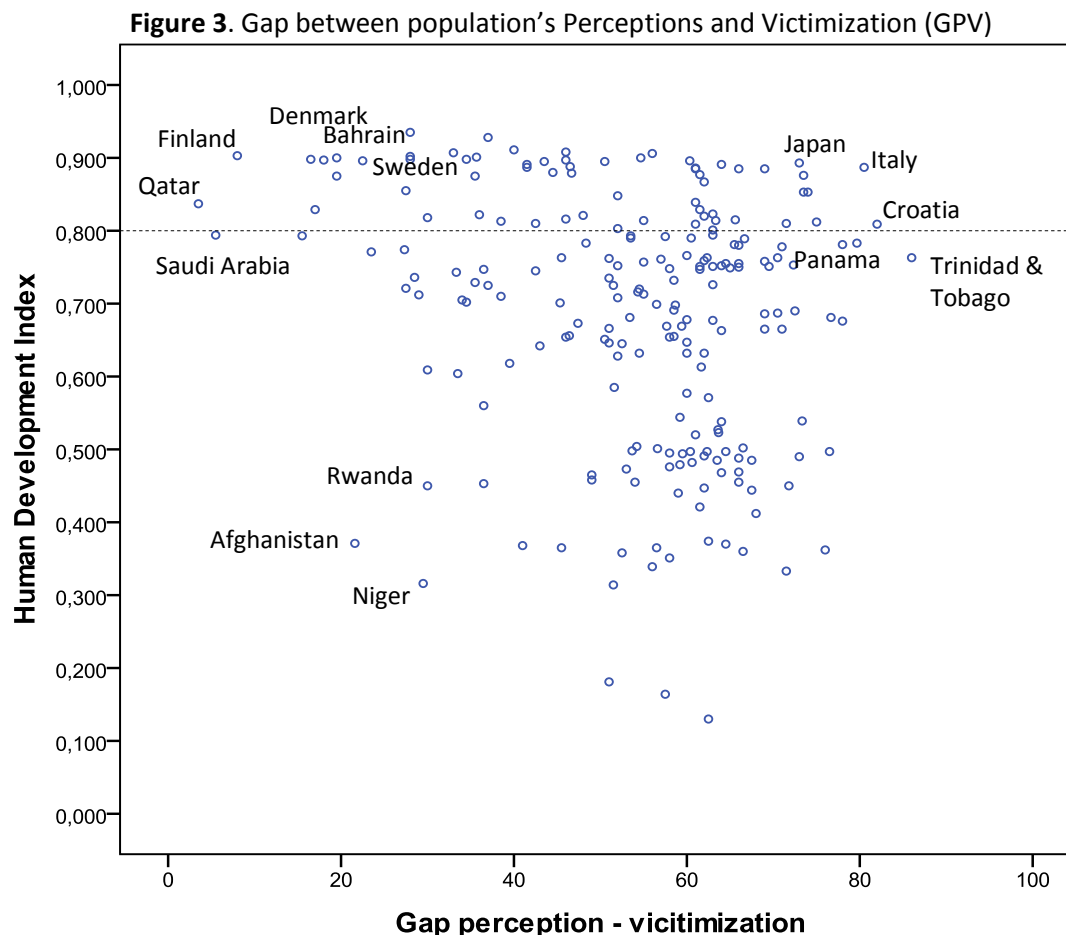
Interpretation:
Crossing our Gap index and Human Development no convincing pattern emerges. However, one can observe that among developed countries the standards deviation of the gap appears wider. One can also notice that this Gap is always positive, which is consistent with intuition: the share of the people perceiving corruption is always larger than the share of the people having actually experienced it.

To isolate better the role of press freedom and confidence, we flagged outliers - countries with the widest or thinner gaps - and draw further charts.

