Trust and corruption: The influence of positive and negative social capital on the economic development in the European Union

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Abstract   Why are the Scandinavian countries in the European Union significantly richer than Southern/Eastern European countries? We try to answer this question from an empirical social capital perspective. In particular, we are interested in the interplay of social trust as a positive and corruption as a negative manifestation of social capital. The opportunities to provide answers by multivariate modelling are, however, limited by several problems related to small sample size and low degrees of freedom. Regarding these problems, we test the inter-relating influences between positive and negative social capital by applying a path model that accounts for Granger-like causal effects. Our empirical results, referring to a sample of up to 25 EU countries, show that corruption might harm poor European countries but is not able to affect social trust. However, corruption in itself means that resources end up in the wrong places and not in socioeconomically optimal investments. There is, therefore, a direct damaging effect of corruption on wealth. This implies that economic actors have to invest higher transaction and control costs which will bind resources to non-productive purposes and thus destroy economic wealth. Most remarkable is that the augmentation of positive social capital could work as an effective counterforce to corruption, even if it does not compensate for the economic loss caused by corruption. Thus, adding the social capital perspective may contribute to understanding present day variation in the wealth of European nations by the damaging effect of corrupt activities and/or the positive force of social trust.

Keywords   Social capital · Corruption · Trust · Path model · Granger causality

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1 Introduction

As a political and economic alliance, the EU consists of 27 member states which contribute to a single European market that is regulated by a standardized legal system. Protected and guided by a framework of legal, political and economic regulatory agencies, significant differences exist between the affluence of member states. One puzzling observation is that Northern Europe—and especially Scandinavia—is significantly richer than Southern or Eastern Europe. In 2004 and 2005, East European countries produced a Gross Domestic Product (according to World Bank Data) which was only a third of the GDP in Scandinavian countries. Measured as per capita value in US dollars (Purchase Power Parity), Romania produced on the average around $9049, Bulgaria $9342 and Poland $13,587 while Finland revealed an averaged GDP of $30,264, Sweden $32,615 and Denmark $32,760. The GDP per capita in Southern European countries such as Greece ($24,397), Spain ($26,665) or Italy ($27,777) was at least 10% lower than in the Scandinavian EU countries.

Classical explanations about the wealth of nations have addressed differences in terms of technology, natural resources such as land, physical and human capital (Jorgenson 1991). What factors additionally account for the wealth of nations? As argued from social capital theorists, there might be positive and negative social forces within each society that can promote or harm the affluence of a country (Ostrom and Ahn 2009). Take corruption as an example of negative social capital and trust as an example of its positive form. In the way corruption is measured on the macro level, it reflects the quality of governmental institutions (Rothstein and Eek 2009), the way political and economic actors treat each other and it also reflects the degree to which actors favour particularistic norms and aims at the expense of universalistic ones (Neumann and Graeff 2010). The detrimental effect of this form of negative social capital on the wealth of a nation is extensively elaborated and established in the literature (Uslaner 2009; Graeff 2009; Doig and Theobald 2000).

A less well-established factor that may have an effect on wealth is social trust. Here we find a key concept of positive social capital for an informal institution that may unite social cohesion and economic growth. American sociologist Coleman (1988) broadly defined social capital as people's ability to cooperate in common goals in groups and organizations. This ability again depends on the extent of shared norms and values in different communities and whether they are able to subordinate individual interests to larger groups' interests. A closer look at Colemans' (1990) notion of Social Capital reveals that the constituting element is the fact that actions of people are being facilitated: Social Capital is "[…] a variety of entities with two elements in common: they all consist of some aspect of social structure, and they facilitate certain actions of actors […] within the structure." Social trust is obviously a good predisposition to provide such facilitation to strangers in general. Corrupt actors—creating their own social structure by particularistic norms and obligations—facilitate the realization of their corrupt partners' aims as well and they do so at the expense of people not involved in these corrupt practices. Because social capital with positive consequences for others and the ability to cooperate are difficult to measure, the concept is therefore primarily operationalized as social trust (Paldam and Svendsen 2000). Facilitation (and social trust, accordingly) is implied by the expectation that given norms are respected by others. Social trust basically deviates from specific trust in that it is expanded to include people about whom the trusting part has no direct knowledge.

In that general vein, trust in most (but not all) people under most (but not all) circumstances simply means that we trust most strangers. This way of looking at others leads to positive interactions and is, therefore, *bridging* social capital (Putnam 2000). As such, the difference from corruption becomes instantly evident: corrupt actors only trust each other. This form

of trust refers to closed (club-like) networks which are aware of their negative consequences for others. They try to veil their illegal deeds and restrict access to their corrupt networks (Graeff 2005). In turn, corruption can be labelled as *bonding* social capital with negative social consequences. Norms that exist in corrupt networks aim at the particularistic gain of the members and conflict with universalistic norms and rules that are valid for all members in society. Norms of *general* cooperation are ruled out for corrupt actors as long as they act within their specific corrupt framework. Norms of cooperation are the central element of social trust, however (Uslaner 2002). These norms lead—on the economic level—to friction-less procedures that more transactions can take place without enforcement by a third party such as the government. Lower transaction and control costs will then contribute to a further increase in economic growth.

Coleman (1988) has claimed that social capital is a new production factor which should be added to the conventional concept of human and physical capital. He only referred to positive social capital such as trust. However, since trust and corruption are both facilitation of actions for others but with different externalities, we will expand these ideas by Coleman. Putnam (1993) has picked up Coleman's argument and argues that social capital may be an important key to understanding the vast differences between Northern and Southern Italy in wealth. We extend their ideas by testing the interplay of positive (trust) and negative (corruption) social capital. As a result, we will focus on trust as *positive* social capital, where group formation promotes economic growth as a new production factor, and on corruption as a form of negative social capital that reduces economic growth.

