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MARKET AND NETWORK CORRUPTION[3]

Economists tend to reduce all corruption to impersonal market-like transactions, ignoring the role of social ties in shaping corruption. In this paper, we show that this simplification substantially limits the understanding of corruption. We distinguish between market corruption (impersonal bribery), and network (or parochial) corruption which is conditional on the social connections between bureaucrats and private agents. We argue, both theoretically and empirically, that these types of corruption have different qualities. Using data from the Life in Transition Survey (LiTS) which covers all post-socialist countries we show, first, that the correlation between market and network corruption is weak, which implies that ignoring network corruption leads not only to an underestimation of the overall scale of corruption but also biases national corruption rankings. Secondly, in line with theoretical expectations, we find that network corruption is more persistent over time, less related to contemporary national socio-economic and institutional characteristics and has stronger historical roots than market corruption. Yet, network corruption, unlike bribery, is not able to 'grease the wheels' and is not associated with political instability. Lastly, we show that the decline in bribery which was observed in almost all post-socialist countries in the period from 2010 to 2016 was accompanied by rising network corruption in many of them, which has important policy implications.

JEL Codes: D73, Z13, L26

Keywords: market corruption, parochial corruption, network corruption, blat, bribery, post-socialist countries.

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Introduction

In the economics literature, corruption is often viewed as governance failure, which is reflected in the popular definition of corruption as the abuse of public office for private gain. Public officials or bureaucrats are assumed to be rational utility-maximizing agents who decide to use discretionary power to extract bribes when the expected benefits exceed the expected costs (Kitgaard, 1988; Rose-Ackerman, 1978; Shleifer & Vishny, 1993). Such a framework implies that institutional reforms raising the relative costs of corrupt behavior (e.g., reforms aimed to improve the separation of powers, increase government transparency and accountability, raise penalties for corruption or salaries of bureaucrats) could help to curb corruption. This implication is generally supported by results of cross-national studies on the determinants of corruption (see reviews by Lambsdorff, 2006; Pellegrini & Gerlagh, 2008; Svensson, 2005; Treisman, 2000, 2007) and it often forms the basis for policy recommendations (e.g., Huther & Sah, 2000; World Bank, 2000).

This mainstream economic approach towards corruption, however, has a yawning gap: it disregards the fact that corruption is socially embedded (Granovetter, 1985; Uzzi, 1996). While this approach considers relationships between bureaucrats and private actors as impersonal, similar to the relationships between sellers and buyers in the market, in reality corrupt transactions occur between socially connected actors. Economists should, better than any other social scientists, understand that two random individuals are not usually able to make a corrupt deal due to incomplete information and the threat of legal punishment. Before offering a bribe, the potential bribe-giver should find the "right" bureaucrat who will not report to police and will fulfill the obligation to provide the informal service requested. The bureaucrat will not take a bribe if she or he does not trust the bribe-giver. It is the social connectedness between a potential bribe-giver and a bribe-taker, their belonging to a common social network, which makes the whole business possible, provides missing information and promotes mutual trust and guarantees. Therefore, it is more plausible to assume that corrupt transactions take place within a social network than that they take place in an impersonal market.

The important role of social connections in shaping corruption was first emphasized by Scott in his seminal study of corruption in developing nations (Scott, 1969). He explicitly distinguished between impersonal bribery – *market corruption* – and corruption based on social or business connections – *non-market* or *parochial corruption.* Although some subsequent studies have provided a more explicit theoretical discussion of these types of corruption (e.g., Husted, 1994; Lambsdorff, 2002; Kingston, 2007), this division still remains out of the mainstream economic literature on corruption. Widely cited analytical reviews, including works

by Aidt (2003), Bardhan (1997, 2006), Jain (2001), and Tanzi (1998), do not contain any explicit discussion on the role of social connections. As mentioned by Aidt (2003: p.F632) "Most economic models of corruption take a somewhat parsimonious view focusing largely on market corruption or bribery".

Fig. 1 below illustrates what does standard economic approach towards corruption misses.

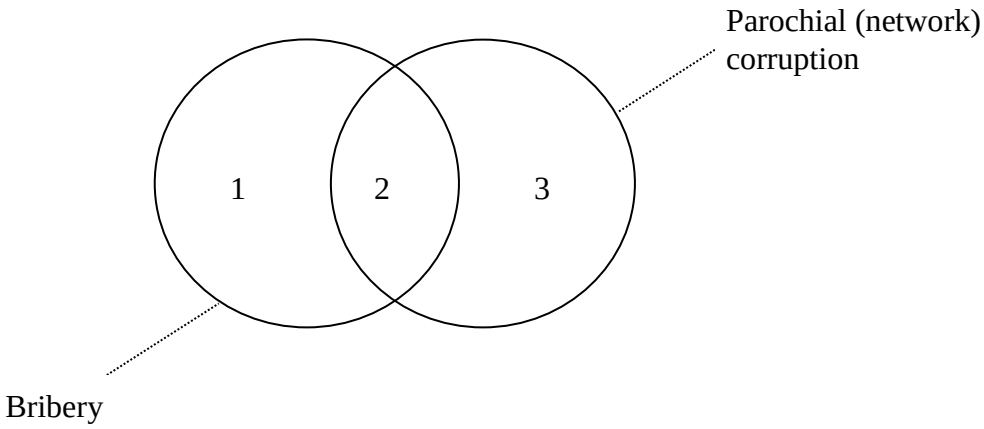

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Figure 1. Bribery and network corruption.

The interplay between bribery and the use of social connections generates three possible types of corruption. The first type (Sector 1 in Fig.1) reflects bribery which is not related to social connections. This is *market corruption* in Scott's terms. The second type is *bribery through social connections* (Sector 2). As economists often reduce all bribery to market corruption, they assume (erroneously) that bribery is completely homogenous and thus Sector 2 does not exist. The last type is *corruption through social connections without paying bribes* (Sector 3). Economists, unlike sociologists or anthropologists, often ignore this type of corruption based on reciprocal exchanges of favors within a social network. Sectors 2 and 3 together form *parochial corruption* in terms of Scott. We prefer, however, the term proposed by Granovetter (2007) and call it *network corruption*.

Therefore, reducing all corruption to impersonal bribery is an oversimplification and can be very misleading. If Sector 3 (see Fig.1) is large, then it leads to an underestimation of the overall scale of corruption. Moreover, if network corruption is not a perfect complement to bribery, then it also distorts national corruption rankings. As the qualities of network corruption should substantially differ from the qualities of impersonal bribery, reducing all corruption to impersonal bribery means misunderstanding of the nature of corruption, its causes and effects, and thus misguides anti-corruption policies, especially in countries with high network corruption.

Despite these concerns, there are no empirical studies (as far as we know) that explicitly distinguish network corruption and examine it together with bribery. While economists traditionally do not pay much attention to social ties when studying corruption, quantitative sociological studies on corruption are rare and the 'sociological turn' in corruption research has been mostly theoretical and qualitative (Heath et al., 2017; Uberti, 2016, 2017). As mentioned by Granovetter (2007: p.162), "no systematic comparative study of variation in the extent of obligation networks across societies exists, and daunting theoretical and methodological obstacles are easy to imagine. But this does not mean that variations are insignificant or that comparative research would not be of great interest".

Our paper fills this gap in the literature. Following the theoretical contributions by Scott and Granovetter, we explicitly distinguish between bribery and network corruption and examine them jointly using data from the 2nd and 3rd rounds of Life in Transition Survey (LiTS) conducted by the European Bank of Reconstruction and Development in 2010 and 2016. As in many previous cross-national studies of corruption, we measure both types of corruption in terms of people's perceptions. Our key measure of bribery reflects the perceived importance of paying bribes for 'getting things done', while our measure of network corruption reflects the perceived importance of using social connections. Besides the fact that LiTS allows us to distinguish these types of corruption, its other advantage is that it covers all post-socialist countries which present an excellent "laboratory" to study market and network corruption. On the one hand, these countries exhibit relatively high levels of corruption rooted, as many authors argue, in the Soviet "blat" (Ledeneva, 1998, 2008; Gellbach, 2001; Sandholtz & Taagepera, 2005), which is in line with conclusions from more general literature on the legacies of the Soviet regime (e.g., Obydenkova & Libman, 2014). On the other hand, the transition to a market economy in these countries disturbed old social networks, increased the value of money, and spurred the decentralization of government, which all led to the increase of bribery (e.g., Levin & Satarov, 2000, 2015). As a result, the current profile of corruption in post-socialist countries should represent a mix of its network and market types. As LiTS additionally covers a few Western European countries, we are able compare the scale and structure of corruption in post-socialist societies with those in mature market economies.

Our main findings and their implications may be summarized as follows. First of all, we find that the country-level correlation between bribery and network corruption is weak and corresponding national rankings are different. Countries with the highest levels of bribery are not the same countries as those with the highest levels of network corruption, and many countries with moderate levels of bribery exhibit relatively high levels of network corruption. Therefore,

ignoring network corruption means underestimating the overall scale of corruption and distorting national corruption rankings.