Trinidad and Tobago

"Outliars"
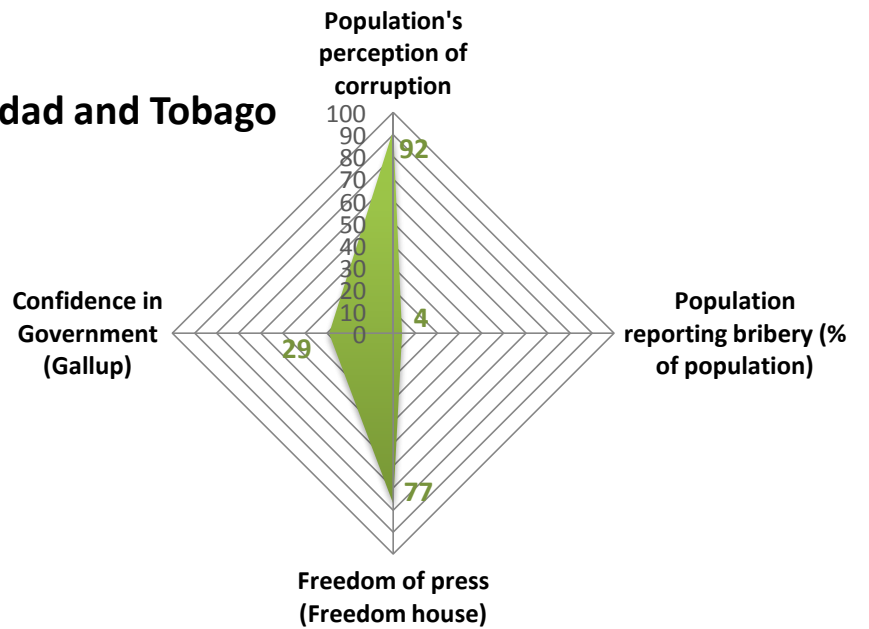
Japan
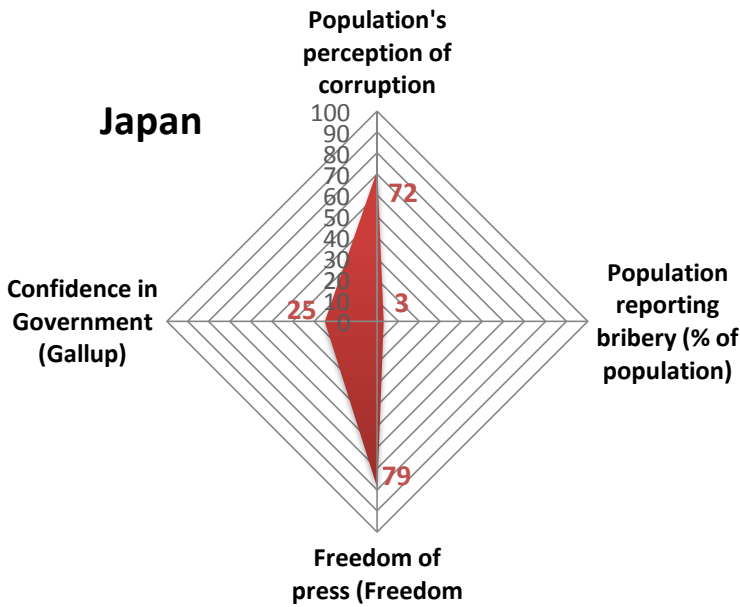
Italy
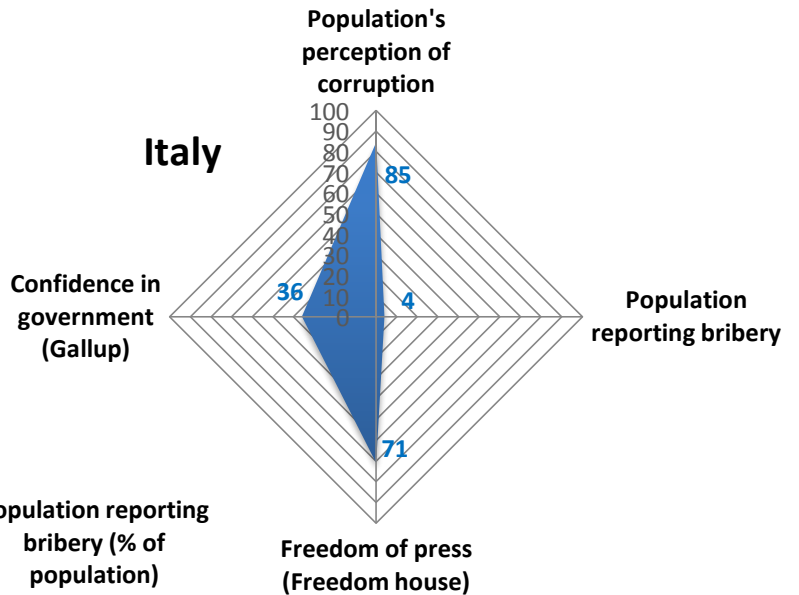
Panama*
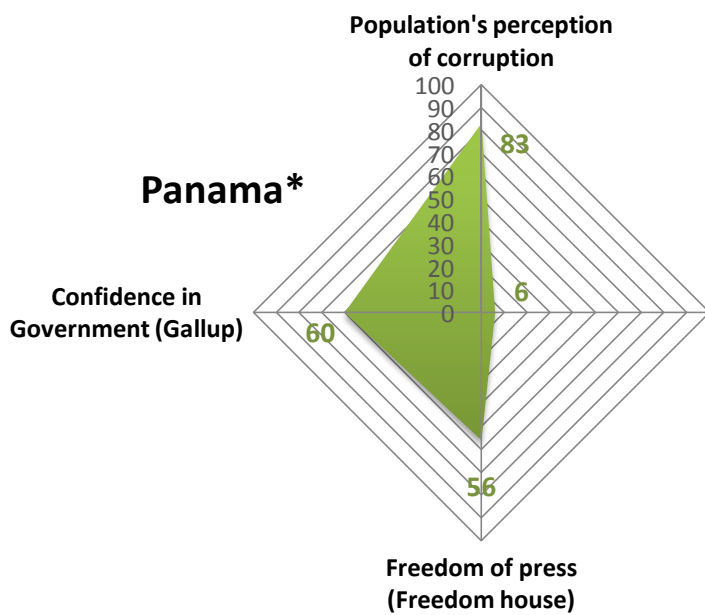
Confidence in Government (2006-2009)		
2006	Panama	36
2007	Panama	25
2008	Panama	31
2009	Panama	**60**
Source Gallup World Poll		

* The latest data available for "Confidence in Government" in Panama was from 2009. In May 2009 Election took place in Panama. Thus, the score of this country for this variable rises this year.

"Outliers"

Finland

Population's perception of corruption: 41
Population reporting bribery (% of population): 9
Freedom of press: 90
Confidence in Government (Gallup): 72

Saudi Arabia

Population's perception of corruption: 32
Population reporting bribery (% of population): 29
Freedom of press (Freedom): 18
Confidence in Government (Gallup): Missing data*

*However, confidence in the local police scores: 88% (2009) and judicial system: 69% (2009)

Qatar

Population's perception of corruption: 9
Population reporting bribery (% of population): 8
Freedom of press (Freedom house): 35
Confidence in Government (Gallup): 89

NB. For the case of Trinidad and Tobago, contrarily to Japan, the Global Corruption Barometer was not available. The populations' perceptions of corruption data are solely the result of Gallup World Poll data regarding corruption in Business and Government, which could be considered as an imperfect proxy for corruption in other institutions. However, table 1 showed that corruption in government and corruption in other administrations were strongly correlated.

Countries like Trinidad and Tobago or Japan display a tremendous gap between bribery reporting and corruption perceptions. Countries displaying the smallest gaps are the ones reporting the highest confidence in government. The question of endogeneity thereby arouses. However, we observe that people's faith in institutions[6] is not much affected by the extent of bribery, while perceptions of corruption are strongly correlated with populations' confidence in institutions (see Table 4).

Opposing two patterns, the "outliars" – countries where the population perceives much corruption while reporting very few cases of bribery – and the outliers – countries with the smallest gap between bribery and perceived corruption – leads to these first observations:

[6] We computed a Confidence Index gathering confidence in local police, government, judicial syst. and military.

✓   The "outliars" have both free press and low confidence in their government;
✓   The outliers display strong confidence in their government, but free press seems not decisive.

We suggest that countries with free press, thin spread between experienced and perceived corruption are likely the countries where "real" corruption prevalence is the lower. Nevertheless, as informed previously, the existence of controlled media cast doubt upon corruption measurement.

C. The influence of Press freedom

From these stylized facts, it is possible to construct the following pattern:

