SPATIAL PROXIMITY AND A SYSTEM OF CZECH CORRUPTION

Steven Gawthorpe, Charles University[1]

steven.gawthorpe@fsv.cuni.cz

Abstract: Systemic corruption is a common term amongst scholars and practitioners, yet there is sparse conceptual agreement and substantive analysis within the discourse. Regardless of the current deficit, there is considerable pioneering space and advantages to contrast against the overwhelming emphasis of on agency. This paper aims to broaden the conceptual scope of systemic corruption research through spatiotemporal analysis of network behavior with breaches of impartiality from the Czech public procurement sector. The empirical approach statistically distinguishes the performance differentials of procurement awards amongst firms that exhibit the characteristics of political influence from those that do not. I operationalize James Scott's (1972) definition of influence as corruption that, *"without the special consideration of kinship, bribery, or friendship the public official could not have made the same decision"*. After stripping away explanatory factors for firm competence, the data reveals that firms with influence characteristics win substantially more and more often regardless of organizational size. The usage of geospatial cluster analysis reveals that influence networks forge preferential advantages and secure repeat wins by engaging with smaller government office sizes outside of densely populated regions. The reoccurring patterns, independent of one specific time or place, suggests characteristics more suitable for the concept of systemic corruption. This framework will be of utility for policymakers– within and outside the Czech Republic–to improve their vantage point perspective beyond case-by-case individual instances and develop more sustainable policy intervention strategies.

Keywords: *Systemic Corruption, Public Procurement, Geospatial Analysis, Czech Republic*

1. INTRODUCTION

Social science theories suggest explanations for why various approaches may or may not be causal features of corruption. A common argument amongst scholars purports that corruption results only in the public and private spheres (See Lennerfors 2009). Some contend that the state behaves as a predatory agent through the creation of rent-generating schemes (See Acemoglu and Verdier 2000; Krueger 1974; Tanzi and Davoodi 1997; Treisman 2000; Tullock 1996). Others contend that instances of state capture transpire from predatory behavior of private firms (Hellman et al. 1999). The World Bank and European Bank for Reconstruction and Development produces the Business Environment and Enterprise Performance Survey (BEEPS), aiming to quantify instances of state capture which exclusively focuses on the private sphere capturing the state with rent-generating schemes. Many of the samples cover post-communist countries which include the Czech Republic. Another tradition of thinking about the causes of corruption explains a state trapped amongst corrupt networks as a result of exceedingly strong and predatory behavior of political parties who decide on filling all major positions in government (Pizorno,1971). A bulk of the research on corruption treats the nature of public and private organizations as something clearly divisible and static in the ways corrupt transactions transpire.

To push this debate forward, it is important to examine alternative perspectives beyond public-private bounds as mutually exclusive. A good body of literature moves beyond the focus of individuals or strict identification of either public or private organizations as culpable and focuses instead on the prevailing systemic problems (See Caiden & Caiden, 1977; Johnston, 1998; Alam, 1989; Persson, Rothstein, & Teorell, 2013; Della Porta and Vannucci, 2011; Stefes, 2007; Frič, 2012; Stefes, 2008). Particular states with a widespread level of dysfunctional institutions give rise to instances where repetitive acts of corruption are the narrative of state and social behavior. Predatory activity by colluding networks frequently extracts state resources at the expense of the public majority. Policy and administrative processes are kept in stasis to prevent alternative participatory outlets with the government. This restriction cultivates a discordant relationship between state and society to which Caiden and Caiden (1977) refer to as an enveloping standard of "social anomie" in the population.

1.1 Research Motivation

This paper aims to identify whether there is a "systemic corruption" phenomenon in the Czech Republic, how big it is, the particular character, and what configuration of forces in a corrupt triangle operate at different levels of the government. This analysis places the role of political influence and firm performance at the forefront. Political parties in the Czech Republic today publicly admitted that corruption scandals for their members are a general problem from political party financing. I ask what role political influence–and its various manifestations–plays in a corrupt system and what motivates them to participate within such a system.

The structure of this paper will continue as follows: The first section will provide a brief background of the Czech problem context. The second section provides a thorough examination of the literature on systemic corruption determining which conceptual dimensions are fit for empirical analysis. The third section summarizes the data collection and hypotheses. The fourth section will show how big, how often, and by how much influence groups benefit from preferential treatment in construction procurement awards in comparison to non-influential or politically connected firms. Through the geospatial location of awards amongst groups I will show the disparity of award values between groups performing similar construction works. The fifth section

reinforces the preferential findings showing how the prevalent network coordination between private firms and government offices sustain a disparity of award values for exclusive groups within the state. With the use of geospatial empirical techniques, I will show the probability such differences are likely to occur and use pattern point techniques to demonstrate such behavior is unlikely to by random chance. The final portion of this paper will outline why the findings of this paper is of critical importance for progressing corruption discourse, enriching policy intervention strategies, and producing a framework to further investigate this phenomenon within and beyond the context of the Czech Republic.

2. PROBLEM BACKGROUND AND CZECH CONTEXT

Pinpointing the core drivers of corruption in the Czech Republic is a subject of debate with various explanations as to who or what is responsible. An instructive starting point to garner a contextual understanding is to examine a comparison to other European Union countries. There are a wide range of global corruption indices (See BEEPS and Integrity Index) but the Quality of Governance (QoG) expert survey captures an appropriate dimension to the Czech problem measuring the extent to which bureaucrats remain impartial to administering public goods or services in face of private interests. Figure one below combines expert survey responses from the Quality of Governance Institute (QoG) administration (Dahlström, C., et al., 2015) with European territorial units and geospatial data from the Eurostat website.

The data ranges in quantiles with the darker shades representing the least impartial treatment of accessibility to public resources to the lighter shades representing the most impartial responses in the survey. The Czech Republic falls directly on the margin of the lowest 20% slightly better than neighboring post-communist countries but ranking much lower than the remaining survey responses in Europe.
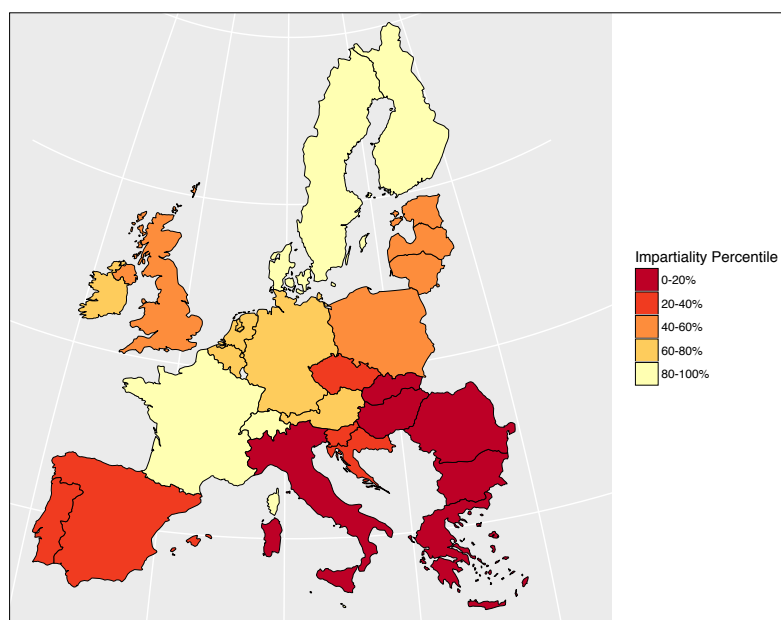

Figure 1: QoG Expert Survey 2012

The survey, albeit not exhaustive, is resourceful for its examination of characteristics of corruption not directly linking criminal activity but the prevailing traits of expectations as to

accessibility and exclusion to public resources for members in society.