Secondly, in line with theoretical expectations, we show that qualities of network corruption differ from qualities of bribery: network corruption is more persistent over time, less related to contemporary national socio-economic and institutional characteristics but more associated with communist and pre-communist legacies than bribery. This suggests that taking network corruption into consideration could help uncover the reasons for the persistence of corruption and its resistance to the redesign of formal institutions (e.g., Persson, Rotstein & Teorell, 2013; Heywood, 2017).

We also find that while bribery is strongly and positively related to political instability, network corruption is not related to it. This might shed some light on why in some countries high corruption generates political instability but in others it does not: this could be due to different balances between market and network corruption.

We do not find any correlation between network corruption and the incidence of self-employment, while in the case of bribery this correlation is strong and positive. This result is interesting in the light of discussion on the extent to which corruption may 'grease-the-wheels' (e.g., Meon & Sekkat, 2005; Meon & Weil, 2010), suggesting that it is market corruption that is able to 'grease' as it assumes more open access to public services than the network type.

Lastly, we show that the decline in bribery which was observed, according to the LiTS data, in almost all post-socialist countries from 2010 to 2016 (see also EBRD, 2016) was accompanied by rising network corruption in many of them. Taking into account different qualities of bribery and network corruption, these trends have important policy implications and cannot be considered as the retreat of corruption in the region.

Overall, our paper shows that taking into account social connections could enrich and improve the economics approach towards corruption. At the same time, our study advances a distinction between market and network corruption, which was largely abandoned in the economics literature, as a useful tool for better understanding the qualities of corruption in any given country.

The rest of the paper is organized as follows. In section 2, we provide a theoretical discussion on market and network corruption, formulate key differences between them, and specify the research hypotheses. In section 3, we describe data and methodology used. In section 4, we present our findings. Section 5 summarizes and discusses our main results.

2. Theoretical background and research hypotheses

2.1. Market corruption and network corruption

Both market corruption and network corruption reflect situations when a public official or a bureaucrat provides some informal and/or illegal favors to certain persons(s) or firm(s) for some reward. In this regard, both of them fall under the popular definition of corruption as abuse of public office for private gain.[4] The crucial difference between them lies in the issue of *whom the bureaucrat provides those favors to*.

In market corruption, the bureaucrat provides favors to *any* person or firm that asks for a service and offers some reward. In other words, *everyone* who follows a certain rule, which is the same for all, may get an illegal or informal service. Often, this rule is simply "pay a bribe". Therefore, access to corrupt services in this case depends only on the willingness and ability of a private actor to pay and does not depend on her or his personality and acquaintance with the bureaucrat. Since Scott (1969), the classic example of market corruption often mentioned in the literature is an auction for public procurement contracts where the winner is a firm that offers the highest informal bid (e.g., Beck & Maher, 1986; Rose-Ackerman, 2002). Such an auction does not undermine the general logic of the market as (higher) bribes are usually paid by more efficient firms.[5] Another example of market corruption is an informal 'price list' for public services when the sizes of bribes are known beforehand.[6]

Network corruption is different: *only* those persons (or firms) who have some kinship, friendship or business ties with the bureaucrat may get a service. That social network may be either large and bond dozens of bureaucrats and public officials, their close or distant relatives, friends, classmates, and business partners[7], or it may be small and include only one bureaucrat and her or his relative or friend as a private actor. The crucial thing is that only members of that network – insiders – have access to corrupt services, while all other persons or firms – outsiders – cannot benefit from this form of corruption. Thus, for network corruption, the winner of the auction mentioned above will be a firm that is connected to the bureaucrat but which is not necessarily the most efficient firm that is able to pay the highest informal bid.[8]

[4] This is a reduced version of J. Nye's definition: "Corruption is behavior which deviates from the formal duties of a public role because of private regarding (personal, close family, private clique) pecuniary or status gains; or violates rules against the exercise of certain types of private-regarding influence" (Nye, 1967: p.419).
[5] In this sense, market corruption is similar to "efficient corruption" discussed by Aidt (2003).
[6] Such payments are widespread in healthcare (Lewis, 2000) and traffic police (e.g., Indem , 2013).
[7] A prominent example is a network supervised by Vladimiro Monestesinos in Peru, see McMillan & Zoido (2004).
[8] Uribe (2014) presents a formal theoretical model of auction when a public official responsible for the auction is related to firm making bids.

The fact that network corruption operates through social connections, while market corruption is an impersonal market-like transaction, implies further important differences between them. First of all, network corruption should be more persistent than market corruption, as it is embedded in social networks and structures which usually evolve slowly and tend to reproduce themselves (e.g., Doreian & Stokman, 1997). This embeddedness should make network corruption less vulnerable to changes in formal institutions and more 'path-dependent' and related to the historical and cultural background than market corruption.

Another difference between network and market corruption concerns access to the public services they provide. As the number of insiders is, by definition, less than the number of outsiders, network corruption provides more restricted access than market corruption. In other words, the number of agents who could benefit from corruption should be larger for market corruption than for network corruption.

Further, the impersonal nature of market corruption implies that the reward to the bureaucrat should have a universal value, irrespective of the personalities of the parties of the corrupt deal. The best candidate for such a role is money. Consequently, market corruption should always involve the transfer of money (usually cash). Network corruption means that not only money but also some non-monetary gratitude in the form of a gift, reciprocal service, or respect may potentially serve as the reward (e.g., Cartier-Bresson, 1997). Moreover, due to the persistent social connectedness of the parties this reward may be delayed in time, which is much more difficult in the case of market corruption.

It is natural to expect that market corruption is riskier than network corruption. One reason is that money transfers are easier to detect than reciprocal and delayed non-monetary exchanges. Another reason is the strong enforcement mechanisms that are built into informal networks and efficiently prevent opportunistic behaviors and whistle-blowing (Kingston, 2007). Moreover, the members of informal networks are often bonded by strong "esprit de corps", which complicates any legal investigations against them (e.g., Lambsdorff, 2002; McMillan & Zoido, 2004). Market corruption lacks such mechanisms.

2.2. Related concepts

Network corruption is related to several concepts studied in social sciences. Perhaps, the closest concept is 'blat', which is the use of personal networks and informal contacts to obtain goods and services in short supply (Ledeneva, 1998). Blat was widespread in socialist countries in Soviet times and may be viewed as a predecessor of network corruption in modern post-

socialist societies.[9] Another close concept is 'favoritism' which, basically, is giving unjustified preferences to certain individuals, either to relatives ('nepotism' or 'familism', see Banfield, 1958; Lipset & Lenz, 2000; Wraith & Simpkins, 1964) or to friends or acquaintances ('cronyism', e.g., see Hutchcroft, 1991; Kang, 2002; Khatri et al., 2006).

Another concept related to network corruption and favoritism is 'clientelism' (or 'patronage'). In the most general terms, clientelism is the informal and mutually beneficial exchange of goods or services between people with unequal economic or social status ('patrons' and 'clients'). While patrons usually provide clients with protection and resources, clients provide to patrons support and information (Boussevain, 1966). Political clientelism, for instance, assumes the exchange of goods or services for political support between politicians and citizens (Hicken, 2012). Clientelism essentially assumes (network) corruption as patrons abuse their office to provide informal favors to their clients (see also Singer, 2009 on the relationship between clientelism and corruption).

There are also typologies of corruption (e.g., see Bussell, 2015 for a comprehensive review) that intersect with the division between market and network corruption highlighted in our paper, but none of them focus on the role of social connections in shaping corruption (see Table 1). One of the most influential divisions in the corruption literature centers on the organization of corruption among bureaucrats: in the *decentralized* case a firm should pay different bribes to different bureaucrats for different services, while in the *centralized* case bureaucrats coordinate their rent-seeking behavior, and this diminishes the costs and uncertainty brought about by corruption (e.g., Blackburn & Forgues-Puccio, 2009; Rock & Bonnet, 2004; Shleifer & Vishny, 1993). This division is, however, silent on the issue of relatedness between bureaucrats and private agents, therefore both market and network corruption may be both centralized and decentralized.

Other divisions distinguish different corrupt practices depending on the use of money (monetary vs. non-monetary corruption), the level of operation (grand vs. petty corruption), the branch of government affected (political corruption vs. bureaucratic), the strength of bargaining power of the bureaucrat (extortive vs. collusive corruption, e.g., Hindriks, Keen & Muthoo, 1999; active vs. passive corruption, see Capasso & Santoro, 2018), or the degree of justification of corrupt practices ('white', 'gray', and 'black' corruption, see Heidenheimer, 2002). Here, one can see more intersections with the market-network divide. As market corruption relies on cash transfers, is not protected by informal enforcement, and assumes 'open access' to corrupt

[9] Chinese 'guanxi' may be considered as an analogue of blat as it also relies on personal connections and helps to cope with the shortage. Guanxi, however, seems to be more culturally ingrained and morally justified than blat (Chen et al., 2013; Ledeneva, 2008). In Arab World, a concept similar to guanxi is 'wasta' (Hutchings & Weir, 2006).

services, this type of corruption may be only monetary and is rarely grand and political. Network corruption may be both monetary and non-monetary, grand and petty, political and bureaucratic. [10] While market corruption may be both extortive and collusive, network corruption, by definition, can be only collusive. [11] As network corruption often assumes nepotism, this type of corruption should have a lighter shade than market corruption, as it is more justifiable to help relatives or good friends than take bribes from unknown people.