Figure 4. Functional form investigation Gap and press freedom: towards stylized facts
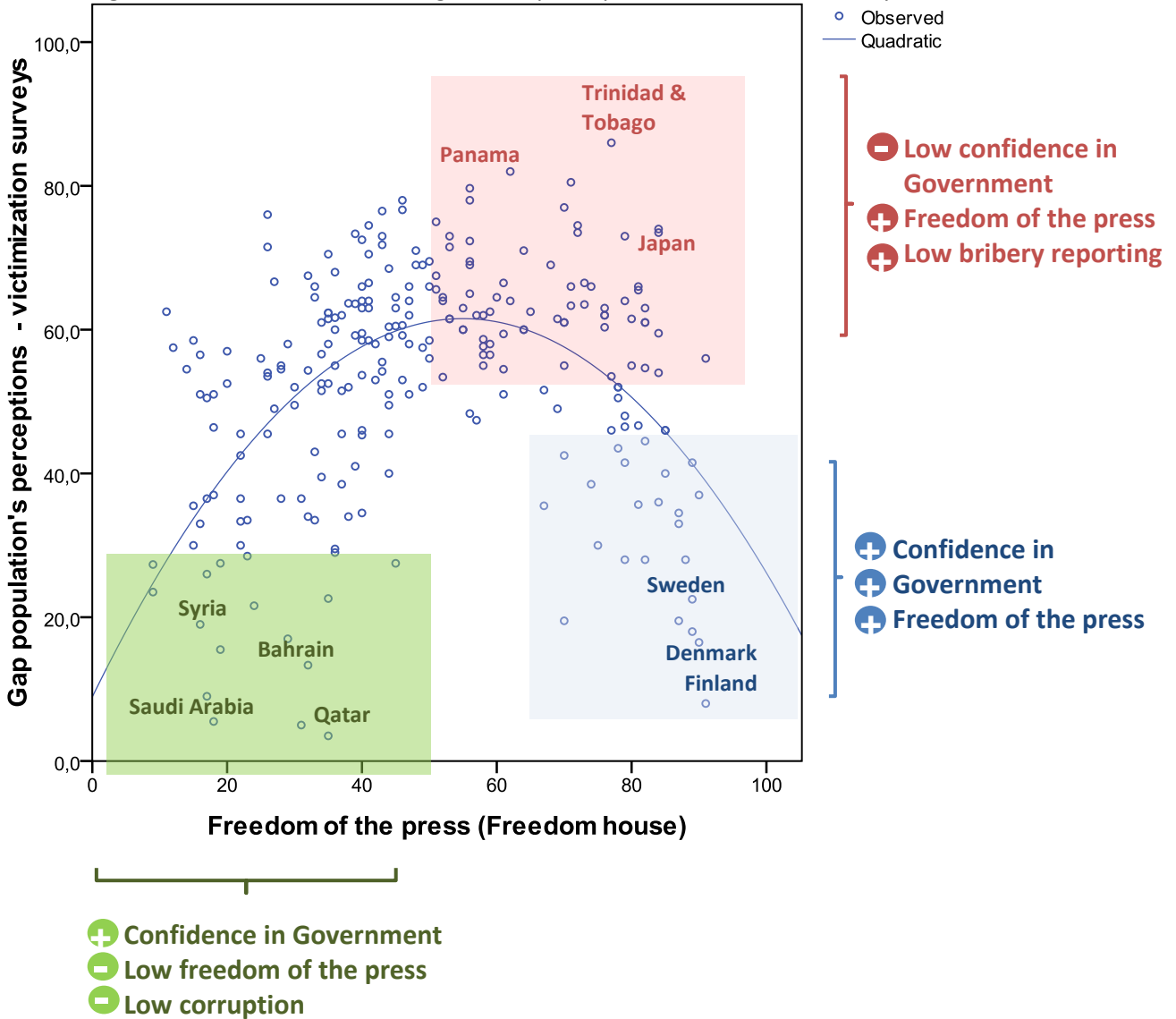
Investigating the correlations between our Gap index (GPV) and press freedom, a quadratic adjustment curve arouses, resulting from the one already uncovered between populations' perceptions of corruption and media freedom [See Brown, J., Orme, W. and Roca, T., (2010)].
As corruption experience and freedom of the press follow a linear association, the resulting gap displays this concave adjustment. The comparison between linear and quadratic adjustment is available in Appendix, Table a.

We observe that populations' perceptions and bribery reporting tend to converge in autocracies and in countries where corruption is likely not widespread. For other countries, freedom of the press seems to enlarge the gap between perceptions and corruption exposure.

It seems likely that in countries suffering from a challenged freedom of the press, perceptions are mainly the consequence of experience, whereas in accountable democracies, corruption perceptions are mostly the fact of media reporting.

D. The role of confidence

We have hitherto made the assumption that people's confidence in institutions may explain part of the gap between reported experiences of corruption and perceptions. Indeed, we assume that perceptions are more correlated with confidence than experiences actually are. To investigate further this hypothesis, we gathered data from the Gallup World Poll describing confidence in different institutions. Table 3 shows that confidence among institutions is quite well articulated:

Table 3. Correlation Matrix, Confidence in institutions

		Confidence local police	Confidence government	Confidence judicial syst.	Confidence military
Confidence local police	Pearson Correlation	1	.566[**]	.678[**]	.713[**]
	Sig. (2-tailed)		.000	.000	.000
	N	482	459	462	430
Confidence government	Pearson Correlation		1	.643[**]	.560[**]
	Sig. (2-tailed)			.000	.000
	N		464	452	423
Confidence judicial syst	Pearson Correlation			1	.679[**]
	Sig. (2-tailed)				.000
	N			513	428
Confidence military	Pearson Correlation				1
	Sig. (2-tailed)				
	N				448
**. Correlation is significant at the 0.01 level (2-tailed).					

In order to use confidence as an explanatory variable in a multivariate analysis, we decided to create a Confidence Index aggregating the previous data using a Principal Components Analysis (PCA).
The strong correlations flagged beforehand likely induce significant KMO[7] and Bartlett test. Our results confirm a KMO = 0.822 and a Bartlett Sphericity test = 834.777, rejecting non-global correlation and allowing factors reduction (see Appendix, Table c,d). We display above the resulting coefficient matrix:

Table 4. Aggregation using PCA

Component Score Coefficient Matrix	
	Component 1
Confidence in Government	0.275
Confidence in Local Police	0.298
Confidence in Judicial syst.	0.301
Confidence in Military	0.298
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.	

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[7] Kaiser-Meyer-Olkin (KMO) is the ratio of the sum of correlations square and partial correlations square. A value higher than 0.6 indicates a suitable PCA.

The endogeneity issue
The role of confidence in corruption assessment appears controversial. Indeed, while corruption experiences may ruin one's faith in administration, it also seems likely that people with originally no confidence in institutions would declare them corrupted answering perception surveys. Thus, an endogeneity issue arises.

Our purpose is to investigate the gap between perceptions and bribery reporting. Introducing confidence, we assume that faith would impact more sorely one of the two components of the GPV, for instance, the perception dimension. Comparing confidence influence towards both experienced and perceived corruption would provide a first clue for resolving the endogeneity dilemma.
Table 4 displays the correlations among our Confidence Index, Transparency's Corruption Perception Index (CPI), Bribery reporting and Populations' perceptions of corruption.

Table 4. Correlations matrix: Perceptions, Bribery reporting and Confidence

		Populations' Perceptions Corruption Index	Bribery Reporting	CPI (Transparency International)	Confidence Index
Populations' Perceptions Corruption Index	Pearson Correlation	1	0.3577*	-0.6441*	-0.5148*
	Sig. (2-tailed)		0.0000	0.0000	0.0000
	N	553	252	540	553
Bribery report	Pearson Correlation		1	-0.5158*	-0.2339*
	Sig. (2-tailed)			0.0000	0.0001
	N		269	265	269
CPI (Transparency International)	Pearson Correlation			1	0.2534*
	Sig. (2-tailed)				0.0000
	N			876	876
Confidence Index	Pearson Correlation				1
	Sig. (2-tailed)				
	N				985
*. Correlation is significant at the 0.01 level (2-tailed).					
NB. The negative sign of the CPI is due to its inversed scale (0 standing for the max. of corruption; 10 for the min.)					