Research by Frič and Nekola (2010) find social elites at the core of influence coordinating political and private official interests to decide which businesses will gain preferential market access. Securing business opportunities do not primarily rely on bribing as one might expect and what is true for corruption the national level may not apply at the regional and local. Michal Klima (2013) discusses the concept of 'godfathers' (kmotři) serving clientalistic interests of coordinating various actors within society for the purpose of exploiting state resources and often simultaneously fulfilling the entrepreneurial and political party roles. There are 6, 249 municipalities[2] which have certain degrees of delegated authority combined with a wide-ranging number of competing political parties. These factors contribute to an important characteristic of diffuse interests and decentralization of clientalistic characteristics.

The nature of political influence and susceptibility to discriminating administrative treatment make the public procurement sector considerably dangerous to corruption. threatening to the sector of public procurement. The Czech Republic is undergoing a major infrastructure boom increasing relative expenditures to close the infrastructure gap with its Western neighbors (approx. 4.6% of GDP compared with 2.6% on average EU) drastically shifting external production to the private sector over in-house production (Pavel, 2012). The privatization frenzy over the last 28 years to modernize public infrastructure and relative inexperience with contracting out makes for an acute contextual dilemma.

The regulatory environment for enforcement is also underdeveloped. The use of debarment or "blacklisting" is a strategy to deter and sanction firms from violating contracting procedures. Currently, the use of blacklisting as an enforcement measure is seldom used. According to Pavel (2012), only about one-third of subjects punished by the Office for the Protection of Competition (ÚOHS) have identified the person responsible and enforced a penalty. Due to the low levels of participating firms in government contracting, the office of competition may be unwilling to blacklist companies because it may reduce the active participation of bidders and prevent new entrants from fear of economic sanction.

3. CONCEPTUALIZING SYSTEMIC CORRUPTION

This section outlines a compilation of the major theoretical contributions on systemic corruption and introduces the conceptual framework used for empirical analysis. First, I will provide an outline of the major theoretical works on systemic corruption. Additional focus will highlight the theoretical works together with the empirical testing of systemic corruption theory. A graph will supplement an overview of all the perspectives of the problem. The second part of this section consolidates all facets of systems theory with some of the common features within literature on systemic corruption.

What is a system? A system is a set of interrelated component parts. The system is greater than the sum of its parts (Imboden, 2012). Although specific systemic corruption literature is limited in face of other research in the field, systems theory in public policy is quite extensive. Stewart et. al (2001) defines the use of systems analysis for public policy as follows:

> *"Systemic models imply understandings of process based on inter-linkages between system components. These links take the form of flows (of money, people, or products) which affect levels of key policy-relevant variables. The structure of the system implies the kinds of links*

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[2] http://www.smocr.cz/en/important-info/structure-of-territorial-self-government.aspx. Accessed May 10, 2017

involved - whether they are hierarchical or network-based, or involve market-type transactions across system boundaries. Systems vary in their structural characteristics from relatively simple, closed forms, to more open, complex and dynamic systems" (p.81).

Systems comprise of feedback loops (Meadows 1998; Forester 1989) and perhaps one of the most critical elements of a system is they are purposeful and goal-oriented (Parsons 1965). The next question remains as to where literature on systemic corruption overlaps with the basic premise of systems thinking.

What do experts mean when they say corruption is systemic? Caiden and Caiden (1977) sought to distinguish systemic corruption from individual corruption by developing a nine-point propositional plan to further the development of hypotheses about the characteristics of systemic corruption. Johnston (1998) diverged away from individual emphasis placing the patterns of interaction between wealth and power at the forefront. He developed one of the few empirical explorations to identify four "syndromes" to capture a general set of characteristics of countries suffer from due to systemic corruption. Stefes (2007) examined systemic corruption in the region of Central and Eastern European countries. He contextually identified some institutional vulnerability that is indicative to the region from the liberalization process, communist legacy, and prevailing cultural norms. Wedel (2012) discusses the variety of means that public and private overlap involved in systemic corruption which is an essential attribute of its institutionalized and reoccurring behavior. She critiques mainstream approaches to addressing the problem is predicated on the overemphasis of single transaction component of corruption as isolated instances or loopholes in the system. Beyerle (2014) defines systemic corruption as "a system of abuse of entrusted power for private, collective, or political gain—often involving a complex, intertwined set of relationships, some obvious, others hidden, with established vested interests, that can operate vertically within an institution or horizontally across political, economic, and social spheres in a society or transnationally (p.25).

What is essential for this paper is to identify which characteristics of corruption are pertinent to the question of systems-level attributes. Due to the limitation of literature on systemic corruption there is no clear articulation of theoretical perspectives fit for testing. In lieu of a single theory to test, I amalgamate all the common themes in systemic corruption literature and select the distinctive boundaries to support the empirical investigation. Figure 2 below summarizes illustrates the core categorical areas to construct the exploratory hypotheses of systemic corruption. Amongst the prevailing literature on systemic corruption I can conceptually reduce systemic corruption to three distinct points:

(i.) the problem core of systemic corruption is one of frequency and reoccurrence; (ii.) networks comprising of individuals and varying organizations are the primary unit of analysis; (iii.) the normative drivers reinforce the expectations of partial and impartial treatment within society and extend beyond illicit activity as a defining feature.
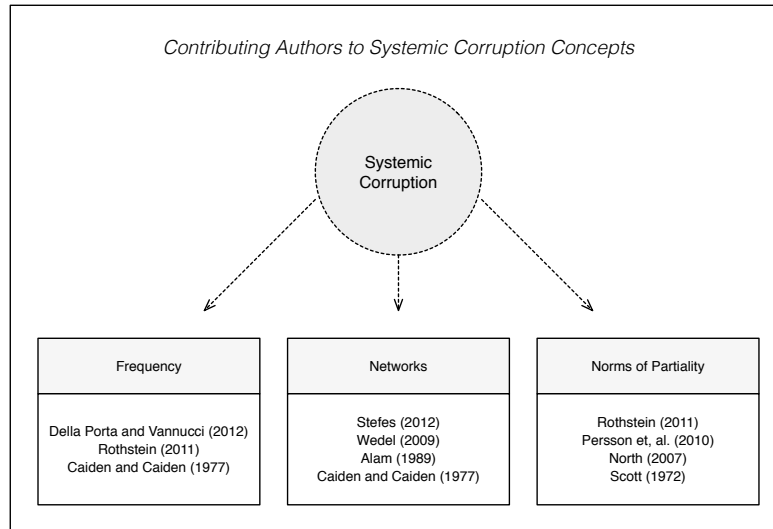
Figure 2: Boundaries for exploratory analysis of systemic corruption