2.3. Research hypotheses

The theory states that network corruption differs from market corruption in many respects. We analyze to what extent these differences exist in practice and what practical implications they have. If they are different, then reducing all corruption to market corruption means seriously misunderstanding corruption, especially in countries with high network corruption. Below we formulate more concrete hypotheses to be tested in the empirical section.

Persistence of corruption

As the expectation that network corruption is more persistent than market corruption is too general to be tested empirically, we unpack it into more concrete hypotheses. We distinguish three hypotheses that refer to different dimensions of persistence. The first one touches *time persistence*:

Hypothesis 1.1: network corruption is more stable over time than market corruption.

The second dimension of persistence concerns the sensitivity of corruption to the socio-economic development and changes in formal institutional settings: the less corruption is sensitive to these things, the more persistent it is. In general, one of the stylized facts about corruption is that it is lower in countries with higher levels of socio-economic development and better quality of formal institutions (e.g., Paldam, 2002; Treisman, 2000). In our case, we differentiate between market and network corruption and expect that:

[10] Strong political corruption may take a form of 'state capture', when the whole decision-making process in the state is influenced by private agents or groups. Therefore, network corruption is much more related to state capture than market corruption.

[11] A related distinction but with a slightly different focus is between 'helping hand' and 'grabbing hand' corruption (e.g., see Chen, 2004; Chen, Hillman & Gu., 2002). In both cases bureaucrats take bribes, but in the former case they are still interested in private sector development (e.g., because it means larger tax base), while in the latter case they are not. While market corruption may have both grabbing and helping character, network corruption cannot be grabbing due to the same reasons as it cannot be extortive.

Hypothesis 1.2: network corruption is less related to the level of economic development and institutional quality than market corruption.[12]

Finally, the third dimension of corruption persistence concerns the linkage between corruption and historical factors. Many authors argue that corruption has deep historical roots (e.g., Becker et al., 2016; Uslaner, 2017). In post-socialist countries, these roots may go back to the socialist period or even much further to the Ottoman rule (see Dimitrova-Grazl, 2007; Beck & Leaven, 2006; Obydenkova & Libman, 2014; Uberti, 2018). Following these studies, we assume that both market corruption and network corruption have historical roots but expect that network corruption is more 'path-dependent' and has deeper roots than market corruption. More concretely, as our sample consists mostly of post-socialist countries, we expect that network corruption should be more related to the historical legacies of the socialist period and/or Ottoman rule than market corruption:

Hypothesis 1.3: network corruption is more related to the historical legacies of the socialist period and/or Ottoman Empire than market corruption.

Corruption and political instability

As noted by Scott "the different patterns of access to influence created by each type of corruption may have quite divergent political consequences" (Scott, 1969: p.331). Scott, however, did not unpacked this expectation into more concrete and empirically testable hypotheses; we do this below.

Overall, we expect that market corruption should be more associated with political instability than network corruption. Market corruption may undermine the functioning of the state as everyone who pays bribes can turn policies to their favor (Evans, 1989; Kang, 2002). In this case, the state may become either "the executive committee of the bourgeoisie", or an instrument to extract corruption rents from the population (Johnston, 2005). In this regard, network corruption should be less destructive, as it assumes that authorities and business form an informal coalition based on partnership, friendship, or family relationships. As a result, authorities are able to control the business, and the business, in its turn, is able to lobby for its

[12] The link between economic development and corruption may go in both directions, either from poorer economic development to higher corruption or from higher corruption to poorer economic development. On the one hand, more developed countries tend to have higher levels of literacy and education and can afford more effective formal institutions and better public administration, which suggests that corruption should decline with economic development. On the other hand, corruption itself is harmful for socio-economic development as it decreases investments and productivity (e.g., Mauro, 1995; Mo, 2001; Lambsdorff, 2003; Meon & Sekkat, 2005; Blackburn & Sarmah, 2008). In our paper, we have no specific theoretical expectations on how the direction of these links with economic development may differ between market corruption and network corruption. Our aim is just to compare the strength of these links.

interests. In some sense, officials and businessmen may act not as separate actors pursuing personal interests, but as a team implementing mutually beneficial policies. The emergence of strong corruption networks may lead to the centralization of corruption, which may be beneficial for economic development (e.g., Blackburn & Forgues-Puccio, 2009).

On the other hand, the linkage between corruption and political (in)stability may be the reverse and go from political (in)stability to corruption. As political instability shortens public officials' time horizons, they become more interested in extracting the maximum amount of rent in short term (Olson, 1993; Treisman, 2000), which means widespread market corruption. Long-term political stability, in contrast, is less compatible with the "predatory" behavior of elites and helps to form mutually beneficial relationships, which implies network corruption.

Therefore, in either case we can expect that:

Hypothesis 2: market corruption is more associated with political instability than network corruption.

'Greasing-the-wheels'

The general consensus in the literature is that corruption has a negative impact on economic development. However, things appear to be less unambiguous when one turns from the level of economy as a whole to the level of particular industries or regions and considers specific time periods. The literature of 1960s–1980s provided many instances when corruption served for the good by helping to avoid strict and excessive state regulation (e.g., Bailey 1966; Huntington, 1968; Leff, 1964; Lui, 1985; Nye, 1967; Scott, 1972). This created a solid basis for the empirical hypothesis that corruption may "grease the wheels" of the economy (Meon & Sekkat, 2005; Meon & Weil, 2010; Dreher & Gassebner, 2013).

In our paper, we expect strong differences between market and network corruption in their abilities to 'grease'. As market corruption provides more open access to public services than network corruption, we expect the former 'greases' better than the latter. Following existing studies (e.g., Aidis et al., 2012; Anokhin & Shulze, 2009; Estrin et al., 2011; Dreher & Gassebner, 2013) we take entrepreneurship as an outcome variable and formulate a more concrete hypothesis:

Hypothesis 3: market corruption is more beneficial for entrepreneurship than network corruption.

3. Data, variables, and measurement issues

General description of the data

We use data from LiTS conducted by EBRD in all transition countries in 2006, 2010, and 2016. We use data from the 2010 and 2016 rounds as they contain questions necessary to measure both bribery and network corruption. The 2010 round covers 17 countries of Central, Eastern and South-Eastern Europe (and Turkey) and 13 CIS countries. In addition, it includes 5 Western European countries: France, Germany, Great Britain, Italy, and Sweden. The 2016 round excludes France, Great Britain, and Sweden but adds Cyprus and Greece. All samples, for each country and for each year, are representative covering individuals over 18 years old. The total LiTS sample is almost 39,000 individuals in 2010 and about 51,000 in 2016.[13]

Measuring corruption

To construct our measure of network corruption we use individual answers to the following question: *Some people, because of their job, position in the community or contacts, are asked by others to help influence decisions in their favor. In general, how important is it in our country to have the support of such people to influence decisions in the following situations?*

a) To get a good job in the government sector;
b) To get a good job in the private sector;
c) To settle a dispute with a neighbor;
d) To obtain permits or official papers such as passports;
e) To get into the university.

For each situation one of the five following answers may be chosen: “not important at all" (1), "somewhat important" (2), "moderately important" (3), "very important" (4), and "essential" (5). Summing the scores presented in parentheses for all items gives a measure of the perceived importance of social connections in the country, which range from 5 to 25 among individuals. Our measure of network corruption in the country – the network corruption perception index (NCPI) – is the country’s average of these individual indices. (When constructing this and all other aggregated indices we use national sample weights provided in the LiTS data file.)

To measure the prevalence of bribery we use the following question: *In your opinion, how often do people like you have to make unofficial payments or gifts in these situations?*

a) Interacting with the road police
b) Requesting official documents from authorities
c) Going to courts for a civil matter
d) Receiving public education (primary or secondary)

[13] More details concerning the survey, complete questionnaires and all datasets are available at the official website http://www.ebrd.com/cs/Satellite?c=Content&cid=1395236498263&d=Mobile&pagename=EBRD%2FContent%2FContentLayout

e) Receiving public education (vocational)
f) Receiving medical treatment in the public health system
g) Requesting unemployment benefits
h) Requesting other social security benefits

For each of these situations one of the five following answers may be chosen: "never" (1), "seldom" (2), "sometimes" (3), "usually" (4), and "always" (5). Summing the scores presented in parentheses for all items gives a measure of individual perceptions of bribery in the country, which may range from 8 to 40 among individuals. Our key measure of the bribery in the country – the bribery perception index (BPI) – is the country's average of these individual indices.

Additionally, LiTS data allow the measurement of respondents' actual engagement in bribery using the following question: *Did you or any member of your household make an unofficial payment or gift when using these services over the past 12 months?* This question refers to all situations listed in the question on bribery perceptions above. The problem with this question, however, that answers related to each specific situation have a large number of missing values (mostly due to the fact that many people did not use a corresponding public service within the year). Therefore, simple summing all the answers implies the loss of many observations. To keep the maximum number of observations, we assume that a respondent was engaged in bribery if she or any member of her household gave a bribe in at least one situation, and we assume that a respondent was not engaged in bribery if she did not answer positively in any of the eight situations presented above and, at the same time, gave one negative answer at least in one situation.[14] The resulting individual bribery experience index is a dummy variable (1 is engaged; 0 is not engaged). The country-level measure of bribery experience is the average of all individual indices.[15]

Other country-level variables

[14] For example, if a respondent did not face 7 of 8 situations at all and answered that he did not give a bribe when she\he faced the 8th situation, we assume that such a respondent did not participate in bribery. One problem with this assumption is that we do not know how the respondent would act if he would face some of those 7 situations. However, the data show that about 95% of respondents who did not pay a bribe in one situation did no pay it in all other situations. Thus, a negative answer at least in one situation is a good predictor for negative answers in all other situations.