We observe that whether all three corruption measures are correlated, in an intuitive way with confidence, experienced corruption appears the less associated with confidence (-0.2339).
Confidence seems, however, strongly correlated (adversely) with populations' perceptions, while not much with experts' perceptions. Furthermore, bribery reporting is not strongly linked with populations' perceptions (0.3577), whereas correlation becomes much stronger if we consider experts' evaluations (0.5158 in absolute value). From these observations, we can draw the following conclusions:

- ✓ Populations' perceptions incorporate people's faith in administrations;
- ✓ Confidence in administration is not much affected by corruption experience;
- ✓ Experts' perceptions are more associated with corruption experience, and less influenced by people's confidence in institutions.

This picture tends to demonstrate that the gulf separating perceptions from experience is likely influenced by populations' confidence in administrations and that experts' assessments almost certainly provide the most robust corruption evaluation.

E.   Perception of corruption, from bribe to gossip?

As last descriptive analysis, we decided to visualize the relationship between experience and populations' perceptions. The following curve adjustment describes what revealed to be a curvilinear relation. Indeed, the logarithm fit displays a $R^2 = 0.221$ versus 0.128 for the linear adjustment (see Appendix Table b.) The Y=X equation stands for a perfect correlation between these two variables, figuring out a Gap equal to 0.

Table 4. Functional form investigation: victimization and perception (pooled dataset)
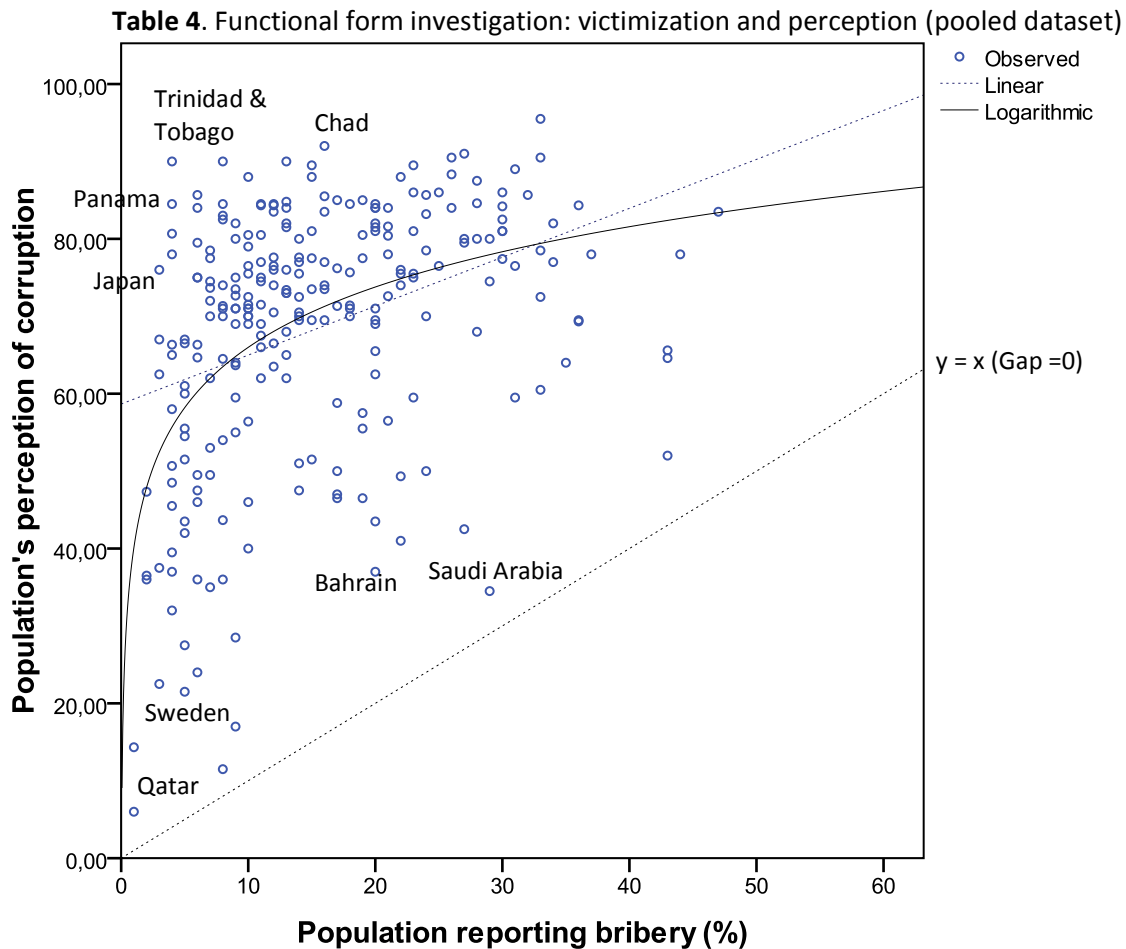
Interpretation

This representation shows that perceptions increase following a non-linear course together with corruption experiences. Thereby, perceptions increase at a break-neck pace when populations start experiencing corruption and ultimately rise more cautiously when corruption becomes widespread.

We suggest that voice (Word of mouth), associated with free media, magnifies corruption gossip increasing perceptions non-linearly. Flagging outliers, we previously underlined that 4% of a population having experienced corruption can induce 92% of this population to perceive administrations as corrupted (case of Trinidad and Tobago).

So far, we have showed that press freedom and confidence may explain part of the gulf separating populations' perceptions from actual experience with corruption. In the next and last section, we will perform a multivariate analysis using panel data to inform these assumptions and try to identify further explanatory variables.

IV.   *Multivariate analysis*

As previously mentioned, we gathered data from various sources in a panel dataset (2006 to 2010, see section II). We use data aggregated at the national level which, unfortunately, prevent us from using respondent's characteristics as control variables. However, we introduced nationally aggregated controls such as subjective well-being data (Life satisfaction), unemployment rate or election-years. We assume these variables may grasp populations' satisfaction, influencing their perceptions of institutions but not the amount of actual corruption people faces, thereby increasing the gap between perceived and experienced corruption (GPV).

