

# Individual and institutional determinants of corruption in the EU countries: the problem of its tolerance

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**Abstract** This paper deals with the problem of corruption, with a focus on both individual and country-specific institutional factors that may affect this problem. We analyse the determinants of the incidence of corruption as well as the tolerance of corruption. We used logit regressions that utilised data derived from Eurobarometer. The results strongly suggest gender, age, and education are important factors. We may say that anti-corruption policy ought to be targeted towards younger, less-educated, self-employed people with no children. On the other hand, a better-educated man in his early 30s seems to be a typical victim of corruption. The same is true for those having problems paying their expenses. Furthermore, contact with public officials appears to be one of the key issues, with Internet-based interactions with the government perhaps serving as the most effective solution to this problem. The rule of law, government effectiveness, and public accountability seem to be other factors that negatively correlate with the level of corruption within a country.

**Keywords** Tolerance of corruption · Determinants of corruption · Institutional factors · Public policy

**JEL Classification** D73 · H11 · H58 · K42

## 1 Introduction

Corruption is one of the most discussed problems in respect to public sector governance, but there is no uniform definition of this phenomenon. Perhaps the most common definition of corruption is provided by Rose-Ackerman (1975), who

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describes corruption as “the misuse of public office for private gain”. Furthermore, Wang and Rosenau (2001) see corruption as some kind of secret collaboration between public officials and subjects from the private sector, which is not consistent with the public interest. This collaboration is motivated by private financial gain. There is very little doubt about the negative consequences of corruption. Most studies clearly conclude that corruption has a negative impact on economic growth (Mauro 1995) as well as income equality (Gupta et al. 2002; Gyimah-Brempong 2002). Moreover, the problem of corruption is also often closely linked to the problems of the shadow economy and tax evasion. As reported by Buehn and Schneider (2009), there is a positive two-way relationship between the shadow economy and corruption. According to Hudson et al. (2012) corruption and the desire to avoid corrupt government officials are the key drivers of businesses into the informal economy.

In light of these findings, the search for factors affecting corruption becomes increasingly important. Our research expands the findings in this area in several different ways. In the forthcoming section we provide a review of the literature dealing with the problem of corruption and its potential determinants. In further sections, we describe the methodology and data used in our model. We apply logit regressions based on data obtained from Eurobarometer in order to examine the potential individual and country-specific determinants of corruption. Considerable attention is also paid to the role of corruption tolerance and its potential determinants. We believe the tolerance of corruption to be one of the most important issues that needs to be faced in respect to the general problem of corruption.

## 2 Literature review

Firstly, we have to shortly address the issue of measures of corruption and their accuracy. In general we can distinguish between perception-based and experience-based approaches. The choice between both measures is important for us, as the factors that seem to be related to perceived corruption do not often correlate with measures based on direct experience (Treisman 2007). A considerable part of the empirical literature relies upon measures of perception, where respondents are requested to assess the level of corruption in their region. However, this measure appears to be significantly biased (Heywood and Rose 2014). Respondents often tend to over-report the extent of corruption. This could be to some extent due to increased exposure to news about corruption (Rizzica and Tonello 2015). Olken (2009) recognises that villagers’ perceptions of corruption in Indonesia appear to be positively correlated with a more objective measure of corruption (missing expenditures), but the magnitude of the correlation was small. Hence, the author emphasises that perception-based data should only be used with strong caution.

On the other hand, experience-based measures are strictly linked to real cases of corruption. However, this measure can be affected by the systematic under-reporting of corruption. Survey data are often unable to capture the true scope corruption. Moreover, those who pay bribes very often tend to conceal this fact in questionnaires. For example, Rose and Mishler (2010) found that among survey

respondents in Russia, the perception of the prevalence of corruption was significantly higher compared to the actual experience of it. Despite this fact, we decide to mostly rely on experience-based data in our analysis, because this kind of data is much more suitable for the examination of determinants and characteristics on an individual level.

When focusing on the potential determinants of corruption, we can distinguish between individual and country-specific determinants. Both types of factors seem to be important in determining the risk of exposure to bribery (Mocan 2008), and studies have mostly examined corruption from one of these two perspectives. On the contrary, our study managed to combine both perspectives in order to obtain more complex results.