The paper is organized as follows: Sect. 2 discusses the relevant literature and develops a model for the causal relationship between corruption, social trust and economic wealth. Section 3 measures these relationships empirically with EU data. Section 4 discusses the findings and causality. Finally, Sect. 5 sums up the results and offers recommendations to political decision-makers regarding corruption and social trust in the future.

2 Social trust and corruption

2.1 Social trust

Positive social capital, in its broadest sense defined as people's ability to cooperate, is self-enforcing (as an informal institution) in contrast to forced cooperation which is enforced by a third party (formal institution). The idea that cultural characteristics in a society affect the economic development can be traced back to Weber (1930 [1906]), who demonstrated the importance of the Protestant ethic for the development of capitalism. In continuation, Putnam (1993, 2000) has suggested that positive social capital is created via voluntary organizations. When people voluntarily get together in groups, 'face-to-face' interaction generates specific trust. In a comparison of Northern and Southern Italy, Putnam (2000) concludes that the density of voluntary organizations is much higher in Northern Italy than in the South. This difference is caused by historical differences in the hierarchical structure of society and is supposed to explain why the economic capacity is so much higher in Northern than in Southern Italy. North and South parted ways already in the eleventh century, and the South was subjected to a hierarchic Norman Empire in 1100. This type of society reduces trust in leaders. Common people and leaders have no social relations and generate no social capital. The South therefore experiences the Hobbesian result of lawlessness, corruption, inefficient government and economic stagnation. The solution would be to reduce interference by the hierarchical state to avoid 'Southern deadlock' and make room for voluntary organizations.

In contrast, Bjørnskov (2005) and Uslaner (2002) argue that specific and social trust are not correlated. Both conclude that while Putnam (1993) assumes that specific trust generated in voluntary organizations will spread to the surrounding society as social trust, new studies have shown that this is far from the case. Rather, people who participate in voluntary associations are already carriers of high social trust and therefore most willing to participate in such organizations. Carriers of low social trust stay on the couch. Putnam's idea is therefore a misunderstanding and its popularity (especially among economists) is probably due to the fact that the link between voluntary associations and trust matches existing game theory concepts like reputation effect. Social norms can be based on religious values or justice, but they also comprise secular norms like professional standards and codes of conduct. These norms are created and carried on, presumably via cultural mechanisms (Uslaner 2004). The word 'culture' implies that the ethical rules by which people live are produced through repetition, tradition and examples (Svendsen and Svendsen 2003).

Regardless of how social trust is formed, the consequence is arguably that in the presence of social trust, fewer will commit crimes, free-ride and ignore the terms of a contract. In other words, an informal agreement arises where the only sanction is social exclusion. You keep your word. Good examples of the formation of social capital in Denmark are the co-op movement and the entrepreneurial culture in general. As a consequence, more transactions can take place at lower costs, and predictability and production in society will increase since it is no longer necessary to formally measure and enforce all transactions. The implication is that if members of a society have social trust in each other, greater economic growth is possible than in a similar society without social trust. Coleman (1988) therefore assumes that social capital is a new production factor that should be added to the conventional concept of human and physical capital.

As argued by Svendsen and Svendsen (2003), invisible capitals also play a role (termed 'Bourdieuconomics' by the authors). Most experts agree that human capital (education and vocational training) explains approximately half of a country's economic *level*, whereas physical capital explains approximately a fourth. Social trust may here turn out to be a new explanation (ibid.). This lack of economic theory may be due to a missing link such as social capital, here measured as social trust. We can therefore speak about institutional competitiveness based on informal rules whereby nothing is written down.

Whiteley (2000) is another example of applying the trust measures in a macroeconomic context. The measure is constructed as a combination of three trust variables from World Value Survey (WVS) (1990–1993) and is included along with several other explanatory variables (investments, educational level, etc.) in a regression of GNP per capita. Whiteley includes 34 countries (for 1970–1972) and finds that trust influences the wealth of nations.

2.2 Corruption

The concept of corruption is derived from the Latin *rumpere* and means 'to break', i.e. break a rule. Not everybody is equal under the law. Laws typically reflect norms and aims that are valid for everyone. In that sense, they are universalistic. Corrupt actors violate—deliberately—such universalistic rules by superseding them by particularistic ones which promote their own gains. Corruption can, therefore, be considered as deliberate non-compliance with the so-called 'arms length principle' (see Tanzi 1996). The problem arises if bureaucrats have discretionary powers to personally determine the outcome of a given case. Bureaucrats with a monopoly can choose to give or deny permission. Monopoly is the source of corruption and bribery which is easy to cover up (I scratch your back, and you scratch mine). As a

result, corruption is usually perceived as the abuse of public office for personal gain (Doig and Theobald 2000, p. 3).

While the regulation of positive social capital by governmental institution is hardly possible, corruption is actively combated by laws. But laws are only as good as the institutions that enforce them, and formal institutions of high quality are therefore a precondition for a modern market economy that precisely requires *impersonal* bureaucratic organization of state as well as market. Corruption can be said to be closely related to the trust concept and thus to the level of social capital. If anybody commits an illegal act against you, for example by ignoring the formal terms of a contract, the transgressor will be punished in a state of law without corruption. It is not possible for the transgressor to share the profits from the transgression with the police and the judge. So if both parties know that it does not pay to break the rules, they will adjust their conduct accordingly and via repeated meetings generate trust and social capital. Eventually, formal contracts will become superfluous since the agents have learned that it is mutually beneficial to respect contracts. Citizens trust the state to enforce the rules in a predictable way.