In order to evaluate rigorously the influence of press freedom and confidence in explaining the GPV, we constructed a first basic model, we tested to detect the existence of random effects, heteroskedasticity and auto-correlation:

A. Methodological issue

1. Comparing fix (1.) and random (2.) effect models

1. $GPV_{ij} = \alpha_{ij} + \beta_1 \text{Press freedom}_{ij} + \beta_2 \text{Press freedom}^2_{ij} + \beta_3 \text{Confidence Index}_{ij} + \varepsilon_{ij}$
with $i = 1,..,N$; $j = 1,…, N$

2. $GPV_{ij} = \alpha_{ij} + \beta_1 \text{Press freedom}_{ij} + \beta_2 \text{Press freedom}^2_{ij} + \beta_3 \text{Confidence Index}_{ij} + u_i + \varepsilon_{ij}$
with $i = 1,..,N$; $j = 1,…, N$

Table 5. Fix effects estimation of the GPV

Parameter	Coefficient	Standard error	t	P>|t|	Confidence Interval 95%	
					lower bound	upper bound
Press freedom	1.463	1.163	1.26	0.211	-0.840	3.767
Press freddom²	-0.018	0.013	-1.36	0.176	-0.043	0.008
Confidence Index	-3.966**	1.596	-2.48	0.014	-7.128	-0.803
Constant	32.029	24.844	1.29	0.200	-17.186	81.244

F(3,114) =2.32
Prob > F = 0.079
N= 250

Dependent variable: Gap between Populations' Perception of Corruption and victimization surveys (GPV)

To isolate the existence of random effect we used the Breusch-Pagan Lagrangian multiplier test. The Breusch-Pagan Lagrangian multiplier statistic is given by:

$L = T * [S_{m=1}^{m=M} [S_{n=1}^{n=m-1} [r_{mn}^2]]]$

With r_{mn}^2 the estimated correlation between the residuals of the M equations; and T, the number of observations; L is distributed following a χ^2, M(M-1)/2 degrees of freedom.

Breusch and Pagan Lagrangian multiplier test for random effects
GPV [code,t] = Xb + u[code] + e[code,t] ;
Estimated results:

	Var	sd=sqrt(Var)
GPV	264.1980	16.2542
e	44.9728	6.7062
u	144.8115	12.0338

Test: Var (u) = 0
Chi² (1) = 72.00
Prob > chi² = 0.000
The null hypothesis stands for Var(u)= 0, thus, a significant result rejects Var(u)= 0.

As the result appears significant we must reject the fix effect model for the random effect one. Table 6, displays the estimation of the basic model using the random effect model:

Table 6. Random effects estimation of the GPV

Parameter	Coefficient	Standard error	Z	P>|Z|	Confidence Interval 95%	
					lower bound	upper bound
Press freedom	1.695***	0.257	6.60	0.000	1.191	2.198
Press freddom²	-0.016***	0.002	-6.49	0.000	-0.020	-0.011
Confidence Index	-4.843***	0.943	-5.13	0.000	-6.692	-2.994
Constant	14.374**	6.136	2.34	0.019	2.348	26.401

Wald chi2(3) = 82.54
Prob > chi2 = 0.000
N= 250

Dependent variable*: GPV: Gap between Populations' Perception of Corruption and victimization surveys*

2. Heteroskedasticity diagnostic

As corruption data backed on household surveys still suffers from incomplete coverage, the number of missing values in our dataset may lead to an unbalanced panel that frequently introduces heteroskedasticity. In order to diagnose it, we performed a Likelihood-ratio (LR) test for heteroskedasticity:

Likelihood-ratio test: LR chi² (132) = 331.10
$$\text{Prob} > \text{chi}^2 \quad = 0.0000$$

The null hypothesis standing for homoskedasticity, the Likelihood-ratio test indicates that our panel faces heteroskedasticity. The most accurate estimation is then provided by a Generalized Least Square (GLS) estimator.

3. First-order autocorrelation test

We ultimately performed a first-order autocorrelation test, using the Wooldridge test [see Drukker, D.M. (2003)]. The null hypothesis stands for no first-order autocorrelation.
We display above the F-Test:

$$F (1, 29) = 0.269$$
$$\text{Prob} > F = 0.608$$

The null hypothesis is not rejected; thus, no further corrections appear necessary.

4. Conclusion

The tests we performed show that the **Generalized Least Square model** would provide consistent estimators. Table 7**,** displays the GLS estimations of the GPV determinants:

Table 7. Generalized Least Square estimation of the GPV determinants : basic model

Parameter	Coefficient	Standard error	Z	P>|Z|	Confidence Interval 95%	
					lower bound	upper bound
Press freedom	1.746***	0.045	38.63	0.000	1.657	1.835
Press freedom²	-0.016***	0.000	-44.90	0.000	-0.017	-0.015
Confidence Index	-4.175***	0.171	-24.36	0.000	-4.511	-3.839
Constant	13.345***	1.325	10.07	0.000	10.749	15.941

Wald chi2(3) = 10924.16
Prob > chi2 = 0.000
N=250

Dependent variable*: GPV (Gap between Populations' Perception of Corruption and victimization surveys)*

Interpretation

These results confirm that our predictors provide a strong overall explanatory power - Wald chi2(3) = 10924.16 - supported by 250 observations. The previously uncovered quadratic adjustment between press freedom and the GPV is now established, so as the adverse correlation with confidence: the less people trust administrations, the deeper the gap between perceptions and experienced corruption.

B. *Introducing new controls*

While the previous explanatory variables confirm their role, we decided to test other controls. We introduced objective variables expecting the following behaviors:

1. Logarithm of **Growth National Income** (GNI): we assume that overall, countries with higher incomes benefit from more efficient institutions. Moreover, we suppose that wealthier countries can afford providing descent salaries to their civil servants reducing corruption incentives.
   We may this way observe both less perceived and experienced corruption decreasing the gap. However, the resulting effect seems hard to evaluate and non-mechanical. Outliers profile already illustrated very different configurations from Japan and Italy to Finland or Qatar.

2. The **size of the population**: the existing literature stresses that the size of the population matters. As informed with table 4, perceptions and experienced corruption do not evolve together linearly. We suggested that media and word-of-mouth significantly influence perceptions which could be in the first place, the result of corruption exposures. A single corruption deed, flagged in the media may influence a whole country, whatever the size of its population, explaining that perceptions are not linearly dependant of experiences using data expressed in percentage of the population. Bigger countries may thus display wider gap.

3. A binary variable reporting if **presidential or legislative elections** were organized the year of the survey. Political scientists usually report high confidence in governments the year following elections. Yet, we informed the case of Panama showing a confidence leap from 31 to 60 % the year of election. However, we suppose that confidence grasp much of the effect of an election-year variable. Furthermore, we were not able to discriminate efficiently by months; however, we suppressed from our dataset elections that took place at the very end of the year, assuming that Gallup surveys respondents had already been polled.
   We coded the election-year variable this way: 1, elections were organized the year of the survey, 0 if not.