Determinants at the individual level, mostly include several socioeconomic characteristics. Currently, there are still far fewer studies focused on the micro-level and individual factors of corruption in comparison to analyses done using cross-sectional data. With respect to gender differences, most of the studies found that women are less likely to be involved in corrupt activities. Women in general seem to be less often involved in bribery (Brollo and Troiano 2016; Swamy et al. 2001; Mutascu 2010) and they are also less likely to agree with the justifications of corruption (Torgler and Valev 2010). Another determinant which is frequently mentioned in the literature is age. Studies mostly found some evidence for inverted U-shape relationship between respondents' age and their involvement in corruption (Mocan 2008). Inverted U-shape relationship has been also found in our empirical analysis.

Truex (2011), based on the analysis of micro-level data obtained in Nepal, concludes that education is another key factor to consider when decreasing the acceptance of corruption. The perception of corruption on a micro-level has been analysed by Melgar et al. (2010). The authors argue that the individual characteristics of the respondents as well as social conditions have a significant effect on the perception of corruption. They conclude that women, as well as divorced, unemployed, and self-employed people tend to perceive higher extents of corruption within a given country. On the other hand, being married, working full-time, attending religious services, and having completed at least secondary education are all negatively correlated with the perception of corruption. The vast majority of the potential determinants mentioned above have been further used in our analysis in order to test their significance based on our dataset.

Turning to the macro-level or cross-section analysis, the most important determinants of corruption are very often related to a country's institutions, public administration, or public policies. The government effectiveness as well as its size proved to be both important factors in respect to reducing the corruption (Zhao and Xu 2015; Goel and Nelson 1998). Serra (2006) found that democracy and political stability are also significant factors affecting the extent of corruption within a country. Similarly, Pellegrini and Gerlagh (2008) argue that uninterrupted medium-long democracy together with the diffusion of newspapers could reduce corruption. The effect of democracy seems to also be mutually conditional with per capita income in a given country, as stated by Neudorfer (2015).

The quality of public institutions is very often considered as a key determinant of corruption. Dreher et al. (2007) found that improvement in institutional quality could reduce the shadow economy and its effects on corruption as well. Despite the fact that there is no easy solution to this problem, public sector anti-corruption strategies, watchdog agencies, and increased public awareness together with the accountability of the courts and support of the media and the private sector could represent an effective set of tools (Stapenhurst and Langseth 1997).

There are also several studies highlighting the effects of e-government or Internet usage on corruption. Andersen (2009), using data from 149 countries in two different years, found a significant and economically-interesting negative effect of e-government on corruption. The positive effect of e-government on reducing the corruption has been also found by Shim and Eom (2008) and Zhao and Xu (2015). A similar effect has been observed in the case of average Internet usage based on the use of long-run and short run regression analyse on panel data from 85 countries (Hunady and Orviska 2015).

There are also several macroeconomic indicators that appear to be significant in respect to corruption, such as GDP per capita, public spending, and secondary school enrolment (Rehman and Naveed 2007) or inflation and income distribution (Ata and Arvas 2011). Consequently, the role of unemployment and education, as well as the strength of a country's institutions, are stressed in Mocan's study (2008).

Moreover, on the one hand corruption seems to be negatively affected by trade openness (Gerring et al. 2005), and on the other hand positively related to the import of arms and higher military expenditures (Hudson and Jones 2008).

### 3 Data and methodology

We utilise a variety of data sources in this analysis, but the core dataset for this paper consists of data from Eurobarometer (European Commission 2013) and World Bank (2015)—worldwide governance indicators. The survey was conducted in 2013 throughout all EU member states. Altogether 27752 respondents participated in this survey; however, after the exclusion of ambiguous answers or missing observations, the dataset used in our regression models consists of 26,398 observations.

Approximately 53.7% of respondents are females and 46.3% are males, and approximately 53% of respondents are currently married. The average age of the respondents is 49.1 years. The numbers of non-missing observations for each country are shown in Appendix 1. It can be observed that respondents especially from Germany and Great Britain are represented slightly more often in the sample. However, all other countries (except for the three smallest ones) are represented at almost equal levels in the sample. Approximately 53.7% of respondents are female and 46.3% are male, and approximately 53% of respondents are currently married. The average age of the respondents is 49.1 years.