[15] Although the correct measurement of actual experience with bribery is not the central issue in our study, we recognize that respondents tend to underreport behaviors (or attitudes) that are socially condemned and/or illegal (as well as they tend to overreport behaviors that are socially desirable and may represent them in a favorable light). Such a 'socially desirable responding' is a consequence of people's basic psychological need to be approved or liked by others (e.g., Nederhof, 1985; Paulhus, 1984). It may complicate the measurement of the incidence of some behaviors or revealing true preferences of people via respondents' surveys. In real-life economics or politics, this wish to be liked by others may result in "expressive behaviors" that may create serious negative externalities (see Hillman, 2010). However, surveys often are the only source of information about the problem under study. In our case, there is no other way to know about people's actual experience with bribery if not asking them directly. At the same time, empirical micro-level literature on determinants of engagement in corruption shows that correlations of engagement in corrupt activities with many socio-demographic characteristics of respondents are qualitatively similar across different surveys. This consistency suggests that, at least in the case of bribery, these questions still help to reveal some "real" and valuable information.

The list of all country-level variables used in this paper, either in the main estimations or in the robustness checks, with a brief description and the sources is presented in Table A1 (in Appendix). Corresponding summary statistics are presented in Table A2 (in Appendix).

To check the validity of our corruption indices we estimate correlations between them and several established measures of corruption: the Corruption Perception Index (CPI) provided by Transparency International and the Control of Corruption Index (CCI) by World Bank. We also employ two aggregated measures of corruption calculated using the European Social Survey (ESS) conducted in 2004: the country's share of the respondents who offered a bribe and country's share of the respondents who were asked for a bribe. Finally, as a proxy for the degree of favoritism in public officials' decisions we employ the favoritism index provided by the World Economic Forum.

To test Hypothesis 1.2, we use the Human Development Index (HDI) from UNDP as a measure of national socio-economic development and institutional quality. Alternatively, we employ several more specific measures of economic development and institutional quality from the World Bank Development Indicators Project (WB DIP), such as GDP per capita, government effectiveness and regulatory quality indices.

To test Hypothesis 1.3, we measure the legacy of the socialist and Ottoman rule via the length of the period spent by the country under these rules. These estimates are taken from Uberti (2018). Following Dimitrova-Grazl (2007), Beck & Leaven (2006), and Uberti (2018), we assume that legacy effects should be stronger for countries that spent more time under these rules.

To test Hypothesis 2, we use the internal conflict index constructed by the Political Risk Services (PRS) Group as the main variable to measure national political instability. This index varies from 0 (the least stable system) to 12 (the most stable system) and has been used in many studies on political stability including those that link political instability with corruption (e.g., Farzanegan & Witthuhn, 2017).

To test Hypothesis 3, we use a measure of self-employment (as the percentage of total employment) taken from WB DIP. Alternatively, for a robustness check, we employ the percentage of people who were self-employed or independent farmers, which we calculated for each country using LiTS data.

4. Empirical results

4.1. Descriptive analysis

BPI, NCPI, and established measures of corruption

Using the methodology described above, we calculated the bribery perception index (BPI) and network corruption perception index (NCPI) for all 37 countries covered by LiTS in 2010 and 2016. These indices together with their standard error are presented in Table 2.

To validate our indices, we estimated correlations between them and a few well-established measures of corruption. We found that both NCPI and BPI are significantly correlated with CPI and CCI, but NCPI's correlation is slightly weaker than that of BPI (see first two rows of Table 3). Two other external measures of corruption – the percentage of people who offered a bribe and the percentage of those who was asked for a bribe from ESS – are much more strongly correlated with BPI than with NCPI.[16] We obtain similar results when we estimate the correlation of our indices with the percentage of respondents who offered a bribe, calculated using the LiTS sample. NCPI, but not BPI, strongly correlates with the percentage of LiTS respondents who think that having political connections is an important factor for success in the country. Also, NCPI is more strongly correlated than BPI with the WEF favoritism index.

These results show that both BPI and NPCI are strongly correlated with the well-established measures of corruption and these correlations are in the right direction. However, the pattern of these correlations differs. While BPI is more strongly correlated with popular composite measures of corruption and measures of actual bribery, NCPI is more strongly correlated with perceptions of the importance of political connections and favoritism. This last fact is especially interesting because NCPI, by construction, reflects *petty* network corruption, while the WEF favoritism index measures favoritism of public officials in policies and contracts decisions, i.e., it is related to *grand* network corruption. This suggests that NCPI to some extent captures cross-country differences in *grand* network corruption as well, which is important for the analysis of the link between network corruption and political (in)stability.

Corruption rankings

In 2010, Azerbaijan had the highest BPI – 30 points – followed by the Kyrgyz Republic with about 23 points. In all other countries BPI was less than 20 points. Among other countries

[16] The low significance of correlation between BPI and ESS-based measures may be explained by the small number of observations (only 9 in 2015).

with relatively high BPIs were Moldova, Tajikistan, Albania, Armenia, and Ukraine. All western European countries were located at the lower end of this ranking, together with Estonia, Latvia, and Georgia. The highest levels of NCPI were observed in the Balkan states: Bulgaria, Macedonia, Serbia, Bosnia & Herzegovina, and Croatia. At the lower end of the NCPI ranking were Sweden, Great Britain, Estonia, Georgia, and Germany. Two other West European countries, France and Italy, had a higher rank and were located closer to the middle. Thus, the advantage of West European countries over the post-socialist ones in terms of corruption becomes less evident if one considers network corruption instead of bribery. This indicates that network corruption is less correlated with socio-economic development than bribery or market corruption, which is line with Hypothesis 1.1 and will be examined in the next section in more details.

Overall in 2010, the national rankings by BPI and NCPI were very different. The correlation between BPI and NCPI was positive (0.22) but statistically insignificant (though this correlation rises to 0.37 and becomes significant if Azerbaijan is excluded from the sample). Fig.2 places all countries on the network corruption-bribery axes where the median level of NCPI and BPI is taken as the zero point. Although countries with relatively low BPIs tend to have relatively low NCPIs, this is not the case when we consider high-BPI and high-NCPI countries. Among top-10 countries for levels of bribery perceptions there are only 3 countries from top-10 for network corruption perceptions. This suggests that network corruption serves not as a complement but rather as a substitute for bribery. As Fig.2 shows, countries with high network corruption belong to middle-corruption countries in terms of bribery, and vice versa. Thus, neglecting network corruption leads to an underestimation of the overall scale of corruption, especially in countries with moderate levels of bribery.

In 2016, both rankings looked slightly different to 2010. The BPI ranking changed much more: the coefficient of persistence in the regression of BPI in 2016 on BPI in 2010 was only about 0.46, while this coefficient in the same regression for NCPI was 0.70. This result supports our theoretical expectation that network corruption is more persistent over time than bribery (Hypothesis 1.1).

In 2016 and in 2010, the countries located in the Balkans had the highest network corruption. This does not seem to be a coincidence: in their distant past these countries were at the periphery of the Ottoman Empire and thus the level of parochial clientelism in these countries should be especially high as the central state had a weak influence on these territories (Mendelsky, 2007). Strong network corruption might have survived in these countries due to its embeddedness in social networks and the structures that evolve very slowly and tend to

reproduce themselves. (This linkage will be examined using regression analysis in the next section).

Another remarkable fact is that in 2016 country rankings by BPI and NCPI were more similar than in 2010: the correlation between BPI and NCPI in 2016 was 0.39 compared to 0.22 in 2010. In other words, NCPI could explain about 15% of the cross-country variation in BPI in 2016, compared with only 5% in 2010. This suggests that from 2010 to 2016 bribery became more linked to the use of social connections. (This is in line with another our findings that NCPI is more correlated with actual bribery in 2016 than in 2010, which is reflected in Table 3.) However, most cross-country variation in network corruption still remains unrelated to the variation in bribery.

Absolute changes

Table 4 shows that the magnitude of changes in BPI was much larger than in NCPI (in absolute terms). For instance, the average percentage point change in BPI was more than -10% compared to less than +1% in NCPI. Therefore, absolute changes in BPI and NCPI, like changes in corruption rankings discussed above, support the expectation that market corruption is more volatile than network corruption.

The analysis of the direction of changes in BPI and NCPI gives even more interesting results (see Fig. 3). As mentioned by EBRD (2016), most post-socialist countries experienced a decline in bribery perceptions and in bribery experience from 2010 to 2015. Our estimations confirm that BPI has declined in 24 countries (out of 32 countries included in both rounds of LiTS), remained almost unchanged in 5 countries (Bulgaria, Macedonia, Estonia, Poland, and Romania) and increased in 3 other countries (Armenia, Moldova, and Serbia). The most substantial decline occurred in Azerbaijan and Kyrgyz Republic but in two other high-bribery countries – Moldova and Armenia – bribery perceptions have significantly increased.