4. **Unemployment rate**: we assume that a high employment rate prevents populations from expressing too much negative opinion about governments and institutions. Reversely, we suppose that populations' judgment regarding their country leadership may reveal much harsher in an employment crisis context. Furthermore, literature tends to show that people perceptions tend to be affected by their fairness feelings (see Douhou, S., Magnus, J.R., Van Soest, A., (2011)).

5. Finally and following the same reasoning, we introduced a **subjective measure of well being** (Life satisfaction). Once again, we suppose that citizens are more "indulgent" with government and administrations when they are satisfied with their lives. Thus, we expect the Gap to decrease with life satisfaction enhancement.

Table 8 gathers estimation results for five new models using these new control variables:

Table 8. GLS estimation of the Gap between populations' perceptions of corruption and bribe situations

Tested model /Parameters	Basic model	Model (a.)	Model (b.)	Model (c.)	Model (d.)	Model (e.)
Press freedom Z	1.746*** (38.63)	1.587*** (25.89)	1.456*** (19.49)	1.384*** (19.92)	1.353*** (18.05)	1.303*** (9.29)
Press freedom² Z	-0.016*** (-44.90)	-0.013*** (-23.79)	-0.012*** (-16.55)	-0.011*** (-17.26)	-0.011*** (-14.77)	-0.010*** (-7.40)
Confidence Index Z	-4.175*** (-24.36)	-3.938*** (-15.56)	-4.414*** (-17.940)	-4.526*** (-19.49)	-4.433*** (-15.02)	-6.597*** (-10.74)
Log GNI *per capita* Z		-7.803*** (-23.74)	-7.790*** (-14.220)	-8.010*** (-26.69)	-5.979*** (-6.43)	-11.528*** (-3.81)
Log Population Z			2.009*** (11.450)	2.329*** (10.19)	2.393*** (10.83)	2.605*** (6.05)
Election-year Z				2.876*** (3.91)	3.681*** (4.01)	-4.334*** (-2.65)
Life satisfaction Z					-1.527*** (-3.23)	-1.625*** (-2.18)
Unemployment rate Z						0.372*** (4.22)
Constant Z	13.345*** (10.07)	43.820*** (21.44)	12.937*** (3.360)	9.652** (2.42)	9.468** (2.12)	26.489** (2.07)
Wald **Prob > chi2** **Sample size N=**	10924.16 0.000 250	2837.79 0.000 249	7215.07 0.000 249	7077.92 0.000 249	2676.25 0.000 248	829.67 0.000 122

Dependent variable: **Gap between Populations' Perception of Corruption and victimization surveys (GPV)**

NB. Detailed results are available in Appendix, Tables f to j.

Interpretation

Our results appear quite consistent, fulfilling our expectations. GNI, Confidence and Life satisfaction reduce the gap between experienced corruption and perceptions, while unemployment and the size of the population widen it. The results regarding election-year appear not in line with our intuition and the sign of the coefficients appears sensible to the sample size. However, we suggest that the data collection period is decisive for this variable. More precise data would be necessary to inform the role of election and electoral campaigns, usually involving finger-pointing and stubborn debates, likely generating negative perceptions towards institutions the year before elections.

Overall, the multivariate analysis confirms the pattern we described, showing that media freedom and confidence should be taken into account to analyze rigorously populations' evaluations of administrations. We also suggest, as far as data are available, to compare perceptions with victimization surveys, to isolate significant gaps likely resulting from measurement flaws.

V.   Concluding remarks

Using household surveys, we investigated the gap between perceived and experienced corruption. We gathered data from the Gallup World Poll and Transparency International's Global Corruption Barometer, reporting actual corruption experiences, but also population's perceptions of corruption in several institutions (Police, Government, Public officials and Civil servants, Judiciary system and Business).

Our first descriptive analysis showed that the gulf separating these two kinds of data can be thorough and unevenly distributed among countries. We underlined the role of confidence and press freedom in perception mechanisms.

Introducing further controls, we showed that populations might be more indulgent towards administrations if people were satisfied with their lives, employed or living in wealthy countries.

We also suggested that confidence may introduce an endogeneity issue as distrust in institutions could result from experienced corruption or induce harsh reporting in perception surveys. Nevertheless, we highlighted that the confidence index we computed was much more correlated with perceptions than with actual bribe situations. Further research remains however necessary to confirm these first findings, although instrumental variables seem difficult to identify.

We ultimately uncovered a curvilinear relationship linking experiences to perceptions. We suggested that word-of-mouth and "gossips" might magnify actual bribery experiences, driving a non-linear perception swell.

Considering the results of the previous analyses, we would recommend data users to compare systematically corruption perceptions to victimization surveys – if consistent across countries. We suggest that the wider the gap between these two types of sources, the less reliable perception data. We display in appendix - Table m - the top and bottom 30 countries in regard to our Gap index. Nevertheless, we suggest controlling the GPV using press freedom evaluation since we previously informed a media bias affecting corruption perceptions in autocracies.

This paper ultimately highlights the need for actionable reliability indices. We will soon propose one in an upcoming research paper.

Comments and suggestion are much welcomed and may be addressed at: roca.thomas@gmail.com