3.2 Frequency and Reoccurrence of Corruption

An *act* within a system is an individual bound by degrees of freedom and capacity to mediate between individual incentives and external influences of the system. The system is an agency reducer. The social act is to be restricted to:

"the class of acts which involve the co-operation of more than one individual, and whose object…is a social object…The objective of the acts is then found in the life-process of the group, and not in those of the separate individuals alone (Buckley, 1967, p.95)

Many of the authors discuss the notion of recurrence or frequency of corruption in their conceptual framework of the problem to some extent; however, Della Porta and Vannucci (2012) featured this concept front-in-center as part of their foundation for systemic corruption requiring, "the frequency and duration of a corrupt exchange among the actors involved" (p.38). Their view argues that repetition of corrupt actions reduces transaction costs. It enables networks to engage in more complex cooperative processes since actors within a network have trust that corrupt activity will likely transpire. Bardhan (1997) summarizes the relationship with the following expression,

'corruption represents an example of what are called frequency-dependent equilibria, and our expected gain from corruption depends crucially on the number of other people we expect to be corrupt' (p.1331).

This conceptual framework differs from others in number of different ways but most importantly by enlarging corrupt acts beyond that of instances of illicit behavior. Bribery alone, for example, is insufficient to characterize systemic corruption because of the embeddedness of norms and purposeful nature of systems. Systems are purposeful and are conditioned to exhaust all potential acts of exploitation available within the normative conditions of society and structural capacity of networks. As a thought exercise one could imagine if one could eradicate instances of bribery, would systemic corruption come to an end? No. There is a myriad of means to produce exchange that do not rely on fixed agreement of monetary reward. The schemes of criminal enterprise are many but the system is one.

The frequency of corruption is the core of the problem since the normative drivers that shape

institutions, acceptable and unacceptable behavior, and qualification reinforce and are reinforced by regular activity. One may state that the problem is not so much that it happens as much as it continues to happen. Systemic corruption fits the necessary criteria when the role of agency has little to no impact on the overarching social dynamics. Additional criteria require that acts of corrupt exchange are not based exclusively on incidental accounts but regularly occurring patterns of behavior. When social processes accommodate the access for few and exclusion of many, then analyzing corruption at the individual level is no longer sufficient for analysis. This notion entails greater insight into the broader normative and structural drivers that perpetuate the problem.

Once in place, the dynamic of this model blurs causal factors relating to corrupt acts. The aim of this conceptual framework is to describe the dynamic of systemic corruption once established as a system. How this system comes to fruition is a separate task in need of research attention. For purposes of analysis, one may theoretically insist that reoccurring corrupt acts persisting over time have a particular threshold nature which is required to fully develop as a full-fledged systemic problem.

3.3 Systemic Corruption Manifests through Networks

Under systemic corruption, agency has comparatively little role in determining the trajectory of a system. Individual actors are indeed crucial within a system; however, the role of agency is less critical. This observation entails that sanction and reward structures targeting individual behavior are likely to have little consequence unless coupled with an auxiliary policy intervention strategy. This explains why prosecuting a key central figure results in another to fulfill the previous role. Individuals cannot guarantee a system of corruption. Agency invokes the notion of *control,* which is unrealistic when occurring through a system. Moreover, individual incentives are a poor indicator of anticipating corruption in systemic circumstances (Rothstein, 2012) since their behavior relies on expectations of what others will do.

Configuration of social ties between actors ensures that expectations are secured and that the manifestations of access and exclusion are materialized. Self-organizing networks (Rhodes, 1997) extend the importance beyond individuals or strict divisions of public-private organizations. Relying on influence is important for organizational survival and the government is not the only obstacle (Bozeman, 2004). Firms must also face the ways in which influence materializes through interest groups, political parties, informal networks, and cadres of contractors with established connections and insider knowledge. Sustaining preferential treatment requires cooperation with multiple stakeholders across varying organizational types. Understanding the ways in which networks develop and sustain themselves is often unique to the system. Analyzing the clusters of groups is an important way to understand how networks form to exploit public resources.

3.4 Normative Drivers and the Role of Impartiality

Norms are cultural products including values, customs and traditions that shape an individual's basic knowledge of what others do and what others think they should do. They dictate the extent to which individuals engage, and expect others to engage in corruption (Sandholtz and Taagepera, 2005; Banuri and Eckel 2012). They work as an informal institution generating incentives and constraints for actors and also shape institutional outcomes (Fjelde and Hegre 2014). The primary purpose of partiality norms is to maintain control over the access and exclusion of public sources.

One type of norms (injunctive norms) indicates the acceptability of a specific behavior, i.e. whether a behavior is considered to be moral and/or legal; the second type of norms (descriptive norms) indicates the frequency of this behavior, i.e. whether a behavior is common. Descriptive

norms are especially impactful and prevail in the situation of norms conflict (e.g. if a behavior is considered to be wrong but common place).

While institutions and formal rules are important in understanding constraints on behavior, they represent a sense of permanence (Cairney, 2012) that is at odds with how social behavior reacts within the systemic conditions. Johnston (2012) argues that our myopic understanding of corruption leads to the excessive and continued use of crime-prevention approaches that rely on penalties and law enforcement as the primary mechanisms for reform. He further argues that "we do not pay sufficient attention to–"embeddedness"–to the ways the social, political and economic contexts shape corrupt dealings" (p.476-477). Prevailing partiality of normative behavior depicts a better categorical area of systemic corruption since they may bypass codified restrictions on behavior and may be a driver in "creating their own perception of what they want and how to behave in the landscape they are in" (Teisman and Klijn, 2008, p. 289). Mungiu-Pippidi argues that the root of systemic corruption is a particularistic political culture, which is defined as a system in which the government's treatment of citizens 'depends on their status or position in society, and people do not even expect to be treated fairly by the state; what they expect is similar treatment to everybody with the same status' (2006, p. 82). Normative drivers within society determine who gets what and in which ways. North (2007) discusses the concept of limited access orders where organizational forms and contract enforcement cater to elites that "limited access orders use rents to maintain order and to hold the social order together…[limited access orders] manipulation functions as a as a kind of social equilibrium: all the parts interact to sustain the social order." (p.8).