Since perception-based indicators of corruption tend to often be inaccurate (Olken 2009; Heywood and Rose 2014; Rose and Mishler 2010) we decide to utilise more experience-based measures. However, it is clear that in this case we can expect some degree of under-reporting of corruption. This could be due to the

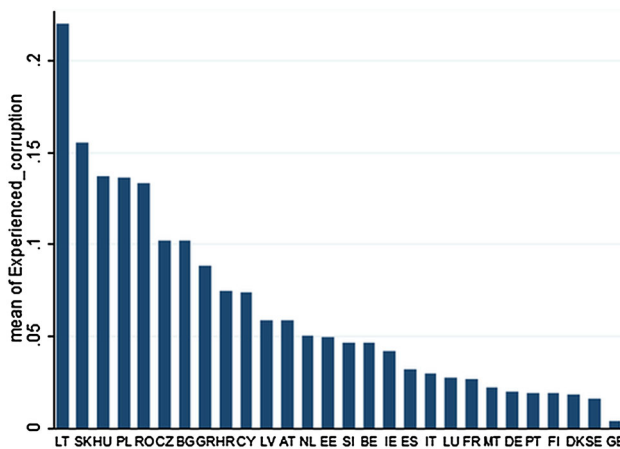
unwillingness of respondents to answer this delicate question as well as the possible misleading answers put forth by those engaged in corruption themselves. Thus, we decide to ignore questions aimed at the respondents' subjective perception of corruption in the country and try to focus on the question directly asking respondents whether they personally have experienced corruption in the last 12 months. The answers have been used as a binary dependent variable in the first set of regression models.

Approximately 6.4% of respondents experienced an instance of corruption within the last 12 months before the interview was conducted. The average values for this dummy variable for all EU countries can be seen in Fig. 1. Respondents who experience the corruption very often come from Latvia, followed by Slovakia, Hungary, Poland, and Romania. On the contrary, personal instances of corruption are less frequent in Great Britain, Sweden, and Denmark. We used a logit regression model in order to examine the potential individual and country-specific factors affecting experiences with corruption. We apply a probit regression as the robustness check. However, for the sake of brevity, we decide to show only logit; thus, as expected, the results are very similar for both methods. The interpretation of logit coefficients in the form of the odds ratio is also more straightforward.

People reporting their experience with corruption could either be victims of corruption or people engaged in corruption themselves. By victims of corruption, we mean those who have been asked for a bribe and did not accept to it, or at least reported this event afterwards.

In general, we could assume that most of the bribers and those benefiting from corruption were not willing to admit this fact in the questionnaire survey. Hence, it is very likely that those who reported their experience with corruption are only the victims of corruption.

Despite this fact and in order to compare the results and make the issue even clearer, we further defined victims as those reporting their experience with corruption to someone else. Those respondents who reported an experience with



**Fig. 1** Average experience with corruption in the EU countries. Source: Eurobarometer 79.1 (2014)

cases of corruption have been coded as 1, while everyone else has been coded as 0. This indicator has been also used as the dependent variable in several regression models. It is evident that respondents who have reported corruption are only the victims of corruption. However, this measure did not capture all of those victims who did not know where to report the corruption they experienced or those who decided not to report their experience for whatever reason. This is of course a significant disadvantage to this approach, which may have some effect on the results and its interpretation.

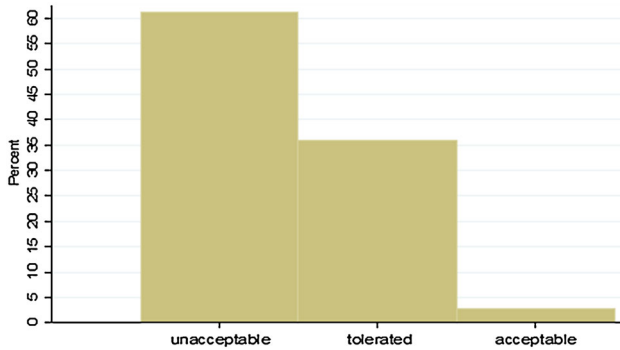
We not only focus on the experience of corruption, but also on the personal attitudes of respondents towards corruption, as this may have a significant effect on the levels of corruption within a particular country. Perhaps one of the most important aspects is individual tolerance of corruption. We focused our attention especially on the index of tolerance to corruption constructed in Eurobarometer 79.1 (European Commission 2013). Respondents were asked the question: “If you wanted to get something from the public administration or public services, to what extent do you think it is acceptable to do any of the following: (1) to give money, (2) to give a gift, (3) to do a favour”. Respondents must respond according to Table 1.

The individual index of tolerance to corruption has been calculated for each respondent based on his/her answers as stated in Table 1. We further decide to merge “acceptable” and “tolerated” answers into the one answer coded as 1. Thus, we get “acceptable” and “tolerated” versus “unacceptable”, which seems to be a more relevant threshold.