In contrast, political systems with a high concentration of power like in Eastern Europe before 1989 tend to destroy the level of social capital directly by eliminating the economic initiative. Citizens simply do not dare get involved in economic exchange since arbitrary state confiscation is an ever-present threat in a system without political veto players to restrain the state (Schjødt and Svendsen 2002). At the same time, centralized power will indirectly affect the degree of social capital via the quality of the economic institutions. Centralized power will increase the possibility of corruption, which reduces the quality of the economic institutions since existing economic rules will not be enforced impartially over time. Instead, the rules are 'bent' according to the preferences of select political groups and bureaucrats. Finally, the degree of social capital will affect the size of the transaction costs and thus the economic growth.

Of course, it can be argued that strong centralization of power and a form of 'super presidentialism' could be effective in a start-up phase just to get the right institutions in place as a framework for generating positive social capital such as trust. The counter-argument is that also strong dictatorships corrupt over time. Stalin may have initially increased the Russians' social capital in relation to the state via forced industrialization and economic progress. But interest groups accumulated in the Russian society and they gained privileged access to the few important political actors and magnified the socioeconomically adverse redistribution of resources.

The acquired social capital in a country with highly centralized power can be negative rather than positive in relation to economic growth because *closed* social networks characterize the 'anti-modern' society, i.e. a society with organizational collapse and corruption of formal organizations. As a defence against the state, individuals may form these closed informal networks, which can establish contacts with bureaucrats and bend the rules via bribery. In this way, social networks compensate for organizational collapse. Rose (2000) argues that these networks constitute a formidable barrier to former planned economies in Eastern Europe that want to change from 'anti-modern' societies to well-functioning market economies. These informal interest groups seek to create special advantages for themselves (also called rent-seeking) and the members trust each other specifically when they perform these unofficial and hidden activities which do not guarantee that resources are invested optimally in a society. Closed networks will therefore affect economic growth negatively in contrast to open networks, where social trust and the ability to cooperate with strangers prevail.

Overall, we suggest that a high level of corruption in a country leads to less social trust and thus social network constellations that hurt the overall economic situation. Corrupt countries

could be doubly punished since both corruption (money is not invested in an optimal way) and lower social trust (high transaction costs) have negative socioeconomic effects. This is also the case because the quality of institutions—measured as corruption—destroys the arms length principle and impersonal enforcement of formal rules. If it pays to break the formal rules, resulting unpredictability in society obstructs the generation of social capital. Such a double damaging effect could explain the differences in wealth that were previously described for EU countries. The idea that institutional quality conditions the degree of social capital in a society thus leads to the following working hypothesis:

> The higher the degree of corruption and the less social capital (measured as social trust) in EU countries, the lower the level of economic development.

2.3 The interplay of trust and corruption

There is a considerable amount of literature already dealing with the theoretical and empirical interplay of trust and corruption. There are, however, only a few papers that try to find out *explicitly* about the relationship between trust and corruption. In most studies, this relationship is considered in its uni-lateral impact. It is either assumed that corruption reduces the level of trust in a society or it is assumed that distrust or low levels of trust are a good breeding ground for corrupt activities.

The trust-eroding impact of corruption has been shown empirically in particular for societies with low levels of trust such as Latin American countries (Seligson 2002). Corruption can spoil the opinion of citizens that there is institutional fairness (Miller and Listhaug 1999), which also negatively affects their general trust level (Chang and Chu 2006). As a result, the loss of trust ends up in inopportune political conditions such as lower level of political legitimacy or approval of democratic processes (Anderson and Tverdova 2003). As a social mediator with its own interests, the media plays a major role in these processes. Political scandals increase the trust-reducing impact of corruption so that the opinion about politicians or public officials turns bad (Bowler and Karp 2004). Scandals about political corruption rather do not lead to supporting the political opposition but to forming a bad opinion about politicians and public officials in general, so that voters and citizens withdraw from elections and political processes (McCann and Domínguez 1998). Societal damaging effects of corruption are also found for similar concepts of trust such as confidence (Pharr 2000; Della Porta 2000).

There are, in turn, a lot of scholars who relate the occurrence of corruption to low levels of trust. Since corruption means that egoistic tendencies prevail at the expense of (trusting or) cooperative ones, universalistic norms no longer apply (Heidenheimer 1996). This might be particularly true for political activities: a lack of trust in administrative processes can turn into an opportunity for the taking place of corrupt activities (Hetherington 1998). The consequences of distrust are assumed to lead to similar outcomes (La Porta et al. 1997): distrust increases the likelihood corruption as it is substantiates the justification of corrupt activities (Xin and Ruden 2004).

The studies previously mentioned did not test for a reciprocal relationship between corruption and trust. But it seems obvious that the positive and negative social tendencies encourage each other in their impact on societal and economic processes (Della Porta and Vannucci 1999). As a result, those studies which explicitly test for a mutual influence of trust and corruption actually discover such a relation (Morris and Klesner 2010; Uslaner 2004). There are some considerable methodological problems when such a reciprocal relationship is considered (see Seligson 2002). Uslaner (2004), for example, applied a "Two-Stages Least Squares" technique to analyze the reciprocity between these variables and six covariates in his initial

calculations (referring to a sample of 23 countries). Even if his results are convincing from a theoretical point of view, given these high numbers of covariates the estimation process seems to be rather instable and sensitive to changes in the variable list. It is, however, remarkable that his results suggest that trust can be a counterforce against corruption. Beside these problems of estimation, there might be also problems of measuring corruption and social trust. We will address some of these problems in the next section.

3 Measurement

For measuring a country's level of social trust and corruption, there are some standard instruments in the literature to which we also refer in our study.