4. METHODS AND DATA

4.1 Data

The sector for this analysis is public procurement construction contracts in the Czech Republic. The data for this analysis covers above-threshold procurement construction contracts from 2006-2012.[3] To distinguish partial and impartial treatment I use data from politickyfinance.cz to identify firms that made a political contribution within a given year, the contribution amount, and to which specific political party. Palanský (2015) identifies that political contributions are a significant variable in the overall success and performance of firms within the Czech procurement sector. He finds, however, that increases in the amount do not proportionately shape the performance but the contribution itself is a significant variable to differentiate between groups. This study will use political contributions as a dummy variable to divide the private firms into non-influence and influence group categories. All of the political contribution covers the same time period as the contracting data.

To control for the size of the private contractors I use data from the Czech Ministry of Finance Administrative Register of Economic Subjects (ARES)[4] for the number of employees, the address of registered location, legal type, registration date, and operating economic sector. The data set also includes the same criteria for offices of the government issuing the tenders. I classify both the private firms and government offices according to the range of employee numbers from the Eurostat classification of firm size: micro (1-10), small (10-49), medium (50-249), and large

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[3] Additional data is available, however, with the time it takes to correct clerical errors in contract awards and making them publically available and using third party references to confirm the veracity of the data within the data set, the data from 2006-2012 is the largest verifiable data set to support the findings within this paper.

[4] Administrativní registr ekonomických subjektů http://wwwinfo.mfcr.cz/ares/

(250+).[5] The population census data of the Czech Republic comes from the Czech Statistical Office which is used as a control variable for the fluctuations in award values and number of overall regional concentration of tenders.

To control for specific work type, only construction contracts with the common procurement vocabulary (CPV) industrial classification was used. Performing PERL regular expressions allows for string character recognition for distinct CPV contract types, ensuring appropriate comparison of similar construction requirements. The extensive controls for CPV values narrowed the type of contracting work and made for greater comparative analysis and no group had advantages over others in the construction sector for arbitrary work requirements in the contract. The drawback to reducing the three groups to similar CPV classification is a substantial reduction in the number of observations. The descriptive filters reduced the data set from 108,000 observations to 9,606. Other filters to the data set consist of obvious clerical errors, missing firm identification numbers (IČO), and the number of employees within the firm. Despite the considerable reduction in the sample size, it is both representative and structured for comparative analysis between groups.

The pattern point analysis relies on the conversion of firm and government office registration addresses. Using the 'ggmap' package in R studio from Kahle & Wickham (2013) the conversion of these addresses into longitude and latitudinal positions made for more specific regional variation and provides 'google drive' distances far more accurate since these distances account for accessible transportation and variances in topography.

4.2 Hypothesis

Hypotheses

Based on the determinants of systemic corruption in the conceptual framework section, I formulate following null hypotheses:

H1: Non-Influence and Influence groups will cluster similarly throughout the procurement

regions.

H2: The Influence group will receive similar patterns of impartial treatment in the procurement

sector as the Non-influence group.

5. EMPIRICAL FINDINGS

5.1 Measuring Competence of the Contracting Firm

It is critical to first establish that firms produce distinct advantages in the procurement sector through means other than innovation of market competency. To isolate for influence as the prevailing factor in determining the differences in the patterns of behavior between groups we must operationalize criteria to account for public officials made discretionary decisions not based on merit but on special considerations of political or personal influence.

Using a t-test for differences in means I investigate as to whether or not one particular group is significantly more "competent" than the other. This is important as we must narrow down that influence ties are the key explanatory factor for the disparity in award prices and preferential treatment in the procurement sector. There is no current available information on post-contract

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[5] http://ec.europa.eu/eurostat/web/structural-business-statistics/structural-business-statistics/sme

evaluation or consistency of fulfilling the government's contract obligations, which limits by how much a group produces quality over another. Within the dataset, however, there are three variables we may use to test the differences: level of experience within the sector, competitive exposure within different administrative territories, and geographical mobility.

Experience accounts for the number of years existing as firm at each specific year per contract award. Competitive exposure includes all the number of bids a firm holds exposure to when receiving an award. The final variable is just how mobile a firm is within the state. The data looks at the google drive distance for each firm relative to the issuing authority. The logic is that a firm may be more competent overall if they can win across various regions and are not limited to one specific areas' subtleties in administrative procedures.

Table 1: Variables to detect variance in competence for the firms within each group

Variables	Non-Influence Mean	Influence Mean	t	Significance
Experience	12.88	12.766	0.736	0.4616
Bids	5.577	5.44	0.955	0.3395
Distance	58.41	49.84	3.419	0.0006***

*, **, *** Significance at the 10, 5, and 1% level

5.1.1 Experience

Differentiating for levels of experience between both groups shows no significant differences. The non-influence group has slightly longer experience as a registered firm with 12.89 years compared to the influence group with 12.76 years of experience. Admittedly, registration date does not guarantee similar levels of experience as a firm. However, there are no demonstrable differences between the registration years and no major concern to purport a major disparity in relative experience for the influence group over the non-influence group.

5.1.2 Competition

Examining each group's exposure to competition is another factor for determining a level playing field. One may presume that certain groups will gravitate towards the areas of contract types with the lowest probability of other firms placing a bid, or carefully discriminating their options to decrease competitive exposure. The differences in the average number of bids holds little significant differences with an average of 5.77 and 5.44 bids respectively for non-influence and influence groups. The significance tests include testing for normal distribution for differences between group averages, which all re-affirm the significance tests.

5.1.3 Distances or Geographic Mobility

The measurement test seeks to find differences between groups as to how far they travel and how many different locations they receive awards from. The notion behind this test is whether or not a firm can win at a number of regionally distinct locations with different nuances in the environmental conditions for construction, the administrative personnel they communicate with, and the prospect of varying changes in competing against different firms they may not be familiar with. The statistical test here confirms that the non-influence group is significantly more likely to travel greater distances to distinct locations than the influence group. We can confirm at the 99% level that the non-influence group will travel roughly 8.57 kilometers more than the influence group when receiving awards at distinct locations. The extra 8.5 kilometers may not seem like

much but it can be more than enough for a firm to move into a different administrative region if close enough to a border. It can also mean the difference between moving from a government office with a large number of employees to a small number or vice versa.