**Table 1** The construction of the index of tolerance to corruption

To what extent do you think it is acceptable to do any of the following:				
	Always acceptable	Sometimes acceptable	Never acceptable	Don't know
To give money	Coded as 3	Coded as 2	Coded as 1	Excluded
To give a gift	Coded as 3	Coded as 2	Coded as 1	Excluded
To do a favour	Coded as 3	Coded as 2	Coded as 1	Excluded
The index of tolerance to corruption	<i>Acceptable</i> (coded as 3) At least one answer = “always acceptable”	<i>Tolerated</i> (coded as 2) At least one answer = “Sometimes acceptable” and no answer = “always acceptable”	<i>Unacceptable</i> (coded as 1) All three answers = “never acceptable”	
We recoded the index of tolerance to corruption into binary variable	<i>Acceptable and Tolerated</i> = 1		<i>Unacceptable</i> = 0 (no tolerance to corruption)	

Source: Author based on the questions from Eurobarometer 79.1 (2014)



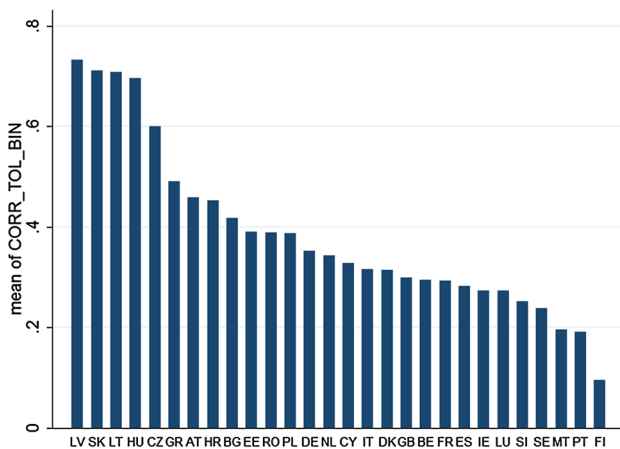
**Fig. 2** The distribution of the index of tolerance to corruption in percent. Source: Author based on Eurobarometer 79.1 (2014)

The distribution of the index of tolerance to corruption among respondents is shown in Fig. 2. More than 60% of respondents stated that each of corrupt practices mentioned above are always unacceptable.

To simplify the interpretation of our results, we assume that those who accepted or tolerated corruption are either actual or potential bribers or at least those who are well adapted to this kind of behaviour.

The average tolerances of corruption within various countries are shown in Fig. 3. Higher values correspond to the higher average tolerance of corruption within a country. The factors correlated with a respondent’s tolerance of corruption are further examined in our analysis by using logit regression models. We also used this indicator as an independent variable in some logit models that measured experiences with corruption. However, we assume that there may be a potential problem of reverse causality in this case.

All dependent variables are summarized and characterized in the Appendix 2. We used socio-economic variables specific to individual respondents in the sample.



**Fig. 3** Average tolerances to corruption in the EU countries. Source: Eurobarometer 79.1 (2014)

These include, among others, gender, age, education, marital status, employment status, and profession. From the perspective of the individual respondents, we also focused our attention on a respondent's individual contact with the public authorities and any problems that they may have with paying their bills. Contact with public authorities is very likely a key factor when examining corruption. There is only a very small chance for respondents to come into contact with corruption when they are not in contact with public officials. Problems with paying bills also serve as an indicator of the respondent's level in society.

We applied several country-specific dependent variables, which are mostly focused on public sector characteristics and institutional factors. These variables are summarized in Appendix 3. They include the share of people interacting with the public sector via the Internet, the share of people with tertiary education, the rule of law index, the government efficiency index, public accountability, and political stability. However, as we can see in Table 2, these variables are mostly strongly correlated to each other. In order to ensure the unbiased results of the regression models, we decided to apply all highly-correlated independent variables to separate equations.

It is rational to assume that the selected country-specific variables could play an important role in the incidence of corruption in the country. Despite the fact, that we used these primarily as control variables, it could also in order to determine which institutional factors may influence corruption the most. We especially believe that the rule of law, government efficiency, and the indicator of Internet interaction with government may play an essential role in this respect.

## 4 Results and discussion

First, we analyse the potential role of selected independent variables in the incidence of corruption using experience-based data. A positive and significant coefficient means that the variable is more likely to increase the probability of

**Table 2** Correlation coefficients between selected independent variable

	Internet interaction with government	Tertiary education	Rule of law	Government efficiency	Public voice accountability	Political stability
Internet interaction with government	1.00					
Tertiary education	0.5660	1.00				
Rule of law	0.8282	0.6242	1.00			
Government efficiency	0.8757	0.6306	0.9532	1.00		
Public voice accountability	0.8594	0.5625	0.9484	0.9402	1.00	
Political stability	0.4940	0.1158	0.6091	0.6083	0.6224	1.00

Source: Author



experiencing corruption. Table 3 shows the results of the first two groups of logit regression models.