Corruption is usually measured by Transparency International's corruption index (CPI), which varies between 10 (no corruption) and 0 (full corruption).[1] The scores of this composite index reflect more than only corruption but to some degree also democratic structures or the shadow economy (Neumann and Graeff 2010). As "poll of polls" it is neither a pure measure for the degree by which institutions in a country are infiltrated with corruption, nor is it an accurate indicator for the spread of corruption across the whole society. Despite its weak validity, it seems to be highly reliable and works well in macro-data models. We will apply the CPI with the intention of capturing a country's propensity to allow for corrupt activities. As such, these activities are considered as bonding social capital with negative social externalities.

The social trust measure from European Values Survey (EVS) and World Values Survey (WVS) asks people whether they think that "in general, you can trust other people, or you cannot be too careful when dealing with others". It is a good indicator of the degree of positive social capital in a society. In this study, the aggregated data of the EVS were used. Since these data are obtained by country surveys, the scores reflect the tendency of the local population to engage in bridging relationships.

The EVS was conducted four times with various sample composition of countries: 1981–1984, 1990–1993, 1999–2001 and 2008–2010. There are only 10 EU countries in the first wave. In order to apply a panel data design with a sufficient amount of EU countries, we use data from the second and the third waves. Since our theoretical suggestions imply directions of influence among the variables, the variable selection should also reflect a temporal sequence. It can be assumed that influences of independent variables need some time to gain a substantial effect. If for instance corruption starts to destroy positive social capital in a society, it will take time to initiate a measureable effect. In order to establish a reasonable incubation period for the positive effects of trust and for the negative influences of corruption, the variables were chosen for about 1995 (corruption) and 1999/2000 (trust). Since the data of the fourth EVS wave would not allow such a time gap regarding the dependent variable wealth, we dismissed this wave from our analysis as well.

Table 1 shows that people in Sweden and Denmark are the most trusting people in the EU. The three Scandinavian countries Denmark, Sweden and Finland top the list along with the Netherlands with scores from 66.5 to 58%. Then follows a large gap to Spain, Ireland, Germany, Austria, Italy and Belgium, which range from 38.55 to 30.7%. Portugal is at the bottom with 10.0% in 1999, six-and-a-half times lower than Denmark.

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[1] In order to ease interpretations in our study, the CPI scores were recoded, now indicating high corruption by high numbers.

Table 1 Countries in the EVS (Waves 2 and 3)

		Trust		CPI	
		1990/1993	1999/2000	1995/1996	2000/2001
	EU country				
1.	Denmark	57.66	66.53	0.66	0.35
2.	Sweden	66.10	66.31	1.02	0.80
3.	Netherlands	53.12	59.81	1.30	1.15
4.	Finland	62.72	58.00	0.92	0.05
5.	Spain	35.98	38.55	5.67	3.00
6.	Ireland	47.37	35.81	1.49	2.65
7.	Germany	34.68	34.77	1.80	2.50
8.	Austria	31.63	33.87	2.64	2.25
9.	Italy	34.15	32.63	6.80	4.95
10.	Belgium	33.20	30.68	3.12	3.65
11.	Great Britain	43.58	29.75	1.50	1.50
12.	Bulgaria	30.40	26.91	7.10	6.30
13.	Luxembourg		25.95	1.39	1.35
14.	Lithuania	30.80	24.88	6.20	5.55
15.	Czech Republic	26.07	23.87	4.63	5.90
16.	Greece		23.73	5.48	5.45
17.	Estonia	27.58	22.83	4.30	4.35
18.	France	22.79	22.24	3.02	3.30
19.	Hungary	24.59	21.84	5.51	4.75
20.	Slovenia	17.39	21.69	4.00	4.65
21.	Poland	29.17	18.85	4.43	5.90
22.	Latvia	19.05	17.12	7.30	6.60
23.	Slovakia	21.57	15.70	6.10	6.40
24.	Romania	16.07	10.13	6.56	7.15
25.	Portugal	21.43	10.05	4.00	3.65
	EU countries with missing data				
26.	Malta	24.00	20.68		
27.	Cyprus				
	Additional countries in the EVS				
28.	Croatia		18.42	7.30	6.20
29.	Russian Federation		23.73	7.42	7.80
30.	Ukraine		27.22	7.20	8.20
31.	Iceland	43.60	41.08	0.70	0.85
30.	Belarus		41.85	6.10	5.90
31.	Turkey		6.76	6.18	6.30

The trust scores represent the percentage of people in a country who mentioned that they would trust others in general. These scores were calculated by applying the weighting variable provided in the EVS dataset. The CPI data were inverted in order to assign higher scores to higher corruption levels. The data ranges from 0 (no corruption) to 10 (highest corruption level). The CPI 95/96 data were expanded by scores from 1997 (Romania), 1998 (Slovakia, Bulgaria, Ukraine, Iceland, Belarus, Latvia, Estonia) and 1999 (Slovenia, Croatia, Lithuania)

The last four countries in EU-15 are at the same level as the eight new Eastern European countries in the EU and the three new applicant countries. Among these 11 countries, Bulgaria has most social trust (26.9%) followed by Lithuania (24.9%) and the Czech Republic (23.9%). At the bottom are Slovakia and Turkey (both 15.7%) and Romania (10.1%).

The corruption numbers in Column 3 largely follow the pattern of social trust which supports the idea that social trust is a form of positive social capital while corruption is an exemplification of negative social capital. The ranking in terms of corruption level is shown in parentheses. Note that Finland in 2000 obtained the maximum score of 0 for non-corruption. Since we used averaged scores, Finland has 0.05 as the lowest corruption score across all EU countries and even across all countries in the world. Countries which come up with relatively low trust scores tend to come up with relatively high levels of corruption.