5.2 Distribution of Procurement Firms

Before moving forward to the differences in award prices between groups, it is important to look at the overall representation in the sector. Figure three below shows the relative proportion of unique firms within the data set per each year from 2006-2012. The non-influence group represents roughly 83% of the total number of firms operating in the procurement sector with the influence group representing roughly 17% after controlling for missing employment number in the data. There is considerable variation of market entrance and exit when comparing the non-influence and influence firms. On the one hand, there is some optimism for the Czech procurement market by which firms enter and exit the market. One of the tenets of state capture is the overwhelming extent private firms restrict the market entrance (See Hellman et al., 2000). On the other hand, the figure below illustrates a deceptive danger as the "influence market" is comparatively invariant to changes conditions as well as the freedom for new entrants. As we will see in the next section, the advantages for the influence group as strikingly disproportionate in comparison to the non-influence group.
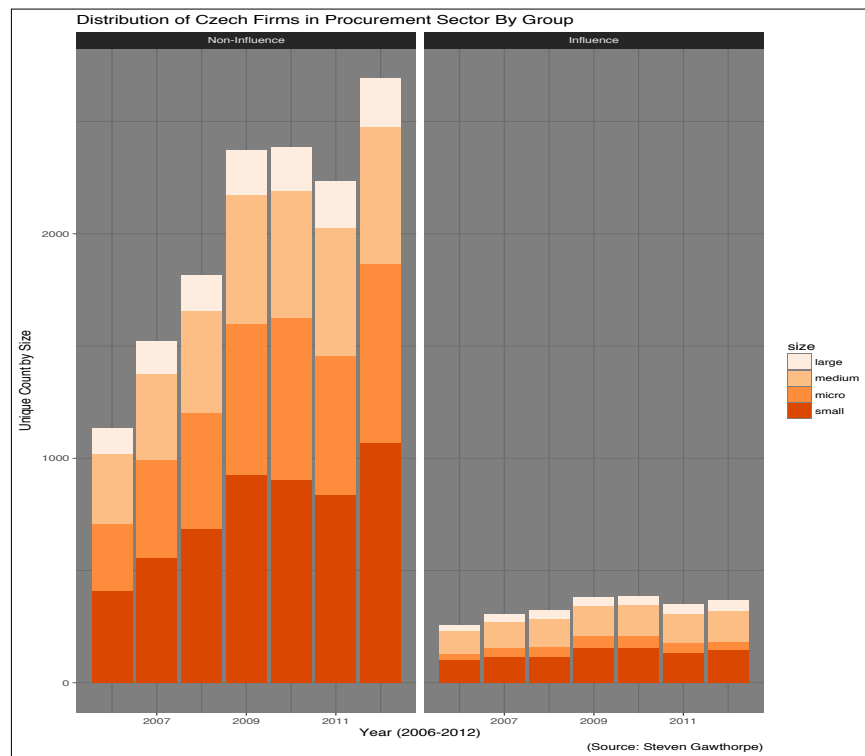

Figure 3: Overall Distribution of Market Entry-Exit of Contractors

5.3 Geo-weighted Summary Statistics

To calculate the differences in geographical weighted values, I used the GWmodel package Lu, B., et al. (2014). The calculation examines non-stationarity of all the award values relative to the distances between the geospatial position of other government contract issuing authorities. The GWmodel package has a function to calculate the bandwidth to specify the appropriate distances for the differences in the spatial coordinates.

Regardless of the regional location influence firms tend to receive higher contract award values one average in the construction sector. Figure 3 below demonstrates that regardless of the location of the award location, the influence group wins significantly higher values than the non-influence group. The period from the data set (2006-2012) additionally demonstrates that the disparity of award wins between both group exists throughout the time period in the data set. The differences in shades of blue correspond to changes in the award values: lighter shades are the lower award values while darker shades are the higher values. The average range of award distribution is no more than 120,000 CZK while the average range for the influence group is 159,000 CZK. These are quite large differences considering that the contract work type is similar.

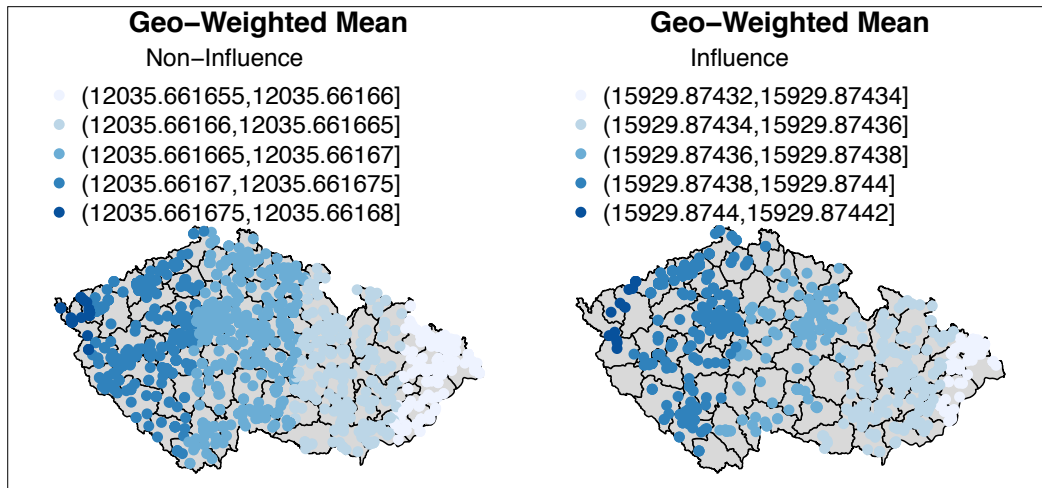| Geo−Weighted Mean	Geo−Weighted Mean
Non−Influence	Influence
(12035.661655,12035.66166]	(15929.87432,15929.87434]
(12035.66166,12035.661665]	(15929.87434,15929.87436]
(12035.661665,12035.66167]	(15929.87436,15929.87438]
(12035.66167,12035.661675]	(15929.87438,15929.8744]
(12035.661675,12035.66168]	(15929.8744,15929.87442]

Figure 4: Distribution of Geo-Weighted Average Awards Wins Per Group Divided by 1000

The map shows non-stationarity changes in awards for the two different groups. If a preferential region benefits one group, then we can assume that the characteristics of corruption are less indicative of a systems-level problem. The patterns of behavior are relevant to emergent conditions at the systems level (See Goldstein, 1999). Isolating aberrant behavior in one locality is unlikely to give better insight into the problem in the grand scope of the country.

There are a number of important factors to consider from this map. First, preferential advantages do not derive from one distinctive administrative office or municipality. Though the absolute value of the awards differs, the acute patterns of partiality are consistent throughout the state. These patterns are inconsistent with one or a few aberrations in the forfeiture of public responsibility. The preponderance of the patterns within the Czech Republic indicate a prevailing system of particularistic behavior.

At the micro level, the players within the sector of public procurement demonstrate behavior of one cohesive structure in terms of the commonalities of their behavioral patterns. Yet, the density of integration for the connections between these players does not exist as strong as it does at the micro-level as does the macro level. The instances of emergence for systems theory possesses the explanatory power to answer the question as to why a large scale of different actors in regionally diverse geographical areas exhibit similar patterns.