While the experience of corruption is used as the dependent variable in the first four models, the reporting of corruption has been applied in the fifth model. We have also used several control variables at the micro-level and country-level. For example, self-assessed knowledge about where to report corruption has been used as a control variable in the fifth model.

As we stated in the methodology section, we can assume that those respondents who mentioned their experience with corruption in the survey are mostly victims of corruption. This could be especially true for all of those reporting this experience to someone (dependent variable, model 5). The results of the first four regressions strongly indicate that education, gender, and age are all significant variables.

The results of the first four regressions strongly indicate that education, gender, and age are all significant variables. More educated people, as well as men, are more likely to become the victims of corruption. In the case of age, there seems to be a non-linear inverted U-curve relationship (except regression 4), with the turning point occurring at approximately 34 years. The probability of experiencing corruption increases with age approximately to 34 years old, and then its probability decreases. Furthermore, women appear to have less experience with corruption. Another highly significant variable in all models concerns the respondents' ability to pay for their expenses. Respondents who have serious problems with paying their bills are exposed to corruption significantly more often. This could be also seen as some proxy for the social status of the respondent. Turning to employment status and corruption, self-employed respondents clearly stand out above all other categories. There is a significantly higher probability for a self-employed respondent to come into contact with corruption than for other respondents. This has been repeatedly confirmed by every logit model utilised in our research.

Furthermore, we experienced another two findings. As assumed, contact with public authorities is one of the decisive factors in experiencing corruption. People who are not in direct contact with public officials are of course unlikely to come into contact with corruption. In a very similar sense, we also tested the effect of the average share of people interacting with public authorities via the Internet. This is a country-specific variable and reflects the average share within a certain country. According to our results, this variable is statistically significant at a level of 1% and seems to have a robust negative effect on the incidence of corruption. We also used the tolerance of corruption as an independent variable in the case of one regression model. As assumed, respondents who tolerate corruption more seem to be more involved in corruption-based activities. Based on our results, this correlation is quite essential. But can we say that people who have virtually no problem with corrupt behaviours are more likely to come into contact with this phenomenon? Despite the rationality of this interpretation, the problem of endogeneity may interfere in this case. We can also assume that individuals who are more exposed to corrupt behaviours could have a higher threshold of tolerance of corruption due to their experiences. In line with this assumption, we did not apply this variable to any other models.

In line with our expectations, the results of the regression where “reported corruption” have been used as dependent variable are mostly similar to the previous

**Table 3** The results of logit models

	Dependent variable: experienced corruption (yes = 1; no = 0)				Dependent variable:
	(1)	(2)	(3)	(4)	reported corruption (yes = 1; no = 0)
	dy/dx	dy/dx	dy/dx	dy/dx	(5) dy/dx
Corruption tolerance			0.021*** (9.81)	0.017*** (10.98)	
Education	0.001*** (2.96)	0.002*** (4.23)	0.001*** (3.01)	0.001*** (4.07)	0.0001** (2.01)
Married	-0.002 (-0.08)	-0.004 (-0.10)	-0.004 (-0.15)	0.002 (0.84)	-0.00001 (-0.01)
Gender (male = 1; female = 0)	0.006** (2.55)	0.008** (2.55)	0.064*** (2.64)	0.007*** (3.21)	0.0008 (1.17)
Age	0.001* (1.66)	0.001* (1.67)	0.001* (1.78)	-0.001*** (-3.63)	0.0003** (2.10)
Age <sup>2</sup>	-0.0001** (-2.33)	-0.0002** (-2.45)	-0.0001** (-2.39)		-0.00001** (-2.56)
Rural/urban	0.002 (0.59)	0.002 (0.58)	0.001 (0.55)	-0.002 (-0.08)	-0.0001 (-0.20)
Children	-0.003 (-1.18)	-0.004 (-1.24)	-0.003 (-1.09)	-0.003 (-1.33)	-0.0007 (-1.19)
Tv	0.004 (0.45)	0.008 (0.62)	0.002 (0.24)	0.003 (0.34)	0.0004 (0.20)
Car	0.003 (1.24)	-0.006 (-1.04)	0.003 (1.12)	0.002 (0.79)	0.0008 (0.71)
Problems with paying bills	0.012*** (5.79)	0.012*** (3.72)	0.01*** (5.52)	0.008*** (5.41)	0.0005 (1.04)
Unemployed	-0.001 (-0.14)	-0.002 (-0.35)	-0.001 (-0.02)	0.011 (0.27)	0.0032** (2.45)
Self-employed	0.029*** (5.22)	0.033*** (3.45)	0.027*** (4.98)	0.023*** (4.14)	0.0024** (1.97)
Top management	0.013 (0.75)	0.003 (0.14)	0.013 (0.76)	0.008 (0.56)	0.0044 (1.53)
Employed professional	0.003 (0.45)	0.0001 (0.01)	0.003 (0.51)	0.002 (0.45)	-0.0012 (-0.89)
Contact with authorities				0.045*** (13.63)	
Know where to report					0.0059*** (5.64)
Internet interaction with government		-0.013** (-2.31)			
Tertiary education		-0.0003 (-0.16)			
Dummy variables for EU countries (excluding Malta)	Yes	No	Yes	Yes	Yes
Log pseudolikelihood	-5769.29	-6130.3	-5668.54	-5455.57	-1130.13
Observations	26,941	26,941	26,941	26,941	26,009