In summary, the EU countries vary considerably on social trust as well as corruption. The overall result is unambiguous and thought-provoking: the further south, the more corruption and less trust. The same is true for the post-Communist countries in Eastern Europe. In the EU, the North has more social trust and less corruption than the South. People in Sweden and Denmark are the most trusting people in the EU (and the world): on average, two out of three trust strangers and thus most other people. Greece, France and Portugal bring up the rear at the same social trust level as Eastern Europe. However, Spain places relatively high in relation to the other EU countries. The overall average for social trust for 1999/2000 in Southern Europe (Greece, France, Portugal, Italy and Spain) is 25.4 and is thus considerably lower than the Scandinavian average (Denmark, Sweden, Finland) of 63.6.[2] This result is matched by the overall average for corruption levels in the North and South of 4.0 and .4, respectively.[3]

So far, the data could contain a double damaging effect in EU countries which implies that corruption reduces wealth while trust loses its impact on wealth due to a negative influence of corruption too.

If this sample of EU countries is applied to statistical techniques beyond descriptive methods, some problems inevitably get in the way. The first pertains to the temporal sequence of our data. As a result of different time points of sampling (EVS in the beginning, CPI in the middle of the 90s), a real time series model does not apply here. The second problem refers to the small sample size. Due to missing data on Greece and Luxembourg, this problem is aggravated because the maximal number of EU countries in the analysis could be 25. This does not allow for multiple regressions with a lot of predictors as such models would run out of degrees of freedom. Moreover, classical analysis tools such as simple regression analysis seems inappropriate. Such an analytical tool would hardly say anything about the relation between trust and corruption.[4] Simple correlation analysis would also not lead to further insights due to its symmetric nature.

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[2] The other Scandinavian countries, Norway and Iceland, also hit the very top (Svendsen and Svendsen 2010).

[3] When a Northern European country like Germany ranks relatively low, it is probably because the 2000 measure covers West Germany as well as the former East Germany. West Germany thus scored approximately 42% in the mid-1990s, whereas the former East Germany scored 25%. This difference could be the result of different institutional designs in the two Germanies, a natural experiment where two political systems may have resulted in different trust scores due to a higher corruption level in East than in West Germany.

[4] Consider a regression model with wealth (operationalized by the Gross domestic product) as a dependent variable and trust and corruption as independent variables. In such regressions, trust in our EU data set would turn insignificant while the corruption variable remains significant. This merely tells something about the direct effect of corruption regarding trust as a spurious effect on wealth. An interaction term between trust and corruption could provide more information on this issue about the relationship between the dependent variables. Such an interaction would come, however, into conflict with both assumptions on linearity and an appropriate number of degrees of freedom. Moreover, as symmetric effect, interactions do not allow for
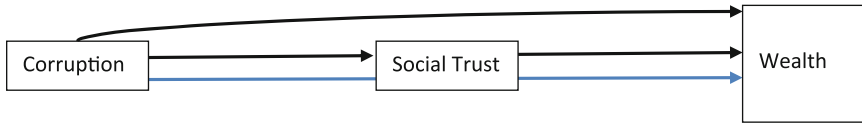
Fig. 1 Conceptual model. *Notes* Direct paths in *black*, indirect path in *blue colour*. (Colour figure online)
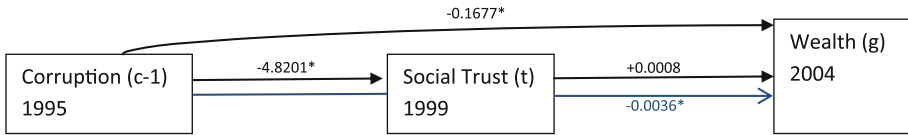

Fig. 2 Model 1.1 regression of wealth on trust and corruption. *Notes* Direct effects in *black colour*, indirect effect in *blue colour*. *Asterisk* denotes significance of coefficient. (Colour figure online)

It seems more appropriate to consider a path model in which trust serves as a mediator of negative influences of corruption (Kline 1998; Cohen and Cohen 2003). Such a model provides some remedies for the problems mentioned above. As for the estimation of such a model with an OLS procedure, it consisted of two regressions which have, at least, 10 data points for each estimated parameter.[5] It is also possible to consider the relation between the dependent variables trust and corruption in the sense that corruption could harm the influence of trust on wealth. Such a model would be suitable to trace the interplay of corruption and social trust in EU countries (see Fig. 1).

Figure 1 shows the conceptual path model we will apply in our analysis. In this figure, trust is considered a mediator variable (Cohen and Cohen 2003). Trust mediates the direct influence of corruption. Corruption itself simultaneously reduces the amount of trust and wealth in a country by direct effects. Corruption can also reduce the impact of trust on wealth which can be interpreted as an *indirect* effect of corruption on wealth (via trust).

Results of the estimation of such a model are reported in Table 2. In order to ease interpretation, the model is illustrated in Fig. 2.

In Model 1.1, trust is considered a mediator variable for the negative influence of corruption. Corruption has a direct effect on wealth, depicted by the upper path in Fig. 2, and an indirect effect via trust. Both effects result into a total effect on wealth. We suspected corruption to have a detrimental influence on trust as well. As can be seen from Table 2, the direct effect of corruption on trust is negative and significant in the EU countries, supporting our proposition that corruption harms the amount of trust in a country. The second negative consequence of corruption becomes visible in the strong direct and total effect on wealth. Corruption reduces the affluence of European countries significantly in the predicted sense.[6]

The missing significance of trust could be due to the prior influence of corruption. This is not the case as can be learned from Model 2.2 in which corruption is applied as a mediator

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Footnote 4 continued

regarding single sided influences. The path model estimation we applied does regard the indirect effect as interaction effect without reducing the degrees of freedom.

[5] All models were estimated by two separate OLS regressions. For the calculation of the standard errors, the Goodman (1960) formula was applied.