VI.   References

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VII. Appendix

Figure a. Functional form investigation: GPV and Press freedom (Pooled dataset)
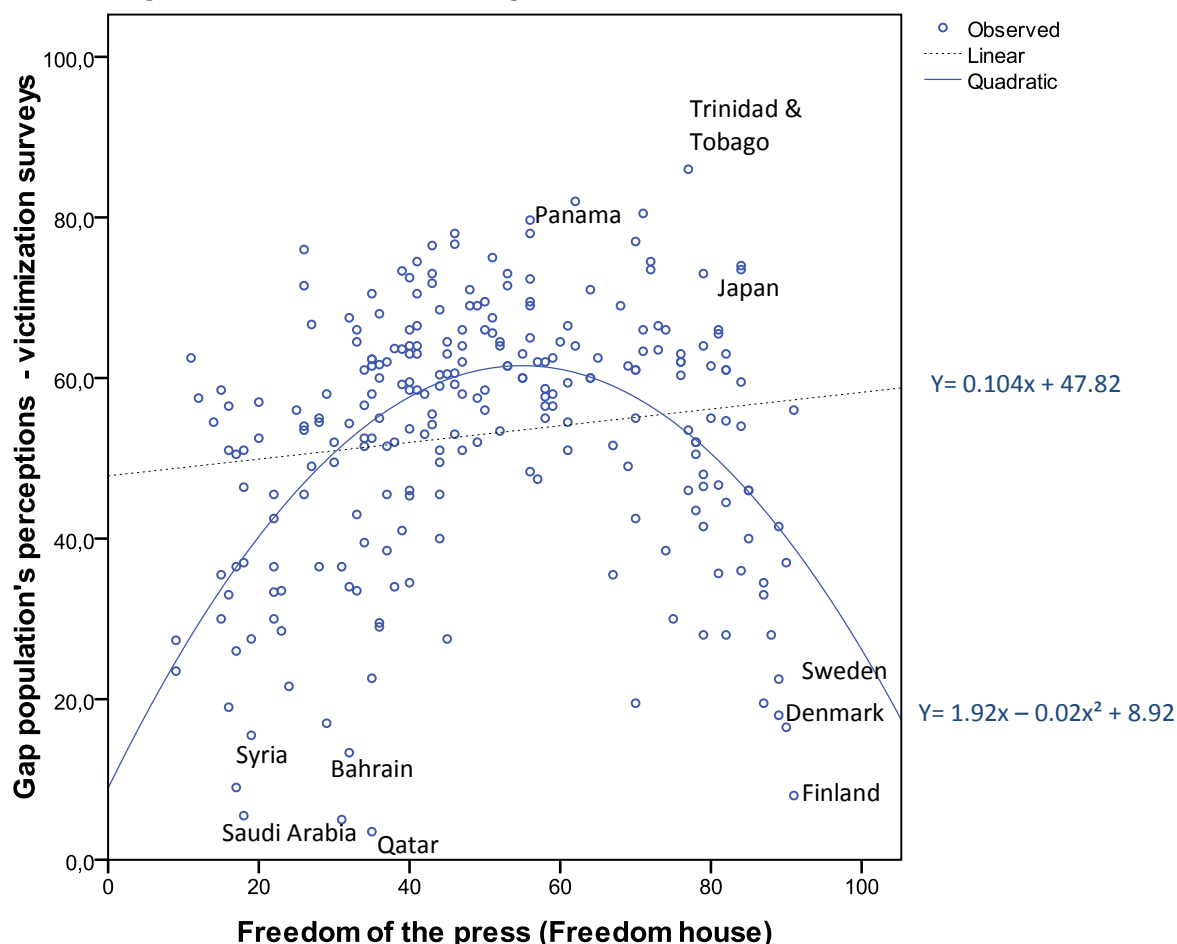
Table a. Functional form investigation: freedom of press and Gap perception - victimization

Quadratic adjustment		Coefficients
Variables	**Freedom of Press**	**1.915***
	t	**(9.279)**
	Freedom of Press^2	**-0.017***
	t	**(-8.956)**
	R^2	**0.260**
	adjusted R^2	**0.254**
	Sample size (N)	**250**
Linear adjustment		
Variable	**Freedom of Press**	**0.104**
	t	**(2.196)**
	R^2	**0.019**
	adjusted R^2	**0.015**
	Sample size (N)	**250**

Dependant variable: Gap between Perception and Victimization (GPV)

Table b. Functional form investigation: corruption experience versus corruption perception

Linear adjustment		Coefficients
Variables	**Population declaring victim of bribery**	0.632***
	t	(6.056)
	R²	0.128
	adjusted R²	0.124
	Sample size (N)	252
Logarithmic adjustment		
Variable	**Log Population declaring victim of bribery**	11.240***
	t	(8.410)
	R²	0.221
	adjusted R²	0.217
	Sample size (N)	252

Dependant variable: Population Perception of Corruption

Table c. Aggregation confidence data: PCA significance test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.822
Bartlett's Test of Sphericity	Approx. Chi-Square	834.777
	df	6
	Sig.	.000

Table d. Aggregation confidence data: PCA summary

Total Variance Explained						
Component	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.908	72.710	72.710	2.908	72.710	72.710
2	.482	12.060	84.770			
3	.321	8.027	92.797			
4	.288	7.203	100.000			

Extraction Method: Principal Component Analysis

Table f. Generalized Least Square estimation of GPV determinants: Introducing new controls

Parameter	Coefficient	Standard error	Z	P>|Z|	Confidence Interval 95%	
					lower bound	upper bound
Press freedom	1.587***	0.061	25.89	0.000	1.467	1.707
Press freedom²	-0.013***	0.001	-23.79	0.000	-0.015	-0.012
Confidence Index	-3.938***	0.253	-15.56	0.000	-4.434	-3.442
Log GNI	-7.803***	0.329	-23.74	0.000	-8.447	-7.159
Constant	43.820***	2.044	21.44	0.000	39.814	47.826

Wald chi2(4) = 5887.85

Prob > chi2 = 0.000

N=249

Dependent variable: *Gap between Populations' Perception of Corruption and victimization surveys (GPV)*

Table g. Generalized Least Square estimation of GPV determinants: Introducing new controls

Parameter	Coefficient	Standard error	Z	P>|Z|	Confidence Interval 95%	
					lower bound	upper bound
Press freedom	1.456***	0.075	19.49	0.000	1.309	1.602
Press freedom²	-0.012***	0.001	-16.55	0.000	-0.014	-0.011
Confidence Index	-4.414***	0.246	-17.94	0.000	-4.896	-3.932
Log GNI	-7.790***	0.548	-14.22	0.000	-8.864	-6.716
Log Population	2.009***	0.175	11.45	0.000	1.665	2.353
Constant	12.937***	3.853	3.36	0.001	5.385	20.489

Wald chi2(5) = 2837.79

Prob > chi2 = 0.000

N=249

Dependent variable: *Gap between Populations' Perception of Corruption and victimization surveys (GPV)*

Table h. Generalized Least Square estimation of GPV determinants: Introducing new controls

Parameter	Coefficient	Standard error	Z	P>|Z|	Confidence Interval 95%	
					lower bound	upper bound
Press freedom	1.384***	0.070	19.920	0.000	1.248	1.521
Press freedom²	-0.011***	0.001	-17.26	0.000	-0.013	-0.010
Confidence Index	-4.526***	0.232	-19.49	0.000	-4.981	-4.071
Log GNI	-8.010***	0.300	-26.69	0.000	-8.598	-7.422
Log Population	2.329***	0.229	10.19	0.000	1.881	2.777
Election-year	2.876***	0.735	3.91	0.000	1.436	4.316
Constant	9.652***	3.983	2.42	0.015	1.846	17.459

Wald chi2(6) = 7077.92

Prob > chi2 = 0.000

N=249

Dependent variable: *Gap between Populations' Perception of Corruption and victimization surveys (GPV)*

Table i. Generalized Least Square estimation of GPV determinants: Introducing new controls

Parameter	Coefficient	Standard error	Z	P>|Z|	Confidence Interval 95%	
					lower bound	upper bound
Press freedom	1.353***	0.075	18.05	0.000	1.206	1.500
Press freedom²	-0.011***	0.001	-14.77	0.000	-0.013	-0.010
Confidence Index	-4.433***	0.295	-15.02	0.000	-5.012	-3.855
Log GNI	-5.979***	0.929	-6.43	0.000	-7.801	-4.158
Log Population	2.393***	0.221	10.83	0.000	1.960	2.826
Election-year	3.681***	0.917	4.01	0.000	1.884	5.478
Life satisfaction	-1.527***	0.472	-3.23	0.001	-2.453	-0.601
Constant	9.468**	4.469	2.12	0.034	0.708	18.228

