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## How city type, trust and technology affect corruption: a multilevel comparative study

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## **How city type, trust and technology affect corruption: a multilevel comparative study.**

### ***Extended abstract***

#### ***Research Question & Contribution***

Corruption has been recognised as a plague in many emerging market economies and is thought to hinder development by raising transaction costs and uncertainty therefore leading to inefficient economic outcomes (Gray & Kaufman 1998). In 2013 World Bank Group President Jim Yong Kim, declared it as a 'public enemy number one' in developing countries (World Bank 2013). Yet despite a widespread understanding of detrimental effects of corruption, there is no sign of it decreasing.

The more we know about corruption, the better solutions we may be able to design. This paper aims to investigate how both individual characteristics and local environment determine corruption. More specifically, we explore how city size, and residing in a capital city influence the two aspects of corruption, notably in individuals' contact with officials, and in the use of courts. Building on Storper (2013) we further examine the effects of local institutional trust (bridging), and community embedded trust (bonding), as well as an interplay between these two forms of trust within cities on the incidence of corruption. Finally, we also investigate how access to elements of information and communication technology, individually and spatially defined (within the local social neighbourhood), affect corruption.

So far, much of the empirical work on the determinants of corruption is primarily based on macro-level evidence (for overview see Treisman, 2007), and there is growing body of studies that provide micro-level evidence, helping to understand corruption as individual-specific phenomenon (e.g. Hunt, 2004; Guerrero and Rodríguez-Oreggia, 2008; Lee & Guven, 2013).

There is also an increasing interest among regional studies scholars, looking at the cross-regional differences as determinants of corruption in the context of a specific country (e.g. Del Monte and Papagni, 2007; Belousova, 2011). With the recent trend of decentralisation within the public sector, local and regional governments have gained more flexibility in policy-making process that explains significant variation in corruption across different regional levels. Corruption may be higher at a local level as a result of a greater frequency and intimacy of interaction between private individuals and officials at more decentralised levels (e.g. Prud'homme, 1995; Tanzi, 1995).

While regional-level research provides interesting insights into cross-regional variation in corruption, the findings are largely based on a single country case, and therefore have limited generalised application. Our paper, on the other hand, utilizes a cross-country micro-level dataset, containing information both on individuals, and on the local (meso-level) institutional environment and country of residence, thus allowing for cross-individual cross-local neighbourhood cross-country comparison to study the determinants of corruption.

We contribute to the current body of literature on corruption in three ways: firstly, we investigate incidence (rather than perception) of corruption at the individual level using data that has not been used before for that purpose. Secondly, the methodology we employ has rarely been used in the context of corruption. We use a multilevel Heckman selection model to account for the structure of the data and for the sampling technique employed to collect the data. This allows us to distinguish between individual and environmental effects, and more specifically to look at meso-level structures within the latter. Thirdly, by shedding some light on the relative weight of individual and environmental factors we show that the determinants of corruption should not be seen as space blind and individual-specific; the spatial context matters, and the meso-level (local neighbourhood) institutional environment has become to play more

important role in shaping patterns of individual behaviour in responding to corruptive practices. Finally, while much of the institutional discussion at a regional level so far focuses on alternative advantages of bonding (community) versus bridging (society), in this work, following Storper's (2013) intuition, we, first, develop the argument of why it is a combination of both bonding and bridging that matters for reducing the incidence of corruption, and, second, we confirm that result empirically.

### ***Theory, Hypotheses & Methodology***

Corruption is a socially embedded phenomenon: in a corrupt environment, officials realise private benefits at the cost of businesses and individuals, whereas this practice becomes so widely shared that it is accepted as a social norm. In this respect corruption becomes institutionalised without gaining legitimacy, with individuals and businesses having consistent expectations about it (Jepperson, 1991). To survive in a corruptive environment individuals and businesses have to adapt their behaviour to the corresponding informal norms in order to minimise the negative effects of corruption (Choi and Thum, 2005; Tonoyan et al., 2010). At the same time, they resort to protection by formal institutional structures, where such are well developed and provide efficient means for fighting corruptive practices, or they develop contacts and social networks to mitigate the effects of corruption (Estrin et al., 2013). Such micro-structures, often becoming deeply embedded in local societies, may evolve into institutional arrangements governed by local communities or local networks (Ostrom, 2000; 2005), viewed as meso-level institutions in the context of regional studies.