[6] If trust is the sole predictor for wealth, there is a significant, positive influence of social capital. Adding corruption to the equation makes this effect vanish.

Table 2 Coefficients, standard errors and t-values for double damage model

Model 1.1 regression of wealth 2004 (g) (OLS, EU countries, $n = 25$): coefficients[a]

Variables	Effect	Coefficient	SE	t
Trust 1999 (t)	Direct (g, t)	0.00075	0.00523	0.14429
CPI 1995 (c – 1)	Direct (t, c – 1)	–4.82007	1.13195	–4.25818
	Indirect (g, c – 1)	–0.00364	0.02595	–0.14039
	Direct (g, c – 1)	–0.16765	0.03803	–4.40857
	Total	–0.17130	0.02782	–6.15613

Model 1.1 Regression of lngdp04_05 (g) (OLS, EU countries, $n = 25$): statistics[b]

Equation	Dependent variable	n	R^2	MSE	Reset test
1	Wealth 2004	25	0.6227	0.61424	0.2567
2	Trust 1999	25	0.4408	0.74779	0.0025

Model 1.2 Corruption as mediator regression of wealth 2004 (g) (OLS, EU countries, $n = 23$): coefficients

Variables	Effect	Coefficient	SE	t
CPI 2000(t)	direct (g, c)	–0.2208	0.0422	–5.2294
Trust 1990(t – 1)	direct (c, t – 1)	–0.1243	0.0177	–6.9867
	indirect (g, t – 1)	0.0274	0.0066	4.1593
	direct (g, t – 1)	–0.0080	0.0062	–1.2792
	Total	0.0194	0.0051	3.7565

Model 1.2 Regression of lngdp04_05 (g) (OLS, EU countries, $n = 23$): statistics

Equation	Dependent variable	n	R^2	MSE	Reset test
1	Wealth 2004	23	0.748	0.5019	0.0586
2	CPI 2000	23	0.699	0.5486	0.8056

[a] In order to substitute missing values, the CPI 95 variable was augmented by CPI scores from different years (see Table 1). Missing EU countries are Malta and Cyprus
[b] Reset test: exact significant levels are reported

variable. Given the results from Model 1.1, one would conclude that trust is not a suitable mediator variable (Baron and Kenny 1986). In conjunction with the results of Model 1.2, it becomes obvious that trust does not come up with a positive direct effect on wealth in our sample of EU countries. Interestingly, there is a strong indirect trust effect on wealth that indicates that an increase of trust can reduce the effect of corruption. Trust might support wealth but this works by the reduction of corruption and not by a direct impact on wealth.

Our analysis presented here might avoid some problems about small sample size estimation as there are no severe problems of low degree of freedoms. These advantages are bartered for some potential drawbacks. First, an analysis that takes only trust and corruption as predictors starts from the assumption that all other influences on wealth are equal (ceteris paribus condition). A critical point in conjunction with this assumption is the distribution of

the residuals. It is necessary to check for anomalies and non-normality. In our study, we did both by several tests.[7] In sum: we do not find any evidence that there are residuals that could cause a bias.

Second, assuming a correct model specification could be critical when only one or two predictors are used. In order to back up this assumption, we applied a reset test to the single equations (Ramsey 1969). In general, we do not find evidence for misspecification, except for Eq. 2 in Model 1.1 and Eq. 1 in Model 2.1. It is self-evident that determining the level of economic development by trust only (Eq. 2, Model 1.1) should lead to some systematic gaps in the residuals. As the overall results in the models are stable and unaffected, this result should not be too troublesome. The same applies for the wealth equation (Eq. 1, Model 2.1) in which the reset test becomes slightly significant. It can be assumed that the trust again causes these problems (see Paldam (2004) for a discussion of significant reset tests when trust is involved).

Third, a simultaneous estimation of the path model would lead to more efficient results than our sequential calculation. In that sense, our way of computing the models implies that the importance to save degrees of freedom is preferred to having an obvious more efficient estimation. While we would not disregard the importance of efficiency, it seems more important in the present aggregate analysis to save degrees of freedom in order to maximize the sample information. This way of conducting the study is supported by the results of the sensitivity analysis.

In order to find out about the sensitivity of our results due to political conditions, we excluded the Eastern European countries from our sample. This might be problematic for estimation due to the small sample size of 15 countries. Because results for corruption do not change (see Model 1.3 and Model 1.4 in the Appendix), it is a clear confirmation for our results in Model 1.1. The t-values of the already insignificant trust variable drop even more when only 15 countries are considered. This leads to a confusion of the sign which should be not taken as too troublesome given the actual low t-values.

The same picture appears if the sample is expanded to all available data for EVS countries, including countries which are hardly associated with European culture such as Russia. But even then the results of Model 1.1 are replicated (see Model 1.4 in the Appendix).

To conclude our calculations with mediator path models: our results do not support the idea that EU countries suffer from a double damaging effect of high corruption and low trust. Corruption does significantly reduce the level of wealth in the EU countries, but trust is able to tone this influence down. While trust does not develop its direct positive influence on wealth in the presence of corruption in our models, it suggests itself as an excellent counterforce against corruption and, in this way, also as an indirect promoter of wealth.

4 Granger-like causality models

The models in the previous section were set up with temporally lagging variables. This design was derived from theoretical ideas how trust and corruption might work. It was assumed that the damaging consequences of corruption need some time to come into effect, as do also the prospering consequences of trust. When this idea is regarded in the operationalization, one is tied down to the available time points in the EVS and CPI.

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[7] Regression diagnostics were computed for all equations. There is no hint of non-normal residuals, tested by the Shapiro–Wilk and the Shapiro–Francia tests.