6. NETWORK FINDINGS AND PROCESSUAL INDICATORS

One of the biggest paradoxes in the data encompasses the question that if political contributions and influence provides such distinct advantages, then why is it that not all firms give contributions?

Answering this question requires practical explanation as to why contributions are necessary for political support, what they are used for, and the structural processes as to how they may disrupt impartial treatment in the procurement process.

6.1 Kernel Density Estimates

A kernel density estimator examines the probability of an event falling within a designated physical space. The data determining the probability of a firm winning over a geospatial area within the Czech Republic uses the physical location of the government authorities' latitude and longitude position. The probability has a "smoothing" function to determine a continuous surface as to where a private firm is likely to win. The kernel density function examines the firm wins in relationship to other nearby wins. It uses a summary of "bumps" of the nearby observations with and determines the width of those bumps (Everitt, et al., 2011).

Figure 5 below highlights the density of contract wins throughout the Czech Republic. Although the non-influence group is significantly larger in terms of the overall number of contractors there are very little comparative clusters to figure 6. The reason for this difference is that non-influence contractors tend to win in regions closer to metropolitan areas such as the capital city of Prague and the second most populated area of Brno. This behavior has an impact on the clusters in the map below which makes the density far more centralized than in figure 6.
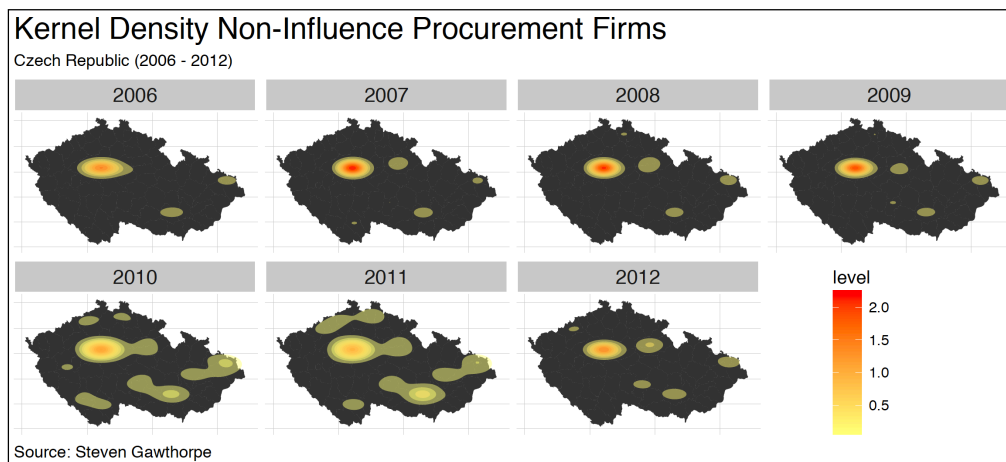

Figure 5: Repeat Contract Wins for the Non-Influence Group

Figure 6 below highlights that influence firms have a more diffuse likelihood of winning in areas outside of the metropolitan regions than exhibited by the non-influence group in Figure 5 and move throughout the Czech Republic winning contractors in various locations as opposed to repeated wins within a small geographic radius.

Kernel Density Influence Procurement Firms
Czech Republic (2006 - 2012)
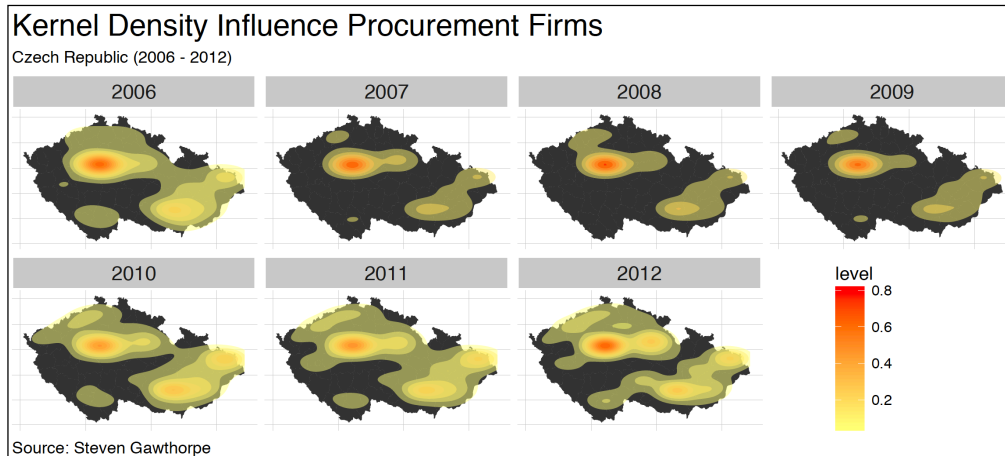
Source: Steven Gawthorpe

Figure 6: Repeat Contract Wins for the Influence Group

Figure 6 (above) illustrates the clustering patterns of influence firm award locations. This spatial image is important as a backdrop for understanding the potential location for contractors to repeatedly win awards throughout the Czech Republic. As you can see the densities reoccur in a manner far more disperse than the non-influence group. However, there are a number of regions distinctly clustered in the figure below outside of the large metropolitan areas. These clusters are distinct from one another and depict the behavioral patterns of the group more so than the demographics of the regions themselves since the tend not to deviate into other territories for contracting opportunities.