Source: Author

(.) denotes z-statistics and \*\*\*/\*\*/\*\*\* denotes statistically significant at the 10/5/1 percent level. Standard errors have been corrected for heteroscedasticity and clustered at country level (adjusted for 28 clusters)

four models. However, there are still some differences. Gender as well as problems with paying bills appear to be both insignificant (but still positive). On the other hand, unemployed people are more likely to become victims of corruption (those reporting this experience to someone) according to this measure. In the next part of the analysis, we focus our attention on country-specific institutional control variables. The results of the next regression models are shown in Table 4.

According to them, the rule of law, government efficiency, and public accountability seem to have a strong negative correlation with the incidence of corruption. It is evident that a stronger rule of law within a country may decrease corruption levels. The same is true for government efficiency. We can say that a more efficient public sector may be less vulnerable to corruption. Furthermore, public voice accountability seems to play also very important role in reducing corruption as well. On the other hand, based on the results it seems to be likely that political stability does not reduce corruption. In the last model (see Table 4), we used country averages for the perception of corruption in a given country as the independent variable. This principally controlled for the perceived levels of corruption in a country. We also tested the relationship between the respondents' perception of how widespread corruption is in their country as well as their real experiences with corruption. As expected, this variable has an intensive and significantly-positive effect on the probability of contact with corruption. Moreover, the results again support our previous findings about the role of selected socio-economic variables.

Finally, we focused our attention on the tolerance of corruption, suspected to be a key factor affecting the incidence of corruption. Moreover, as stated in the methodology, respondents with a higher tolerance of corruption could be seen as suspected bribers or those obtaining some benefit from corrupt activities. We again applied logit regression with a calculation of marginal effects. The results are summarised in Table 5. First of all, the extent of corruption within a country seems to be significantly associated with the individual tolerance of corruption. Thus, it seems likely that a corrupt environment could lead to a higher individual tolerance of corruption, which could again lead to higher incidences of corruption within a given country.

Further results again suggest that self-employed people in general seem to have a significantly higher tolerance of corruption. Thus, self-employed people tend to be more often involved in corruption on both sides. On the other hand, having a problem with expenses is not a statistically significant variable, in contrast to the models of the experience of corruption. In other words, low-income people tend to often be the victims of corruption but not the initiators of corruption.

Based on the results, it seems also likely that education may decrease the tolerance of corruption, and women appear to not be less tolerant of corruption as previously found in other studies. There is also some weak evidence that having a child could be negatively correlated with respondents' involvement in corruption. Perhaps this could be the consequence of an increasing sense of responsibility and higher risk aversion.

As far as we know, the consequences of corruption tolerance and institutional determinants of corruption have not been studied based on similar micro-level data so far. This approach allows us to analyse corruption based on a considerable