The dynamics of network corruption, however, were not so encouraging. Our estimations show that NCPI declined in only 10 countries, while in 10 countries it remained almost unchanged and it rose in 12 countries (note that in 10 of these 12 countries BPI declined). Clearly, these results do not allow us to say that corruption declined in the region. Rather, it seems that the structure of corruption in post-socialist countries shifted towards the network type. This is especially true for Georgia, Kyrgyz Republic, and Tajikistan where the large reduction of BPI (by 10%, 28% and 18%, respectively) was associated with a substantial

increase in NCPI (by 20%, 10%, and 20%, respectively).[17] These divergent changes suggest that market corruption may transform to network corruption. The available data, unfortunately, do not allow us to examine this issue from a cross-country perspective in more details.[18]

4.2. Regression analysis

Contemporary socio-economic development and institutional characteristics

As our descriptive analysis shows, Western European countries exhibit lower levels of market and network corruption than post-socialist countries but their advantage in terms of market corruption is less evident than in terms of bribery. Below we examine the relationships between BPI, NCPI, and contemporary national socio-economic development in more details.

Table 5 shows the estimation results of the regressions of BPI (upper panel) and NPCI (lower panel) on the level of socio-economic development measured using HDI.[19] We find a significant and negative association between both types of corruption and HDI both in 2010 and 2016. The correlation of HDI with bribery is, however, much stronger than that with network corruption. For instance, in 2010 R-square in the regression with BPI was 0.4 against only 0.12 for NCPI. We reach the same conclusion when we estimate a pooled regression: R-square in regression with BPI is about 0.41 against only 0.16 in regression with NCPI. We also estimated a 'random effects' model which allows us to take into account unobserved national heterogeneity. This model confirms that bribery is much more related to socio-economic development than network corruption.[20] As socio-economic development is closely linked to institutional quality, we receive qualitatively the same results when we run regressions with various measures of government effectiveness and regulatory quality and with the degree of the country's

[17] Such a high volatility in time of both BPI and NCPI may reflect changes in the composition of countries' samples. However, our auxiliary estimations show that the contribution of compositional changes was negligible: the difference between changes in average BPI and NCPI with and without adjustments for changes in socio-demographic structures of the countries' samples did not exceed 4% of the 2016 index levels.

[18] Russia may serve as a good illustration for mutual transformations of market and network corruption. Like many post-socialist countries, and especially CIS countries, Russia entered economic transition with informal networks of blat inherited from the long relatively stable Soviet period. During transition old social networks have been broken and, at the same time, government became less centralized and the value of money has increased. As a result, market corruption has flourished. Levin and Satarov (2000) provide various estimates of monetary costs induced by corruption in the form of impersonal bribery, kickbacks, and extortions. According to these authors, total corruption-related payments amounted to $10-20 billion in a year in 1990s. However, more recent studies point to a reverse shift from market to network corruption that occurred in the 2000s (e.g., Frye et al., 2009; Ledeneva & Shekshnia, 2011; Kravtsova, 2012; Levin & Satarov, 2015; Yakovlev, 2006). This is in line with LiTS data which show that in the period from 2010 to 2016 BPI in Russia has declined almost by 10% while NCPI has increased by 4%. To some extent, this shift was supported by artificially restricted political competition and low rotation of Russia's political elites.

[19] The results are qualitatively the same when we use GDP per capita instead of HDI.

[20] Our analysis is not aimed at establishing causal links and we allow both directions of influence: from economic development to corruption and from corruption to economic development.

democratization (results available upon request). All these findings are in line with Hypothesis 1.2.

Communist and Ottoman legacies

Table 6 shows the estimation results of regressions of BPI (upper panel) and NPCI (lower panel) on the duration of communism and Ottoman rule in the country. First of all, our results confirm the findings of previous studies: today's corruption in post-socialist countries is rooted in their communist past. All our regressions indicate that bribery and network corruption are higher in countries which spent more time under communism. The relationship between corruption and the Ottoman legacy is more nuanced. We do not find a significant correlation between bribery and the length of the period spent under the Ottoman rule but find strong positive correlation between the length of this period and network corruption. This suggests that the legacy of Ottoman rule in post-socialist countries consists in the network type of corruption rather than in the market type. Another interesting finding is that the influence of the Ottoman rule on NCPI appears to be stronger than the influence of communism, even in regressions that include both historical legacy variables simultaneously (standardized beta coefficient is 0.537 for the period spent under Ottoman and 0.322 for the period under communism). Overall, these results confirm Hypothesis 1.3 that network corruption is more path-dependent and has deeper historical roots than market corruption.

Political (in)stability

Table 7 shows the estimation results of the regressions of BPI and NCPI on political instability measured using the ICRG internal conflict index (the higher the index, the greater the political stability). All estimated specifications indicate that bribery is negatively associated with political stability.[21] Although network corruption is negatively associated with political stability as well, this association is weaker (for instance, in the regression using pooled data the standardized beta coefficient for BPI is -0.384 and only -0.253 for NCPI) and less robust. Moreover, NCPI becomes insignificant whenever we include BPI in the regression. These results are in line with Hypothesis 2.

Greasing the wheels

[21] Again, we should note that our analysis is not aimed at establishing causal links and we allow both directions of influence: from political (in)stability to corruption and from corruption to political (in)stability.

Table 8 shows the estimation results of the regressions of the rate of self-employment on BPI and NCPI. All estimated specifications show that self-employment is positively correlated with bribery but not correlated with network corruption. This supports Hypothesis 3 and confirms the theoretical expectations that bribery is able to 'grease the wheels' better than network corruption.

4.3. Robustness checks

To test the robustness of our findings we made several checks (all results are available upon request). First, we tried alternative measures of socio-economic development, political stability, and self-employment in our regressions. For socio-economic development we used GDP per capita (in logs); for the political stability – the political stability and absence of violence index from the World Bank (its correlation with the ICRG internal conflicts index is around 0.81); for self-employment – the percentage of self-employed calculated using LiTS national samples (the correlation with self-employment from WB DIP is 0.4, significant at 1%). All our results remained qualitatively the same. Additionally, we compared the impacts of BPI and NCPI on the size of the shadow economy (Hassan & Shenider, 2016) as a close substitute for self-employment in post-socialist countries. We found a strong positive correlation between the shadow economy and BPI, which is in line with results of Dreher & Schneider (2010) for low-income countries, but there was weak or no correlation with NCPI (see Table A3 in Appendix).

Secondly, when testing Hypotheses 2 and 3 we included in our regressions GDP per capita (in logs) as the integrative control variable of national socio-economic development and institutional quality. Our main findings remained qualitatively the same, which indicates that the stronger association of BPI with political instability and self-employment is not a byproduct of some omitted variable. Our results did not change when we controlled for EU/non-EU membership.

Thirdly, we checked the extent to which our findings are robust to outliers. We identified all observations with *dfbeta* greater than *2/sqrt(N)* (see Besley, Kuh & Welsch, 1980) and re-estimated all regressions on a sample excluding these observations. This procedure did not affect our conclusions.

Fourthly, we re-estimated all regressions where either BPI or NCPI serve as dependent variables (presented in Tables 5 and 6) using WLS (countries where indices are estimated with less precision received less weight). All results remained unaffected.

Finally, as mentioned above, we adjusted our aggregated bribery and network corruption indices measured in 2016 for changes in the composition of national LiTS samples from 2010 to 2016, and this adjustment did not affect our results.

5. Summary and Discussion

The dominant economic approach towards corruption tends to reduce all corruption to bribery in the form of market-like impersonal transactions between bureaucrats and private actors. This approach ignores the fact that corruption usually relies on social connections. In this study we present both theoretical arguments and empirical evidence that ignoring this substantially limits and even biases the understanding of corruption.

We distinguish between market corruption – impersonal bribery – and network corruption conditional on social connections, and analyze them jointly using data from the 2010 and 2016 rounds of LiTS which cover all post-socialist countries. We show that bribery and network corruption are weakly correlated at the country level and have different qualities. The former is more persistent, less related to contemporary national socio-economic and institutional characteristics and more associated with communist and pre-communist legacies than bribery. Network corruption, unlike bribery, is not associated with political instability and the incidence of self-employment in the country.

These results suggest that distinguishing between market and network corruption is useful in many respects. First of all, it contributes to the understanding the reasons for the persistence of corruption. Currently, there are two major approaches to this issue in the economics literature. One approach considers corruption as 'frequency-dependent equilibria' where expected gain from corruption depends crucially on the perceived number of other people participating in corruption (e.g., Andvig & Moene, 1990; Bardhan, 1997; Corbacho et al., 2016; Mishra, 2005). Therefore, corruption is persistent because it is widespread. The other approach assumes that corruption persists as it works as a 'problem-solving' mechanism that compensates for the weakness of formal institutions (e.g., see Marquette & Peiffer, 2015).