For interpretation of Models 1 in the previous section, a certain amount of caution about the "causal" meaning of the results is advisable. The models with two independent variables which were presented before do not rule out rival explanations. It is therefore imperative to check for the robustness of these results even because they have been surprising and contrary to expectation. Luckily, there is an easy procedure which suggests itself by the time series like structure of our data.

We will introduce this procedure by referring to the result in Model 1 that corruption reduces the level of trust. A straightforward interpretation of this effect is that corruption obstructs the emergence of trust. Positive social capital might have, however, an endogenous encouraging effect: if it exists in a country on a relatively high level, corruption might not able to harm it anymore due to its self-enforcing nature of trust that was described in Sect. 2. This would imply that the effect of trust on wealth depends on the level of prior levels of trust. For corruption, one could assume that it only has a damaging effect on trust (and as a result on wealth, accordingly) beyond the already existing prior positive effect of lagged levels of trust. In Model 1.1 and Model 1.2, the effect of corruption on trust was considered unaffected by prior trust influences. In order to test the "robustness" of the corruption influence on trust, one might add a variable depicting the prior levels of trust. If corruption still remains significant, one could conclude that corruption can account for variation of trust that is not explained by prior trust levels.[8]

The suggestion for such a procedure was provided by Granger (1969).[9] For time-series data, his idea of causality implies that (Lütkepohl 2005, p. 48): "[…] a cause cannot come after the effect. Thus, if a variable x affects a variable z, the former should help improving the predictions of the latter variable." In our data set, it does not make sense to assume the 90s data of trust and corruption being time series data, e.g. that they belong to the same time points. The general idea by Granger is, however, applicable. Moreover, we consider not only the direct effects of the variables but their indirect effects as well. This allows for a more complete picture of the actual realization of influences. If corruption remains significant while prior levels of trust are simultaneously in the model, one could conclude (with the proviso that 90s data do not measure the same time points) that trust can be better predicted when prior levels of corruption are also considered. In a loose interpretation, one could state that corruption would be Granger causal to trust. This would be true if there is, at least, a significant corruption influence on the mediator variable (see Fig. 3). Arguably, such an additional model parameter would further reduce the degrees of freedom in a simultaneous estimation process. In our models, this will not happen due to the sequential estimation as applied before. Since the Granger-like model results can be compared to the previous models in order to assess their stability, the loss of model efficiency seems to be justified.

In Model 2.1, corruption works as predictor for trust (identical to Model 1.1). But trust is also determined by its lagged variable (see Table 3).

Model 2.2 is identical to Model 1.1 but with one additional path: trust 99 is not only predicted by corruption 95 but also by trust 90. Since the Granger idea is of interest here, the first focus is on the direct influences on trust 99. The remarkable point is: corruption loses its influence on trust 99 if lagged trust is also considered as a predictor. While the direct effect on wealth is still negative and significant, trust 99 is only determined by its predecessor variable. Notice that there is, however, no direct effect on wealth.

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[8] The models' robustness should not be taken lightly here because we are dealing with two independent variables only. We are fully aware of the fact that there are a lot of variables which are potentially able to explain wealth. These variables are part of the error term in our model.

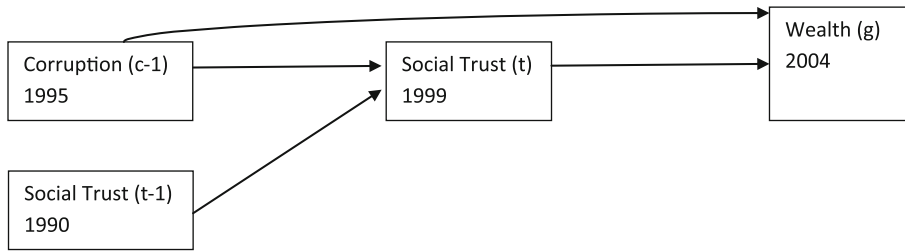[9] In contrast to our setting, Granger (1969) deals with time series data only.

Fig. 3 Granger-like model regression of wealth on trust and corruption. *Notes* This figure corresponds to the results of Model 2.1. For Model 2.2, corruption 2000 is set as the mediator variable and corruption 1995 is taken as its predictor

Table 3 Coefficients, standard errors and *t*-values for Granger-like path models

Model 2.1 Regression of wealth 2004 (g) (OLS, $n = 23$)

Variables	Effect	Coefficient	SE	t
Trust 1999 (t)	direct (g, t)	0.00462	0.0047	0.9652
Trust 1990 (t − 1)	direct (t, t − 1)	1.07945	0.1290	8.3672
	indirect (g, t − 1)	0.00499	0.0052	0.9522
CPI 1995 (c − 1)	direct (t, c − 1)	−0.03264	0.8406	−0.0388
	indirect (g, c − 1)	−0.00015	0.0056	−0.0269
	direct (g, c − 1)	−0.13692	0.0359	−3.8071
	total	−0.13707	0.0257	−5.3228

Model 2.1

Equation	Dependent variable	n	R^2	MSE	Reset test
1	Wealth 2004	23	0.6664	0.5775	0.0332
2	Trust 1999	23	0.8857	0.3380	0.8235

Model 2.2 Regression of wealth 2004 (g) (OLS, $n = 23$)

Variables	Effect	Coefficient	SE	t
CPI 2000 (c)	direct (g, c)	−0.22085	0.04223	−5.22946
CPI 1995 (c − 1)	direct (c, c − 1)	0.60819	0.11207	5.42694
	indirect (g, c − 1)	−0.13432	0.03598	−3.73295
Trust 1990 (t − 1)	direct (c, t − 1)	−0.05543	0.01719	−3.22344
	indirect (g, t − 1)	0.01224	0.00452	2.70837
	direct (g, t − 1)	−0.00803	0.00628	−1.27924
	total	0.00420	0.00517	0.81381

Model 2.2

Equation	Dependent variable	n	R^2	e	Reset test
1	Wealth 2004	23	0,6664	0,57758	0,0586
2	Trust 1999	23	0,8857	0,33808	0,7827

If corruption is taken as the mediator variable and determined by its lagged version and trust 90 (Model 2.2), the picture is completed. Trust reduces corruption although the lagged corruption variable is present in the model. It also has an indirect effect via corruption 2000. But the corruption effects are still overwhelming and devastating for wealth, stronger than the positive indirect effect of trust.