Accordingly, our work builds upon the institutional theory, in particular on the work by Ostrom (2005), who, recognising that different institutional structures shaping patterns of behaviour are located at diverse levels including geographic domains, calls upon the need for multilevel analysis of studying the role of institutions. Ostrom (1998; 2000; 2005) also emphasizes the importance of locally evolving institutions governed by communities that are placed at the centre of analysis of the spatial context in determining the response of individuals to corruption. We further develop the discussion, drawing on the regional economic literature to emphasize how the specificity of regional institutional structures may affect the behaviour of individuals towards corruptive practices. Following Rodriguez-Pose and Storper (2006) and Storper (2013), within regional institutional structures we distinguish between two different levels, notably broader **local society (bridging)**, and more embedded **communities (bonding)** within cities. Based on this literature we postulate our hypotheses.

First, in our study we argue that use of government services is determined by occupational categories in that business owners and the self-employed use these services more often. We further propose that large cities see more corruption than medium and small ones due to the concentration of government activity and anonymity that is provided to the officials, whereas capital cities, regardless of their large size, see less corruption.

Further, we hypothesize that access to technology decreases incidence of corruption as individuals gain access to information and knowledge resources, importantly not just based on their individual access, but also based on technological density they encounter in their local environment.

We use individual level data across 35 countries from EBRD Life in Transition Survey 2010 that provides detailed information on the use of various government services (of courts and of officials to obtain documents) and on the occurrence of corruption among the users. To test our hypotheses, we employ a multilevel Heckman selection probit model.

### ***Results***

Table 1 below reports the key set of our results. In summary, those suggest that some individuals, business owners in particular, are more likely to face corruption, and therefore need more policy attention. We also find that the differences in environment play a critical role. More specifically, our results suggest that larger cities are more prone to officials' corruption than medium and small ones, whilst, interesting enough, we find that capital cities are different from larger cities in that they seem to exhibit lower corruption levels for both, courts and officials. We interpret the latter association as related to the structure of social and political connections. Larger cities are often more fragmented than capital cities in terms of power. Larger cities with many small jurisdictions imply localities where consistent expectations are easier to achieve, so individuals more likely to adopt patterns that other individuals practice, including corruptive behaviour, being trapped in a circle of corruption, where corruption becomes a (local) social norm. At the same time, capital cities are typically less fragmented and more centralised in terms of power, having metropolitan governance structures; they have bigger, more internally heterogeneous jurisdictions. Importantly, there is less scope for local social process of learning from other individuals to establish corruption as a local norm.

In Table 2 we further show that the effect of the size of the city on corruption is mitigated by higher level of local institutional trust (**bridging**), and inbound trust proxied by trust in friends and acquaintances (**bonding**), although the effect of the former is weaker compared to the effect of the latter. While much of the institutional discussion at a regional level so far was on alternative advantages of bonding (community) versus bridging (society), following Storper's (2013) intuition, we further show that it is a combination of both bonding and bridging that matters for institutional quality in mitigating the negative effect of corruption within larger cities. Our results suggest that where bonding and bridging are both present, this reinforces their moderating effect on the impact of city size on corruption. Finally, apart from institutional setup, it is also ICT (technology) however that may also play a positive role limiting corruption. In the neighbourhoods where on average individuals have higher access to elements of information and communication technology, corruption of both, officials and courts, is significantly lower.