Our study emphasizes another source of corruption persistence, namely its embeddedness in social networks and structures. As social networks tend to evolve slowly over time and reproduce themselves (e.g., see Kostiuchenko, 2012 and Steen & Ruus, 2002 for evidence on continuity of Soviet elites in post-socialist countries), social interactions that are embedded in these networks should persist as well. This mechanism is all the more important as market corruption tends to turn into network corruption over time: "Even in corruption that begins as a purely "market" phenomenon, the need for secrecy […] makes it highly likely that repeat

offenders will cultivate appropriate personal ties for their own protection, thus endowing market corruption with important network elements" (Granovetter, 2007, 167-168).

Our result that bribery is positively related to political instability, while network corruption is not, echoes the ambiguous view on the link between corruption and political (in)stability in the literature. Corruption should lead to more political stability as it may help to "buy-off" electoral support (Manzetti & Wilson, 2007), on the other hand, corruption should weaken political stability by undermining political trust (e.g., Anderson & Tverdova, 2003; Seligson, 2002) or by deepening political and economic inequalities (e.g., Neudorfer & Theuerkauf, 2014). The division into market and network corruption points to a possible source of this ambiguity: studies arguing that corruption supports political stability focus on political clientelism closely related to network corruption (e.g., Manzetti & Wilson, 2007), while studies considering bribery take the opposite view (e.g., Seligson, 2002).

Our finding that bribery is strongly and positively correlated with the incidence of self-employment is line with hypothesis that corruption may 'grease-the-wheels' (Dreher & Gassebner, 2013; Vial & Hanoteau, 2010). However, we do not find such an association in the case of network corruption, which suggests that it is the market type of corruption that is able to 'grease'. Therefore, if one acknowledges that market corruption is more vulnerable than network corruption and tends either to vanish or to evolve into network corruption, then one should give less weight to the 'grease- the-wheels' hypothesis in practice.

Another finding that clearly illustrates how focusing exclusively on bribery may be short-sighted is the decrease of bribery in the face of growing network corruption in post-socialist countries. Populist anti-corruption campaigns could celebrate victory, but in reality corruption just changed its face and became more 'networked', i.e., conditional on social connections and secret. This structural shift demands much more emphasis on such anti-corruption policies as removing conflicts of interest and the rotation of public officials (Abbink, 2004).

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Table 1. Market-network corruption distinction vs. other typologies of corruption.

		Market corruption	**Network corruption**
Degree of coordination between bureaucrats	Decentralized	YES	YES
	Centralized	YES	YES
Use of money	Monetary	YES	YES
	Non-monetary	NO	YES
Level of operation	Grand	NO	YES
	Petty	YES	YES
Branch of government (legislative or executive)	Political	NO	YES
	Bureaucratic	YES	YES
Strength of bargaining power of bureaucrat	Extortive	YES	NO
	Collusive	YES	YES
Degree of justification	White	NO	YES
	Grey	YES/NO	YES
	Black	YES	YES/NO

Table 2. Bribery perception index (BPI) and network corruption perception index (NCPI) with their standard errors across countries covered by LiTS in 2010 and 2015-2016 (sorted by NCPI in 2010).

		2010				2015			
N	**Country**	**BPI**	**se**	**NCPI**	**se**	**BPI**	**se**	**NCPI**	**se**
1	Bulgaria	12.1	0.21	18.1	0.15	12.5	0.23	17	0.18
2	Macedonia	12.2	0.2	16.6	0.13	12.5	0.23	15.8	0.15
3	Serbia	12.3	0.17	16.6	0.13	13.4	0.24	16.6	0.13
4	B&Herzeg.	13.9	0.21	16.4	0.14	13	0.19	15.1	0.12
5	Croatia	12.2	0.19	16.1	0.15	11.5	0.16	14.9	0.11
6	Hungary	13.7	0.25	15.7	0.17	11.9	0.18	13.9	0.15
7	Armenia	17.1	0.28	15.3	0.14	22.7	0.38	16.3	0.19
8	Turkey	15.7	0.29	15	0.15	14.9	0.31	16.7	0.16
9	Albania	17.3	0.28	14.9	0.11	13.5	0.23	14.3	0.13
10	Mongolia	14.5	0.32	14.8	0.16	12.4	0.18	13.2	0.14
11	Slovak Rep.	16	0.25	14.8	0.14	11.2	0.2	15.1	0.2
12	Montenegro	13.2	0.2	14.4	0.16	11.8	0.22	14.8	0.17
13	Kazakhstan	13.6	0.27	14.3	0.17	11.9	0.19	14.3	0.15
14	Ukraine	16.7	0.22	14.3	0.12	15	0.25	14.6	0.19
15	Kosovo	12.3	0.21	14.2	0.14	9.6	0.12	14.7	0.16
16	Uzbekistan	13.6	0.24	14.2	0.15	9.9	0.15	12.5	0.2
17	Russia	12.6	0.16	14	0.13	12.1	0.22	14.7	0.21
18	Tajikistan	17.4	0.33	14	0.16	14.3	0.27	16.8	0.17
19	France	9.8	0.11	13.6	0.14	n/a	n/a	n/a	n/a
20	Romania	15.2	0.19	13.6	0.16	14.8	0.28	13.2	0.17
21	Slovenia	11.4	0.16	13.5	0.12	10.9	0.2	14	0.14
22	Czech Rep.	13.9	0.2	13.4	0.14	10.4	0.14	13.6	0.15
23	Kyrgyz Rep.	22.8	0.38	13.4	0.15	16.5	0.22	14.9	0.14
24	Lithuania	11.5	0.16	13.3	0.12	10	0.13	14.1	0.14
25	Moldova	18.2	0.29	13.2	0.15	22.9	0.37	13.1	0.17
26	Azerbaijan	29.8	0.35	13.1	0.15	13.7	0.26	13.7	0.16
27	Italy	10.4	0.16	13	0.14	10	0.13	11.7	0.14
28	Belarus	13	0.22	12.9	0.15	11.9	0.14	14.3	0.15
29	Latvia	10.1	0.13	12.8	0.12	9.4	0.08	13.7	0.13
30	Poland	10.8	0.13	12.8	0.11	10.7	0.34	11.6	0.22
31	Germany	9.5	0.11	11.9	0.14	8.9	0.16	12	0.2
32	Georgia	10.7	0.19	11.5	0.14	9.6	0.13	13.8	0.18
33	Estonia	9	0.09	11.2	0.13	8.9	0.09	11.2	0.13
34	Great Britain	8.8	0.07	11.1	0.13	n/a	n/a	n/a	n/a
35	Sweden	8.2	0.05	9.8	0.13	n/a	n/a	n/a	n/a
36	Cyprus	n/a	n/a	n/a	n/a	9.1	0.1	13.8	0.14
37	Greece	n/a	n/a	n/a	n/a	11.2	0.14	13.5	0.12

Table 3. Correlations of bribery perception index (BPI) and network corruption perception index (NCPI) with other measures of corruption.

	2010		2015	
	BPI	**NCPI**	**BPI**	**NCPI**
CPI (Transparency International)	-0.60**	-0.52**	-0.49**	-0.43**
CCI (World Bank)	-0.66**	-0.46**	-0.55**	-0.43**
Percentage of people who offered a bribe (EVS, 2004)	0.66**	0.30	0.47	0.21
Percentage of people who was asked for a bribe (EVS, 2004)	0.66**	0.30	0.51	0.18
Percentage of people who offered a bribe (LiTS)	0.84**	0.08	0.65**	0.35**
Success factor: political connections (LiTS)	-0.12	0.68**	-0.07	0.40**
Favoritism index (World Economic Forum)	-0.33*	-0.64**	-0.28	-0.32*

Note: ** - significant at 5% level; * - significant at 10% level.

Table 4. Absolute and relative changes in bribery perception index (BPI) and network corruption perception index (NCPI) from 2010 to 2016 across 32 countries.

	BPI		NCPI	
	mean	st.dev	mean	st.dev
Simple change	-1.92	3.56	0.08	1.17
Absolute change	2.58	3.11	0.92	0.71
% change (% to 2010)	-11.30	15.55	0.88	8.42

Table 5. Bribery perception index (BPI), network corruption perception index (NCPI), and socio-economic development.

DV: BPI	**2010**	**2016**	**Pooled (CRSE)**	**RE**
HDI	-33.058***	-29.793***	-31.743***	-31.953***
	(6.297)	(8.387)	(6.046)	(5.448)
Year 2016			-0.792	-0.814
			(0.629)	(0.656)
N	33	32	65	65
R2	0.401	0.380	0.409	
DV: NCPI	**2010**	**2016**	**Pooled (CRSE)**	**RE**
HDI	-7.197***	-10.007***	-8.329***	-9.138***
	(3.182)	(3.454)	(2.719)	(3.007)
Year 2016			0.425	0.345
			(0.243)	(0.223)
N	33	32	65	65
R2	0.121	0.212	0.163	0.163

Note: ***-significant at 1% level; ** - significant at 5% level; * - significant at 10% level. Heteroscedasticity-robust standard errors (Huber-White-Sandwich) in parentheses. CRSE – cluster robust standard errors.

Table 6. Bribery perception index (BPI), network corruption perception index (NCPI), and historical legacies.