Trust can counteract the negative consequences of corruption although it will not lead to a direct improvement of wealth. Corruption harms wealth directly and *can* violate trust as well, if trust is not augmented in a country (but left stable compared to prospering corruption). In that sense, corruption cannot be called Granger causal for corruption which implies that a countries endowment with trust can be unaffected by corruption. Trust can be called Granger causal for the reduction of corruption. Trust is, as a consequence, an endogenous remedy for corruption which also fits to the descriptive findings before: this might be the reason why Scandinavian countries stay relatively corruption-free—trust and other forms of social capital counteract corruption tendencies.

5 Conclusion

There is little doubt in the literature that corruption is a major threat to economic development and economic growth (Mauro 1995; Bardhan 1997). The relationship between the level of economic development and corruption might be complex (Blackburn et al. 2006), but its seems obvious that low income situations are tightly correlated to high levels of corruption (Sah 1988). This suggestion is supported by the findings of our study relating to EU countries. In our sample of European Union countries, corruption is a strong direct predictor of lower levels of economic development. Given these results, the question why the Scandinavian countries are significantly richer than Southern or Eastern European countries can be partly answered by referring to the detrimental impact of corruption. This must not lead to a despairing attitude about the future of lower developed countries in the EU since our results suggest that there is a strong counterforce against the amount of corrupt networks with the nature of bonding social capital. Social trust, the paradigm of bridging social capital, can counteract corrupt tendencies. The level of social trust does not have a significant impact on the level of economic development but it can contribute to wealth improvements indirectly by reducing the spread of corruption. Since the latter effect is valid even when controlling for previous levels of corruption (see Models 2), this result seems to be rather stable. It also fits to the results obtained by Uslaner (2004), Chang and Chu (2006) and Morris and Klesner (2010).

Analyzing a sample of EU countries provides the advantage of relatively good data-coverage even if sample size is rather small. Since corruption and trust are linked to the political conditions of a country, an EU sample also provides the opportunity to scrutinize the interplay of these determinants of economic development in a relatively homogenous political and legal setting.

There are, however, some statistical drawbacks related to our analysis that should be mentioned. The results derived for the EU sample might not be valid for samples of various country compositions. The sensitivity analysis suggests that sample extensions with other European countries will not change the results but it might be different if countries from other cultures enter the sample. The in-group variation of EU countries could be smaller than the in-group variation of African or Latin American countries.

It might also be statistically unsatisfactory that the dependent variable was measured as a time-invariant measure only. The degree by which corruption can harm the level of economic

development might vary across countries and time (O'Connor and Fischer 2011). Also, this process can be moderated by the level of positive capital in a country. This implied that a real time-series model would be the appropriate method for analyzing the interplay of positive and negative social capital. Unfortunately, the data do not allow for setting up such a model.

Given these drawbacks, what can the South or the East learn from the North in the EU? In a broader perspective on social capital, one possible and so far ignored explanation may be the presence of social capital in the Northern welfare states. A high institutional quality seems to be a good preposition for the generation of economic predispositions of wealth. Corruption will decrease the institutional quality which would lead to low stocks of social trust if the trust level is low (see Models 2). But this seems to be only one side of the coin. Descriptively, we observe a North-"East/South" divide in the EU, where social trust was strongly correlated with the level of corruption. In general we found that the further south or east we moved in the EU, the higher the level of corruption and the lower the stock of social trust. While the formal institutions are necessary to maintain economic processes, the informal institutions (such as positive group norms of trust) are also essential. In Scandinavia it is not necessary to write everything down and enforce sanction. The informal contract—you keep your word—actually works in practice. As a consequence, citizens and society save a significant amount of resources and hassle protecting themselves against fraud. Such resource savings simply give an international competitive advantage over mistrustful societies.

In its efforts to increase overall economic growth, the EU can therefore overall benefit from Scandinavian experiences from building social "bulwarks" against corruption by augmenting positive social capital. So can other countries like the United States. The policy recommendation here is therefore that the EU takes effective action against corruption, especially in Southern Europe and the new Eastern European member countries, in order to realize a double profit due to less corruption and more social trust.

Appendix

See Table 4.

Table 4

Variables	Effect	Coefficient	SE	t
Model 1.3 regression of wealth 2004/2005 (g) (OLS, no East Europe countries, $n = 15$)				
Trust 1999 (t)	Direct (g, t)	−0.0020	0.0042	−0.4903
CPI (c − 1)	Direct (t, c − 1)	−4.6179	2.0681	−2.2328
	Indirect (g, c − 1)	0.0096	0.0219	0.4388
	Direct (g, c − 1)	−0.0790	0.0373	−2.1168
	Total	−0.0694	0.0308	−2.2530
Model 1.4 regression of wealth 2004/2005 (g) (OLS, EVS full sample, $n = 31$)				
Trust 1999 (t)	Direct (g, t)	−0.0029	0.0052	−0.5710
CPI (c − 1)	Direct (t, c − 1)	−4.1443	0.9355	−4.4296
	Indirect (g, c − 1)	0.0123	0.0222	0.5526
	Direct (g, c − 1)	−0.2076	0.0339	−6.1172
	Total	−0.1953	0.0259	−7.5392

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