6.2 Composition of Public-Private Overlap

The following chord diagram determines where private firms–within their respective group–typically win contracts according to the size of the government offices. Figure 7 (below) shows the pattern movement as to where private firms proportionately win contacts according to corresponding size of government contract office. The scale for government office size is the same scale as number of employees for private firms which is as follows: large (250+), medium (50-249), small (10-49), and micro (1-9). The pattern movement in blue refers to non-influence groups and their corresponding movement, while red refers to the influence groups' movement.
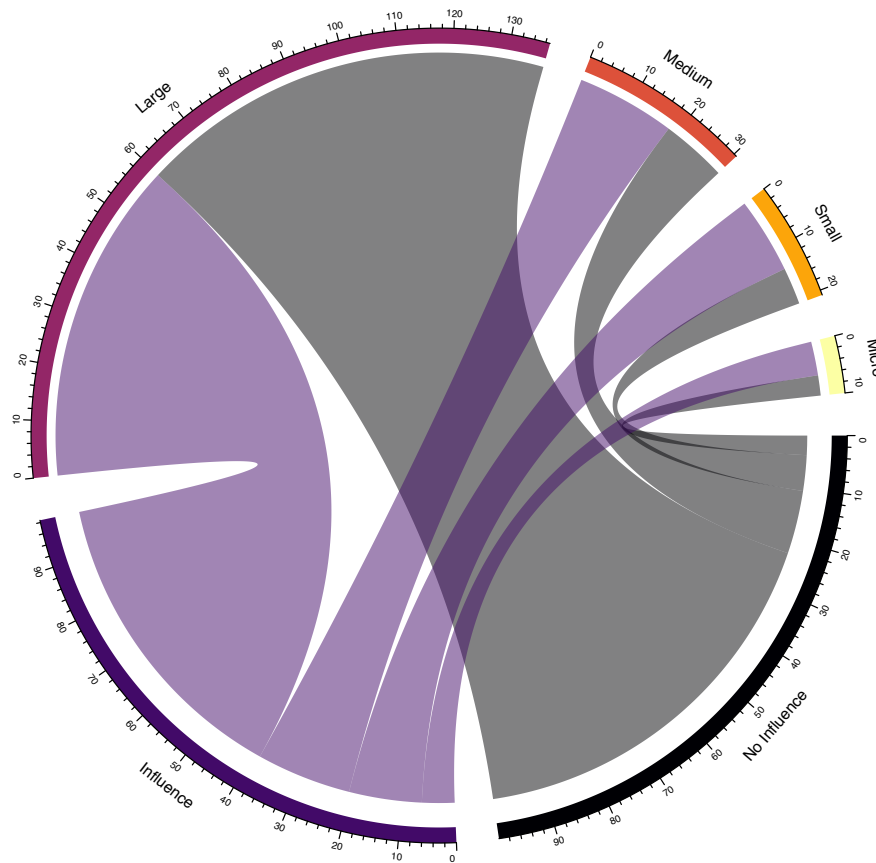
Figure 7: Proportion of Government Office Size Issuing Contracts to each Group. The scale for government office size is the same scale for private firms which is as follows: large (250+), medium (50-249), small (10-49), and micro (1-9).

Table two below provides the summary of the proportion of the size of the government offices that issue contacts to non-influence and influence firms. The pattern of behavior is quite interesting as there is roughly double the percentage differences for the smaller government offices for the influence group over the non-influence group. This pattern is quite interesting as the influence group relies on close proximity and consistent relationships with smaller government offices to secure stability in future transactions. The path towards larger government offices for the non-influence group exemplifies that more oversight may be more likely to transpire and reward merit for an innovative product over a personal connection. The non-influence group may seek these government offices for contracts as a form of insulation against non-competitive practices of corrupt actors. The influence groups may seek smaller government offices as they are more likely to expend little resources amongst personnel in exchange for contract opportunities.

Table 2: Proportion Distribution of Government Offices Issuing Awards to the Private Firm Groups

	Large	Medium	Small	Micro
Non-Influence Group	76.98068***	12.21472***	6.862745***	3.747991**
Influence Group	59.76027***	18.32192***	14.041096***	6.271404**

*, **, *** Significance at the 10, 5, and 1% level

The non-influence group wins one out of three wins in metropolitan areas within the data set

while the influence group wins one out of every five contracts in metropolitan areas. This is quite a peculiar distinction between the two groups. There are several implications to derive from this pattern of behavior.

The first area to consider is the comparative level of risk. The Czech capital receives considerable media attention both domestically and internationally. The risks as part of malfeasance on both firm and bureaucratic behavior have greater exposure to national and international attention. The media attention does not eliminate corruption but it does fundamentally alter the behavioral patterns as corrupt actors incur greater degrees of risk. There is a greater density of NGOs and watchdog organizations in the Czech capital. Organizations like Nadacni Fond Proti Korupci (Anti-Corruption Endowment) provide cash endowments to those willing to expose corruption. With the greater density of anti-corruption activity and pressure for corporate social responsibility, one can suppose that the low hanging fruit of corruption exposure is greater in Prague than in small municipalities throughout the state. This level of risk is likely to crowd out the smaller instances relating to influence as it is more resource-intensive to produce the level of secrecy necessary for rent extraction.

The proportion of rent-extraction is a second important consideration for this pattern. The procurement area of Prague is substantially different in its composition of public administration than other areas. The table below shows the comparative differences between the percentage proportion of government office sizes against the prevailing national average. The predominant government office size in metropolitan areas is "large" with 92% compared to the national average of 32%. The smaller office sizes such as "small" and "micro" represent 1.8% and 0.7% compared to 24% and 13% for the national average. Other areas throughout the state have far greater density of smaller office sizes than in Prague. Given the large disparity in government office sizes in metropolitan to the average, it is both far less likely and far less lucrative to produce the level of rent extraction than would be in other areas of the state. Sustaining influence over a prolonged period with the greater exposure to uncertainty given the exposure to risk and lower yields on rent extraction.

One final consideration for the clustering of procurement award wins is the level of competition. Firms travel from across the state to compete for the most lucrative construction opportunities. Such opportunities attractive a far greater degree of competent tenders with the potential for more "eyes" on the administrative procedures given the size of the government offices overseeing the contracts. The density of competition provides an additional insight into the competency of firms from each group. It is difficult to extrapolate from the if firms from the influence and non-influence group intentionally seek opportunities from these distinct regions or if these patterns reflect a path towards least resistance. Whatever the case, the regional differences are robust between both groups and the level of risk, lower prospects for sustainable rent yields, and competitive exposure make the Czech capital less attractive for repeat patterns of influence across all firm types.

6.3 Tests for Complete Spatial Randomness (CSR)

The equation below tests for the significance of the spatial characteristics of the data set. The g-distance function calculates the average nearest neighbor point for construction award locations in the Czech Republic (this function is also known as "inter-event" distribution). Testing for the extent of spatial random variance uses the g-distance algorithm created by Baddeley, A., & Turner, R. (2005). Distances above the blue line indicate clustering patterns due to some particular process and not random (Ripley, 1988). Values closely following the blue indicate Poisson (random)

processes and values below the blue line indicate dispersion of point patterns. The equation accounting for complete spatial randomness (CSR) using a (Poisson) point process is below:

Equation for G-distance function:

$$G(d) = 1-\exp(-\lambda\pi d)$$

Where lambda is the intensity (expected number of points per unit area). Deviations between the empirical and theoretical G curves may suggest spatial clustering or spatial regularity. If the distribution follows along the pattern of the blue line of the Poisson distribution (*Gpois* in the image), then there is concern for the effects of the data to be likely due to random circumstance and not contingent upon geographic effects.