DV: BPI	**2010**			**2016**			**Pooled (CRSE)**			**RE**		
Communism	0.082***		0.082***	0.042*		0.053***	0.063***		0.067***	0.066***		0.070***
	(0.029)		(0.028)	(0.023)		(0.021)	(0.023)		(0.021)	(0.022)		(0.022)
Ottoman		0.001	0.001		0.002	0.004*		0.001	0.003		0.002	0.003
		(0.003)	(0.003)		(0.002)	(0.002)		(0.002)	(0.002)		(0.003)	(0.002)
Year 2016							-1.354**	-1.314**	-1.434**	-1.459**	-1.464**	-1.505**
							(0.599)	(0.610)	(0.579)	(0.613)	(0.611)	(0.612)
N	35	35	35	34	34	34	69	69	69	69	69	69
R2	0.197	0.002	0.200	0.077	0.017	0.129	0.163	0.035	0.183	0.163	0.035	0.183
DV: NCPI	**2010**			**2016**			**Pooled (CRSE)**			**RE**		
Communism	0.021*		0.022**	0.012		0.023**	0.017		0.023***	0.021**		0.026***
	(0.013)		(0.011)	(0.013)		(0.009)	(0.011)		(0.008)	(0.010)		(0.009)
Ottoman		0.004***	0.004***		0.003**	0.003***		0.004***	0.004***		0.004***	0.004***
		(0.001)	(0.001)		(0.001)	(0.001)		(0.001)	(0.001)		(0.001)	(0.001)
Year 2016							0.252	0.168	0.126	0.128	0.107	0.095
							(0.227)	(0.245)	(0.223)	(0.205)	(0.201)	(0.201)
N	35	35	35	34	34	34	69	69	69	69	69	69
R2	0.079	0.303	0.388	0.032	0.171	0.277	0.063	0.241	0.342	0.063	0.241	0.342

Note: ***-significant at 1% level; ** - significant at 5% level; * - significant at 10% level. Heteroscedasticity-robust standard errors (Huber-White-Sandwich) in parentheses.
CRSE – cluster robust standard errors. *Communism* and *Ottoman* variables reflect the number of years spent by a country under communism and Ottoman rule, respectively.

Table 7. Bribery perception index (BPI), network corruption perception index (NCPI), and political instability.

	2010			2016		
BPI	-0.074***		-0.072***	-0.165***		-0.131**
	(0.026)		(0.024)	(0.063)		(0.058)
NCPI		-0.069	-0.020		-0.321**	-0.205
		(0.104)	(0.100)		(0.132)	(0.132)
N	27	27	27	26	26	26
R2	0.096	0.014	0.097	0.254	0.179	0.317
	Pooled (CRSE)			**RE**		
BPI	-0.109***		-0.096***	-0.058*		-0.046
	(0.029)		(0.023)	(0.035)		(0.035)
NCPI		-0.173*	-0.100		-0.166*	-0.136
		(0.103)	(0.093)		(0.096)	(0.097)
Year 2015	-0.676***	-0.536***	-0.642***	-0.665***	-0.593***	-0.643***
	(0.194)	(0.171)	(0.193)	(0.180)	(0.164)	(0.179)
N	53	53	53	53	53	53
R2	0.212	0.130	0.231	0.212	0.130	0.231

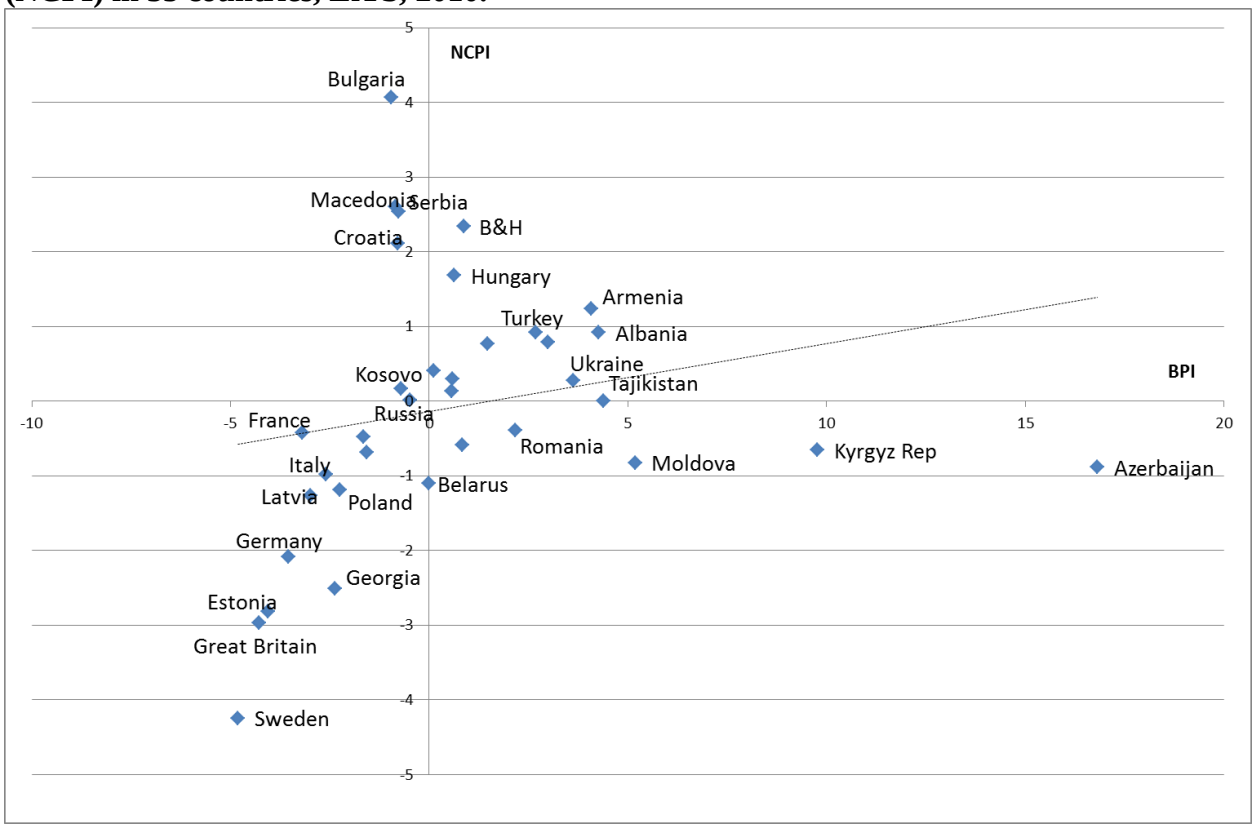
Note: ***-significant at 1% level; ** - significant at 5% level; * - significant at 10% level. Heteroscedasticity-robust standard errors (Huber-White-Sandwich) in parentheses. CRSE – cluster robust standard errors.

Table 8. Bribery perception index (BPI), network corruption perception index (NCPI), and self-employment.

	2010			2016		
BPI	2.569***		2.581***	2.011***		2.083***
	(0.368)		(0.335)	(0.574)		(0.713)
NCPI		1.275	-0.127		1.451	-0.392
		(1.643)	(1.287)		(1.424)	(1.463)
N	34	34	34	33	33	33
R2	0.410	0.017	0.410	0.165	0.018	0.166
	Pooled (CRSE)			**RE**		
BPI	2.365***		2.403***	0.012		0.020
	(0.399)		(0.377)	(0.171)		(0.168)
NCPI		1.348	-0.299		0.715	0.759
		(1.390)	(1.005)		(0.436)	(0.495)
Year 2015	2.375	-0.882	2.500	-1.812***	-1.895***	-1.855***
	(1.893)	(0.942)	(1.988)	(0.666)	(0.521)	(0.653)
N	67	67	67	67	67	67
R2	0.292	0.018	0.293	0.292	0.018	0.293