**Table 4** The results of logit models

Dependent variable: experienced corruption (yes = 1; no = 0)					
	(1) dy/dx	(2) dy/dx	(3) dy/dx	(4) dy/dx	(5) dy/dx
Education	0.002*** (3.56)	0.002*** (3.61)	0.002*** (3.60)	0.002*** (3.46)	0.001*** (3.08)
Married	0.0005 (0.14)	−0.0003 (−0.10)	0.0003 (0.10)	0.005* (1.65)	0.0003 (0.11)
Gender	0.007* (2.12)	0.007** (2.05)	0.007*** (2.02)	0.008** (2.35)	0.007** (2.43)
Age	0.001** (1.79)	0.001** (2.27)	0.001* (1.81)	0.002*** (3.08)	0.001** (2.23)
Age <sup>2</sup>	−0.00002*** (−2.85)	−0.00002*** (−3.31)	−0.00002*** (−2.81)	−0.0002*** (−4.20)	−0.00002*** (−2.97)
Rural/urban	0.001 (0.44)	0.0005 (0.18)	0.002 (0.58)	0.002 (0.43)	0.006 (0.19)
Children	−0.004 (−1.15)	−0.003 (−1.15)	−0.004 (−1.21)	−0.006** (−2.00)	−0.004 (−1.38)
Tv	0.005 (0.41)	0.004 (0.32)	0.006 (0.48)	0.015 (1.25)	0.007 (0.75)
Car	−0.005 (−0.91)	−0.003 (−0.60)	−0.003 (−0.76)	−0.016*** (−3.07)	0.001 (0.48)
Problems with paying bills	0.009** (2.59)	0.010*** (2.87)	0.009*** (2.62)	0.018*** (4.91)	0.012*** (5.52)
Unemployed	−0.019 (−0.41)	−0.001 (−0.24)	−0.002 (−0.41)	−0.004 (−0.69)	−0.003 (−0.52)
Self-employed	0.032*** (3.26)	0.031*** (3.61)	0.034*** (4.05)	0.034*** (4.13)	0.034*** (6.99)
Top management	0.006 (0.33)	0.006 (0.33)	0.007 (0.38)	−0.005 (−0.26)	0.010 (0.57)
Employed professional	0.001 (0.20)	0.0006 (0.10)	−0.0002 (−0.04)	0.003 (0.29)	0.002 (0.27)
Rule of law	−0.041*** (−4.52)				
Government effectiveness		−0.046*** (−5.45)			
Public voice accountability			−0.060*** (−5.91)		
Corruption perception (country average)					0.581*** (9.44)
Political stability				0.005 (0.29)	
Log pseudolikelihood	−6103.2	−6093.39	−6122.7	−6266.2	−5821.9
Observations	26,941	26,941	26,941	26,941	26,941

Source: Author

Notes: (.) denotes z-statistics and \*/\*\*/\*\* denotes statistically significant at the 10/5/1 percent level. Standard errors have been corrected for heteroscedasticity and clustered at country level (adjusted for 28 clusters)

**Table 5** The results of logit models

Dependent variable: corruption tolerance (acceptable or tolerated = 1, unacceptable = 0)			
	(1) dy/dx	(2) dy/dx	(3) dy/dx
Education	−0.0006 (−0.84)	−0.002*** (−2.97)	−0.002*** (−2.94)
Married	−0.012* (−1.04)	−0.005 (−0.59)	−0.004 (−0.55)
Gender	0.003 (0.35)	0.005 (0.54)	0.006 (0.67)
Age	−0.002*** (−3.31)	−0.002*** (−3.68)	−0.002*** (−3.57)
Age <sup>2</sup>			
Rural/urban	0.005 (0.64)	0.004 (0.57)	0.005 (0.60)
Children	−0.005 (−1.28)	−0.006* (−1.77)	−0.006* (−1.72)
Tv	0.057 (1.41)	0.044 (1.09)	0.043 (1.05)
Car	−0.016 (−0.54)	0.0003 (0.01)	0.002 (0.11)
Problems with paying bills	0.005 (0.61)	0.002 (0.34)	0.001 (0.19)
Unemployed	−0.022 (−1.08)	−0.012 (−0.56)	
Self-employed	0.035** (2.46)	0.029** (2.01)	
Top management	−0.002 (−0.06)	−0.010 (−0.36)	
Employed professional	−0.007 (−0.32)	−0.004 (−0.18)	
Corruption perception (the country average)	2.284*** (5.70)		
Dummy variables for all EU countries (excluding Malta)	No	Yes	Yes
Log pseudolikelihood	−20,310.2	−16,366.7	−16,366.7
Observations	26,909	26,941	26,941

Source: Author

Notes: (.) denotes z-statistics and \*/\*\*/\*\* denotes statistically significant at the 10/5/1 percent level. Standard errors have been corrected for heteroscedasticity and clustered at country level (adjusted for 28 clusters)

number of observations at a level where this problem actually arises. Despite this fact, it is important to point out that the survey data have some limitations when studying corruption and its determinants, as stated in the literature review and methodology. Moreover, it should also be borne in mind that this analysis is only a static one; thus there are no trends to be captured. The issue of endogeneity could be seen as another problem arising from our analysis. We believe that this problem could be reduced by the application of exogenous control variables (such as gender, age, education, occupation, ownership of certain durables...) as well as by the usage of country-specific averages for potentially endogenous variables (tolerance of corruption, perception of corruption). Using instrumental variables regression could be beneficial in this case, but unfortunately finding appropriate instruments is a very challenging issue. Similarly, we also examined country-specific institutional variables and their association with corruption perception and corruption tolerance at the level of individual respondents. Despite the fact that our analysis has been

conducted based on data from European countries, we believe that our findings could be, with some limitations, applicable to all developed countries.