**Table 1. Regression Results**

VARIABLES	Model 1				Model 2			
	Level 2: PSU Level 1: Individual				Level 2: PSU Level 1: Individual			
	Coef	St Err	Coef	St Err	Coef	St Err	Coef	St Err
	<b>Official corruption</b>		<b>Officials use</b>		<b>Court corruption</b>		<b>Court use</b>	
Employed for wages			-0.00576	(0.0442)			-0.0313	(0.0504)
Employed for wages (PSU average)			-0.453	(0.343)			-0.705*	(0.418)
Self-employed			0.0475	(0.0988)			0.0695	(0.108)
Self-employed (PSU average)			1.012	(0.760)			-2.479**	(1.012)
Business owner			0.183*	(0.104)			0.269***	(0.104)
Business owner (PSU average)			-0.654	(0.950)			-0.628	(1.110)
Technological access	-0.697***	(0.162)	0.457***	(0.0629)	-0.896***	(0.240)	0.285***	(0.0707)
Technological access (PSU average)	-2.752***	(0.738)	-0.295	(0.307)	-2.041*	(1.169)	0.214	(0.367)
Medium city	0.140	(0.129)	0.0272	(0.0475)	-0.00917	(0.185)	-0.0143	(0.0540)
Large city	0.498***	(0.153)	-0.220***	(0.0576)	0.0543	(0.218)	0.0232	(0.0634)
Capital	-0.446**	(0.198)	0.236***	(0.0709)	-0.584*	(0.306)	-0.0627	(0.0807)
<b>Control variables</b>								
Consumption	-5.88e-07	(4.43e-06)	6.59e-06***	(1.82e-06)	-4.95e-06	(7.72e-06)	1.10e-06	(1.96e-06)
Consumption (PSU average)	-2.34e-05	(3.65e-05)	-1.49e-05	(1.12e-05)	1.22e-05	(4.64e-05)	7.27e-06	(1.28e-05)
Gender	-0.0326	(0.105)	0.00114	(0.0402)	0.157	(0.158)	-0.0532	(0.0454)
Gender (PSU average)	0.644	(1.321)	-0.0672	(0.385)	2.053	(1.813)	0.732	(0.452)
Age	0.00680	(0.0190)	0.0102	(0.00935)	0.0212	(0.0310)	0.0262**	(0.0108)
Age squared	0.000169	(0.000215)	-0.000200*	(0.000111)	0.000367	(0.000351)	0.000306**	(0.000127)
Age (PSU average)	-0.0411	(0.0254)	-0.0128	(0.00784)	-0.0538	(0.0400)	-0.0222**	(0.00970)
Higher Education	0.00679	(0.130)	0.191***	(0.0477)	-0.189	(0.195)	0.0495	(0.0542)
Higher education (PSU average)	0.930	(1.103)	0.560	(0.360)	3.733**	(1.725)	0.496	(0.430)
Distance from capital	2.34e-05	(0.000145)	0.000139***	(5.14e-05)	0.000171	(0.000210)	-3.14e-05	(5.60e-05)
Constant	1.308	(1.415)	-0.297	(0.471)	0.594	(2.374)	-1.895***	(0.571)

Level: country-psu				
St dev (official/courts corruption)	0.414***	(0.0540)	0.0713	(0.169)
St dev (official/courts use)	-0.275***	(0.0239)	-0.471***	(0.0328)
Cross-eq corr (courts corruption & use)	0.190***	(0.0507)	-0.155	(0.106)
Level: residuals				
Cross-eq corr (courts corruption & use)	-0.00140	(0.0888)	0.0206	(0.131)
Observations	27,288		26,649	
Log Likelihood	-15476		-5053	
df	36		36	

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.10, +p<0.15

**Table 2. City size, residing in capital city and trust: interactions results**

Variables	Model 3				Model 4				Model 5				
	Level 2: PSU				Level 2: PSU				Level 2: PSU				
	Level 1: Individual				Level 1: Individual				Level 1: Individual				
	Official Corr		Official Use		Official Corr		Official Use		Official Corr		Official Use		
Employed for wages			-0.0056	(0.043)			-0.0054	(0.043)			-0.005	(0.043)	
Employed for wages (PSU average)			-0.409	(0.341)			-0.534	(0.347)			-0.487	(0.349)	
Self-employed			0.051	(0.095)			0.050	(0.094)			0.049	(0.094)	
Self-employed (PSU average)			.862	(0.743)			.717	(0.753)			.574	(0.756)	
Business owner			0.191*	(0.099)			0.191*	(0.099)			0.189*	(0.10)	
Business owner (PSU average)			-0.538	(0.928)			-0.421	(0.931)			-0.284	(0.944)	
Technological access	-0.77***	(.147)	.458***	(.062)	-0.75***	(.143)	.458***	(.062)	-	0.721***	(.144)	.460***	(.062)
Technological access (PSU average)	-2.68***	(.773)	-.323	(.306)	-2.23***	(.748)	-.416	(.322)	-1.84**	(.765)	-.425	(.327)	