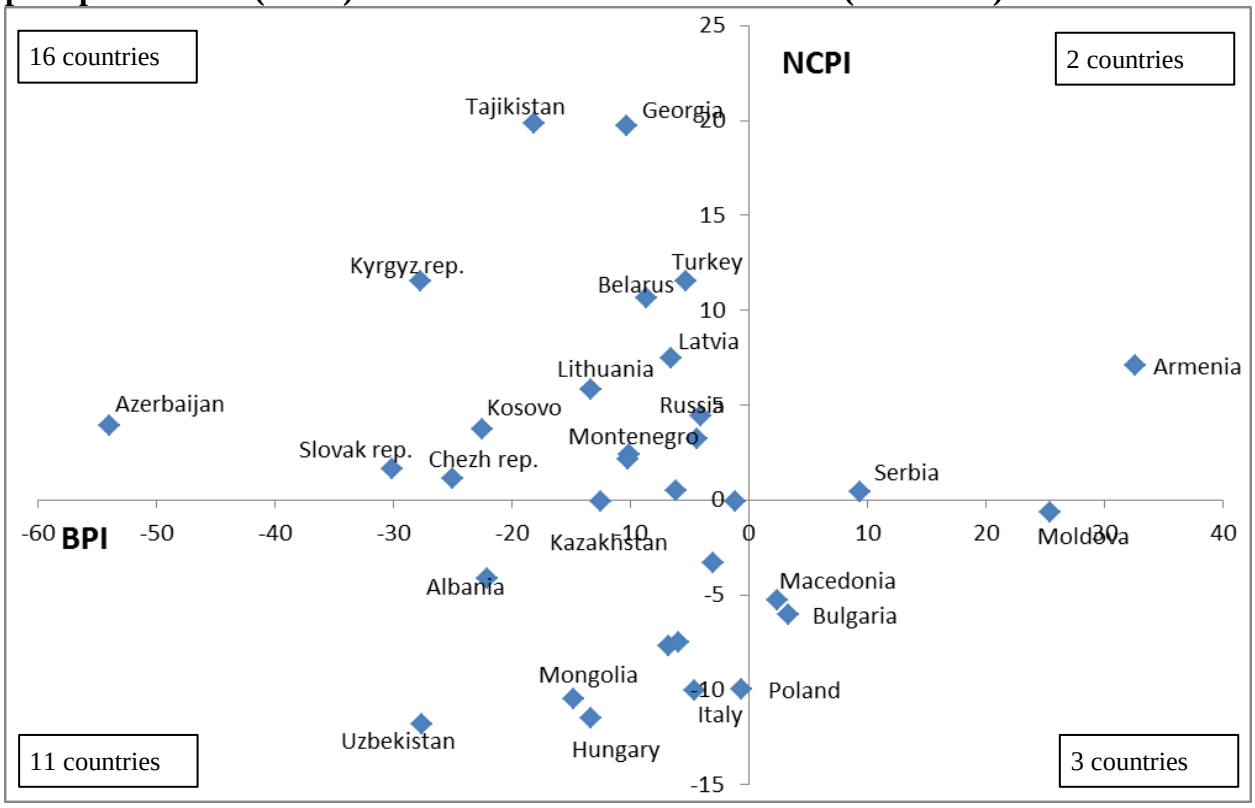
Note: ***-significant at 1% level; ** - significant at 5% level; * - significant at 10% level. Heteroscedasticity-robust standard errors (Huber-White-Sandwich) in parentheses CRSE – cluster robust standard errors.

Figure 2. Bribery perceptions index (BPI) vs. network corruption perceptions index (NCPI) in 35 countries, LiTS, 2010.



Note: the median level of NCPI and BPI is taken as the zero point.

Figure 3. Changes in the bribery perceptions index (BPI) and network corruption perceptions index (NCPI) across countries from 2010 to 2016 (% of 2010).



Appendix

Table A1. Country-level variables used in the paper.

Country characteristics	Measure	Brief description	Source
Corruption level	Corruption Perception Index	This is an aggregate indicator that draws on different assessments and business opinion surveys carried out by independent and reputable institutions in almost in each country around the world. The surveys and assessments used to compile the index include questions relating to bribery of public officials, kickbacks in public procurement, embezzlement of public funds, and questions that probe the strength and effectiveness of public sector anti-corruption efforts. This index ranks countries according to the perception of corruption in the public sector. It scores countries on a scale from 0 (highly corrupt) to 10 (very clean).	Transparency International
	Control of Corruption Index	This index measures one of the six broad dimensions of governance (the other five dimensions are Rule of Law, Voice and Accountability, Political Stability/Absence of Violence, Government Effectiveness, and Regulatory Quality) covered by the World Bank's Worldwide Governance Indicators Project. The index combines up to 21 different assessments and surveys, depending on availability, each of which receives a different weight, depending on its estimated precision and country coverage. CCI changes from -2.5 (highly corrupt) to 2.5 (very clean).	World Bank Development Indicators Project
	% offered a bribe	The country's share of the respondents who offered a bribe	ESS, 2004, authors calculations
	% were asked for a bribe	country's share of the respondents who was asked for a bribe	ESS, 2004, authors calculations
Socio-economic development	Human Development Index (HDI)	HDI combines GDP per capita, literacy, and life expectancy.	United Nations Development Program
	GDP per capita corrected by PPP	Gross Domestic Product in US dollars adjusted by cross-country differences in purchasing power	World Bank Development Indicators Project
Institutional quality	Government Effectiveness Index	This index measures the quality of public services, effectiveness of governmental policy and its implementation and the degree of government independence from the pressure of interest groups.	World Bank's Worldwide Governance Indicators project
	Regulatory Quality Index	This index is an indicator of the quality of public sector regulation.	

Table A1. (continued).

Country characteristics	Measure	Brief description	Source
Degree of democratization	Polity IV index	This index is linked to the difference between democratic and autocratic features of country's political regime. It takes 21 different values ranging from -10 (pure autocracy) to 10 (perfect democracy).	Marshall et al., 2011 See also Polity IV project
Communist legacy	Years spent under Communism	The number of years spent by the country under Communism	Uberti (2018)
Ottoman legacy	Years spent under the Ottoman rule	The number of years spent by the country under the Ottoman Rule	Uberti (2018)
Political (in)stability	Internal conflict index	The index is the sum of the three sub-components: civil war/coup threat; terrorism/political violence; and civil disorder. It varies from 0 (the least stable system) to 12 (the most stable system).	PRS Group
	Political Stability and Absence Violence Index	This index measures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism.	World Bank's Worldwide Governance Indicators project
Self-employment	Self-employed, % of total employment		World Bank Development Indicators Project
	People who worked as self-employed or as independent farmers (% of all people classified as employed)		Authors' calculations using, LiTS data
Size of shadow economy	% of GDP account for informal economy		Hassan & Shneider (2016)
Favoritism	WEF Favoritism index	To what extent do government officials in your country show favoritism to well-connected firms and individuals when deciding upon policies and contracts? [1 = always, 7=never]	Executive Opinion Survey, Global competitiveness report by World Economic forum

Table A2. Summary statistics of all variables used in our paper.

Our measures of corruption	**N**	**Mean**	**St.dev**	**Min**	**Max**
Bribery perception index (points), LiTS	69	13.08	3.79	8.24	29.84
Network corruption perception index (points), LiTS	69	14.08	1.60	9.79	18.10
Bribery experience index, LiTS (% of respondents participated in bribery)	69	20.34	15.66	0.73	75.74
Other measures of corruption	**N**	**Mean**	**St.dev**	**Min**	**Max**
Corruption Perceptions Index, TI (0 is highly corrupt; 10 is very clean)	67	24.15	22.42	1.60	81.00
Control of Corruption Index, WB (-2.5 is highly corrupt; 2.5 is very clean)	69	-0.08	0.82	-1.30	2.27
Share who offered a bribe (%), EVS	11	4.22	5.03	0.60	16.93
Share who was asked for a bribe (%), EVS	11	9.37	9.12	1.44	32.62
Favoritism index, WEF (1=widespread favoritism; 7 =no favoritism)	63	2.96	0.66	1.86	5.01
Other country-level characteristics	**N**	**Mean**	**St.dev**	**Min**	**Max**
Human Development Index (0-low, 1-high)	65	0.79	0.08	0.62	0.93
GDP per cap ($ PPP)	69	18444	10483	2106	43938
Government effectiveness (-2.5-low, 2.5-high)	69	0.18	0.73	-1.09	1.96
Regulatory quality (-2.5-low, 2.5-high)	69	0.31	0.76	-1.69	1.84
Political regime (-10-autocracy, 10 -democracy)	67	6.27	5.66	-9.00	10.00
Political instability and absence of violence index (-2.5- high, 2.5-low)	69	0.04	0.70	-1.93	1.26
ICRG internal conflict index	53	9.79	1.12	6.92	11.50
Share of self-employed, WB (%)	67	26.88	16.51	3.10	68.10
Share of self-employed, LiTS (%)	69	6.32	6.01	0.82	37.07
Shadow economy (% of GDP)	65	36.10	13.50	14.86	70.66
Communism duration (years)	69	45.01	22.04	0.00	74.00
Ottoman rule duration (years)	69	172.77	216.24	0.00	573.00

Table A3. Bribery perception index (BPI), network corruption perception index (NCPI), and the size of shadow economy.

	2010			**2016**		
BPI	1.590**		1.585**	2.139***		1.948***
	(0.624)		(0.648)	(0.461)		(0.459)
NCPI		0.917	0.055		2.756**	1.090
		(1.264)	(1.137)		(1.351)	(1.251)
N	33	33	33	32	32	32
R2	0.233	0.013	0.233	0.296	0.101	0.309
	Pooled (CRSE)			**RE**		
BPI	1.788***		1.726***	0.178		0.126
	(0.491)		(0.486)	(0.294)		(0.291)
NCPI		1.663	0.507		-0.084	0.131
		(1.075)	(0.854)		(0.784)	(0.819)
Year 2015	0.936	-1.656	0.700	-2.674**	-3.002***	-2.793**
	(1.704)	(1.373)	(1.486)	(1.251)	(1.062)	(1.233)
N	65	65	65	65	65	65
R2	0.257	0.042	0.260	0.257	0.042	0.260

Note: estimates for the size of shadow economy are taken from Hassan & Shneider, 2016; ***- significant at 1% level; ** - significant at 5% level; * - significant at 10% level. Heteroscedasticity-robust standard errors (Huber-White-Sandwich) in parentheses CRSE – cluster robust standard errors.

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