Figure 8 and figure 9 illustrate the G-distance results for the non-influence and influence groups respectively. The red line of the curve does not follow the blue line of the Poisson random curve for both figure 8 and figure 9. We may reject the null that the clusters found in the previous kernel density analysis are due to random circumstances. We may conclude that the outcome of the characteristics of influence in the public procurement sector are highly unlikely due to random chance.
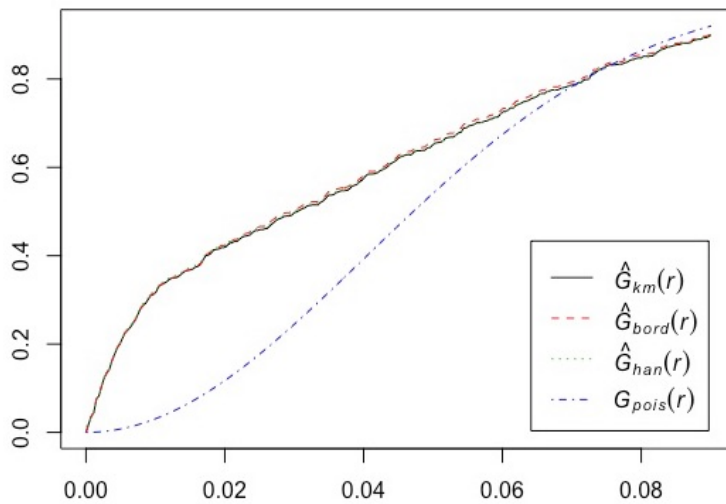

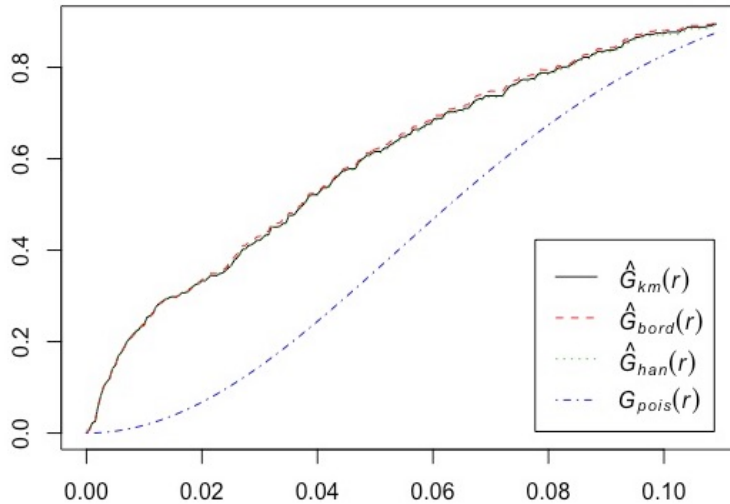Figure 8: Non-influence group. G-distance complete spatial randomness test.

Figure 9: Influence group. G-distance complete spatial randomness test.

7. CONCLUSION

Can the previous findings merit the existence of a system of corruption? With the rejection of H1 we can confidently state that within the data, there is no significant difference for the influence group to perform governmental services than the non-influence group. The availability of variables to support those differences indicate that there are no distinctive organizational advantages for influence firms over non-influence firms. We have exhausted all available measures of differences leaving only the variable of influence as the predominant distinguishing factor which opens all the avenues to explore the outcomes prevalent for each group's respective patterns of behavior.

Given the rejection of H1 and H2 we may further confidently state that preferential treatment exists as both a geographic phenomenon and one which is not predicated on measures of competency. The variables producing preferential treatment creates disparities in resources in favor for the minority of influence firms at the expense of non-influential firms. These differences prolong through both physical space and time with little variation of market conditions. Accessibility to the advantages of influence networks is slim yet entrance into the competitive domain of non-influence remains relatively open but with little monetary reward for market uncertainty.

The remaining question is to what extent are these patterns indicative of a system and what differentiates them from other instances of corruption? The first essential feature is the stability of particularistic behavior. The influence group resembles the patterns consistent with literature on systems theory which contends that systems are resilient to change. The influence group is relatively invariant to consistent award wins with higher overall values. They do not control the "market" but control the influence market. The second crucial feature is the superveniance of the phenomenon. Caiden and Caiden contend that corruption is systemic when a single violation is a poor metric of the overarching problem (1977). The spatiotemporal patterns reflect a problem much more suitable as one of persistence throughout space rather than instance of case. Lastly, there is no discernable organization, agent, region, authority, or legal violation as a core driver. As to whom or what is quite blurry resembling what Wedel describes as "structural unaccountability".

Recognizing the patterns within a system is imperative for understanding the overarching social drivers of corruption. Emphasizing the individual as the primary unit isolates the problem away

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from the overarching social narratives. Anti-corruption intervention strategies tend to focus on the individual more than the network (Wedel, 2015; Stefes, 2007; Perrson et al., 2013), which presses for the need to identify the endogenous modes of interaction between the state and civil society. By no means is the framework in this analysis exhaustive. The empirical analysis in this paper does not give an explicit understanding of the processes by which corruption transpires. What cluster analysis does offer is an assessment of the broader social patterns that promote preferential advantages to a select few at the disadvantage of many. Understanding these patterns are paramount for identifying the root of the problem and developing sustainable policy interventions.

APPENDIX:

Award Distribution For Micro Firms
Nominal prices (2006 - 2012)
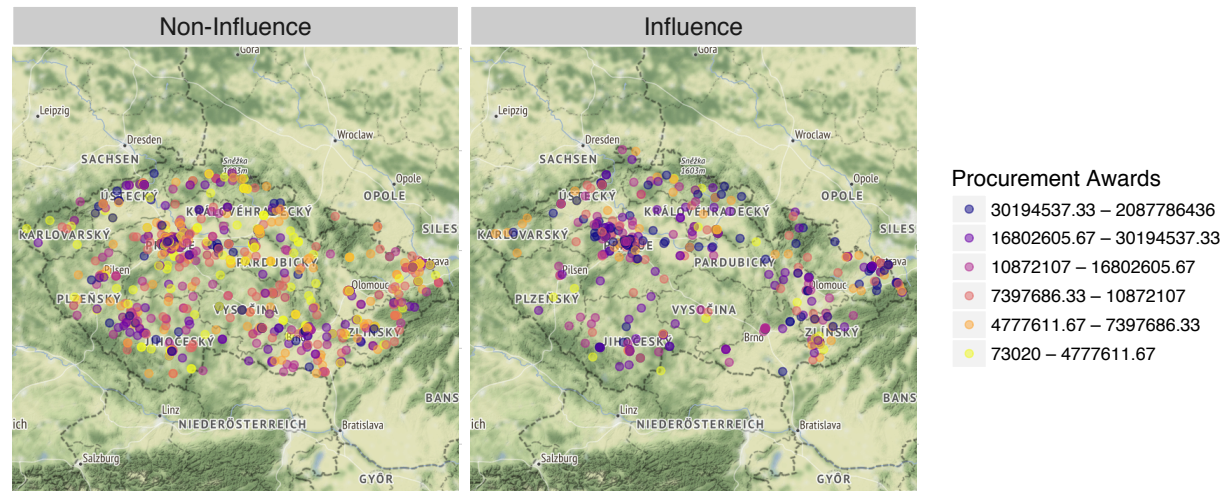
Source: Steven Gawthorpe

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