Medium city	0.114	(.122)	.031	(.047)	0.150	(.115)	.028	(.048)	0.312**	(.129)	.029	(.048)	
Large city	0.511***	(.161)	-.193***	(.054)	0.414***	(.146)	-.195***	(.054)	0.550***	(.152)	-.193***	(.055)	
Capital	-.619***	(.200)	.225***	(.068)	-.485***	(.170)	.229***	(.068)	-	0.463***	(.175)	.244***	(.070)
Institutional Trust (PSU average)	1.19*	(.630)	-.001	(.224)	-	-	-	-	1.83**	(.802)	.063	(.242)	
Inbound Trust (PSU average)	-	-	-	-	.597	(1.68)	.213	(.612)	-2.91	(2.13)	.283	(.637)	
Medium city_x_Institutional Trust	-1.522*	(.873)	.112	(.308)	-	-	-	-	-1.32	(1.01)	.009	(.335)	
Large city_x_Institutional Trust	-1.828	(1.12)	-.136	(.343)	-	-	-	-	-1.85	(1.26)	-.236	(.402)	
Capital city_x_Institutional Trust	-.296	(1.356)	-.140	(.452)	-	-	-	-	-.687	(1.37)	.218	(.525)	
Medium city_x_Inbound Trust	-	-	-	-	-3.20	(2.25)	.663	(.764)	-.796	(2.57)	.561	(.787)	
Large city_x_In bound Trust	-	-	-	-	-4.56*	(2.13)	.203	(.841)	-1.05	(2.52)	.231	(.878)	
Capital city_x_Inbound	-	-	-	-	4.19	(3.02)	-.314	(1.24)	3.85	(3.36)	-.040	(1.25)	



Trust												
Institutional Trust_x_Inbound Trust	-	-	-	-	-	-	-	-	12.26	(8.13)	-1.41	(2.40)
Medium city_x_Institutional Trust_x_Inbound Trust	-	-	-	-	-	-	-	-	-24.56**	(10.49)	1.38	(3.05)
Large city_x_Institutional Trust_x_Inbound Trust	-	-	-	-	-	-	-	-	-16.94	(12.86)	1.54	(3.78)
Capital city_x_Institutional Trust_x_Inbound Trust	-	-	-	-	-	-	-	-	-1.43	(18.86)	-8.03	(5.24)
Control variables												
Consumption	-1.18e-06	(5.57e-06)	6.22e-06***	(1.68e-06)	-2.63e-06	(6.66e-06)	6.25e-06***	(1.71e-06)	-2.67e-06	(7.07e-06)	6.23e-06***	(1.71e-06)
Consumption (PSU average)	-0.000	(.000)	-0.000	(.000)	-0.000	(.000)	-0.000	(.000)	-0.000	(.000)	-0.000	(.000)
Gender	-0.039	(.092)	.000	(.039)	-0.036	(.091)	.001	(.039)	-0.032	(.093)	.000	(.039)
Gender (PSU average)	-0.091	(1.31)	-.163	(.384)	.690	(1.04)	-.119	(.388)	.523	(1.06)	-.070	(.391)

Age	.013	(.017)	.01	(.009)	.013	(.016)	.01	(.009)	.009	(.017)	.01	(.01)
Age squared	-0.000	.000	-0.000	(.0001)	-0.000	.000	-0.000*	(.0001)	-0.000	.000	-0.000	(.0001)
Age (PSU average)	-0.035	(.025)	-0.013	(.008)	-0.010	.023	-0.015*	(.008)	-0.006	(.024)	-0.016	(.008)
Higher Education	-0.034	(.110)	.194***	(.0457)	-0.036	(.111)	.194***	(.045)	-0.017	(.107)	.194***	(.046)
Higher education (PSU average)	1.41	(1.06)	.661*	(.355)	.962	(1.08)	.771**	(.365)	.559	(1.07)	.745*	(.370)
Distance from capital	-0.000	(.000)	-	(.000)	-0.000	(.000)	-	(.000)	3.06-06	(.000)	-	(.000)
			.0001***				.0001***				.0001***	
Constant	1.66	(1.41)	-.261	(.472)	-.142	(1.44)	-.081	(.486)	-.496	(1.43)	-.077	(.493)
Level: country-psu												
St dev (official corruption)	1.44		(.074)		1.47		(.075)		1.43		(.072)	
St dev (official use)	.766		(.019)		.767		(.019)		.765		(.019)	
Cross-eq corr (offic. corruption & use)	.078		(.047)		.074		(.044)		.096		(.045)	
Level: residuals												
Cross-eq corr (office. corruption & use)	-.158		(.073)		-.151		(.069)		-.114		(.077)	

Observations	27288	27288	27288	
Log Likelihood	-15474	-15473	-15466	
df	44	44	60	

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.10, +p<0.15