Wald chi2(7) = 2676.25
Prob > chi2 = 0.000
N=248

Dependent variable: Gap between Populations' Perception of Corruption and victimization surveys (GPV)

Table j. Generalized Least Square estimation of GPV determinants: Introducing new controls

Parameter	Coefficient	Standard error	Z	P>|Z|	Confidence Interval 95%	
					lower bound	upper bound
Press freedom	1.303***	0.140	9.29	0.000	1.028	1.578
Press freedom²	-0.010***	0.001	-7.40	0.000	-0.012	-0.007
Confidence Index	-6.597***	0.614	-10.74	0.000	-7.802	-5.393
Log GNI	-11.528***	3.026	-3.81	0.000	-17.459	-5.596
Log Population	2.605***	0.431	6.05	0.000	1.761	3.449
Election-year	-4.334***	1.633	-2.65	0.008	-7.534	-1.134
Life satisfaction	-1.625***	0.744	-2.18	0.029	-3.083	-0.167
Unemployment rate	0.372***	0.088	4.22	0.000	0.199	0.545
Constant	26.489**	12.771	2.07	0.038	1.459	51.519

Wald chi2(8) = 829.67
Prob > chi2 = 0.000
N=122

Dependent variable: Gap between Populations' Perception of Corruption and victimization surveys (GPV)

Table I displays our Basic model estimation using a relative Gap index computed this way:

$RelGPV_{i,j} = (PPCI_{i,j} - Bribery\ report_{i,j}) / PPCI_{i,j} \times 100$

Table l. Generalized Least Square estimation of the GPV determinants : basic model

Parameter	Coefficient	Standard error	Z	P>|Z|	Confidence Interval 95%	
					lower bound	upper bound
Press freedom	1.027***	0.020	52.06	0.000	0.989	1.066
Press freedom²	-0.007***	0.000	-38.48	0.000	-0.007	-0.007
Confidence Index	1.276***	0.111	11.47	0.000	1.058	1.494
Constant	46.322***	0.550	84.20	0.000	45.243	47.400

Wald chi2(3) = 6136.31
Prob > chi2 = 0.000
N=250

Dependent variable: RelGPV (Relative Gap between Populations' Perception of Corruption and victimization surveys)

Table m. Rankings: Gap between perceived and experienced corruption (Both using household surveys)

Rank	country	year	GPV[1]	Relative GPV[2]	Nb. Perception sources[3]
Top 30					
1	Trinidad and Tobago	2008	86.00	95.56	2
2	Croatia	2009	82.00	91.11	2
3	Italy	2008	80.50	95.27	2
4	Panama	2009	79.67	93.00	3
5	Indonesia	2008	78.00	88.64	2
6	Panama	2008	78.00	92.86	2
7	South Africa	2009	77.00	85.56	2
8	Indonesia	2009	76.67	95.04	3
9	Nepal	2009	76.50	90.53	2
10	Chad	2008	76.00	82.61	2
11	Argentina	2009	75.00	90.36	3
12	Sierra Leone	2008	74.50	83.24	2
13	South Africa	2008	74.50	90.30	2
14	Portugal	2009	74.00	94.87	2
15	Israel	2008	73.50	86.98	2
16	Portugal	2008	73.50	92.45	2
17	Cambodia	2009	73.33	86.96	3
18	Bosnia and Herzegovina	2009	73.00	82.95	2
19	Japan	2008	73.00	96.05	2
20	Nepal	2008	73.00	89.02	2
21	Paraguay	2008	72.50	85.80	2
22	Peru	2009	72.33	85.77	3
23	Senegal	2010	71.80	84.67	5
24	Argentina	2008	71.50	91.08	2
25	Burundi	2008	71.50	85.63	2
26	Bulgaria	2009	71.00	84.52	2
27	Honduras	2009	71.00	88.75	2
28	Malaysia	2008	70.50	90.97	2
29	Paraguay	2009	70.50	87.58	2
30	Comoros	2009	69.50	86.34	2
Bottom 30					
222	Somalia	2009	33.00	66.00	2
223	Rwanda	2009	30.00	75.00	2
224	Tajikistan	2009	30.00	63.83	2
225	Uruguay	2010	30.00	83.33	2
226	Niger	2009	29.50	63.44	2
227	Algeria	2010	29.00	45.31	2
228	Azerbaijan	2008	28.50	47.90	2
229	Australia	2008	28.00	77.78	2
230	Canada	2008	28.00	80.00	2
231	Luxembourg	2008	28.00	87.50	2
232	Kuwait	2009	27.50	59.14	2
233	Tunisia	2008	27.50	45.45	2
234	Belarus	2009	27.33	55.41	3
235	Syrian Arab Republic	2009	26.00	52.00	2
236	Belarus	2008	23.50	54.02	2
237	Iraq	2010	22.60	34.45	5

238	Denmark	2009	22.50	81.82	2
239	Afghanistan	2010	21.60	33.44	5
240	Hong Kong, China (SAR)	2008	19.50	86.67	2
241	New Zealand	2008	19.50	68.42	2
242	Somalia	2010	19.00	46.34	2
243	Sweden	2008	18.00	75.00	2
244	Bahrain	2009	17.00	45.95	2
245	Denmark	2008	16.50	76.74	2
246	Saudi Arabia	2008	15.50	36.47	2
247	Singapore	2009	13.33	93.02	3
248	Syrian Arab Republic	2008	9.00	17.31	2
249	Finland	2008	8.00	47.06	2
250	Saudi Arabia	2009	5.50	15.94	2
251	Singapore	2008	5.00	83.33	2
252	Qatar	2009	3.50	30.43	2

[1] Absolute Gap between Populations' Perception of Corruption (PPCI) and bribery reporting:
$GPV_{i,j} = PPCI_{i,j} - \text{Bribery report}_{i,j}$

[2] Relative Gap between Populations' Perception of Corruption (PPCI) and bribery reporting:
$RelGPV_{i,j} = (PPCI_{i,j} - \text{Bribery report}_{i,j}) / PPCI_{i,j} \times 100$

[3] Number of indicators we use to calculate the PPCI (according to available data)

NB. The difference between absolute and relative Gap could be important especially for countries flagging low level of corruption (both experienced and perceived). In order to not penalize these countries, we decided that absolute difference was a more appropriate computation method. Nevertheless, overall regression results do not vary extensively. Table l, display the estimations of the basic model using the gap computed with the relative formula.