## 5 Concluding remarks

Our study brings some new empirical insights into the problem of corruption and its potential determinants. The interpretation of the results is rather complex and several implications for public policy may be derived from our results. We begin with the socioeconomic characteristics of respondents, which could have an effect on experience with corruption and tolerance of corruption.

Most of these results conform to the findings of previous studies (Melgar 2010; Mocan 2008; Mutascu 2010), but there are also several new aspects that arise. It is interesting that education seems to be positively correlated with a higher probability of experiencing corruption, but negatively correlated with a tolerance of corruption.

However, the average educational level in a country seems to be not correlated with the incidence of corruption. Furthermore, the experience with corruption rises in conjunction with age until approximately 34 years, after which it declines. With respect to gender, men appear to be more often victims of corruption than women, in spite of nearly equal tolerances of corruption for both men and women. Moreover, there is some evidence that respondents living with children in their household tend to be less tolerant to corruption and thus they are also less likely to become bribers. Hence, there is some reason to believe that a decrease in corruption may be one of the side products of effective family support policies.

We also identify the most critical groups of respondents with respect to corruption. The first group contains those having problems paying their bills (low-income class). People in this group appear to be victims of corruption more often. This may be true for unemployed people as well, as shown by the results of other regression. On the other hand, self-employed people have in general a higher tolerance of corruption, which is not true for those having problems with paying their bills or the unemployed. Hence, self-employed people are involved in corruption on both sides. In addition to the fact that they are often the victims of corruption, a significant part of this cohort also tends to accept this kind of behaviour and possibly engage in it themselves. Our results are partly in line with the assumptions of Torgler and Valev (2006), who argued that self-employed individuals might be in the best position to invest in bribing and benefit from corruption. Based on the results, we can say that anti-corruption policy must be especially targeted towards younger, less-educated, self-employed people with no children. On the other hand, a better-educated man in his early 30s is a typical victim of corruption. This is especially true for low-income groups.

We also found strong support for the assumption that contact with public officials is perhaps the key factor affecting the incidence of corruption. It is obvious that respondents that came into contact with authorities experienced corruption significantly more often, and the effect of this variable is quite strong. Moreover, higher average shares of individuals interacting with government via the Internet seem to be negatively correlated with the level of corruption. Hence, the prevention

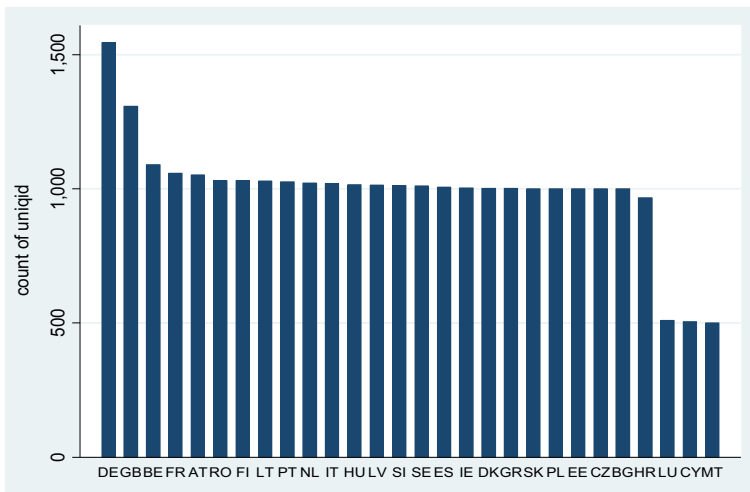
of direct contact with officials seems to be a substantial step towards reducing corruption. Maybe the most effective way to accomplish this may be through the introduction or enhancement of e-government usage within a country. These findings are strongly in accordance with several other previous studies (Andersen 2009; Hunady and Orviska 2015).

Regarding public governance, the rule of law, government effectiveness, and public accountability seem to have an essential role in reducing the corruption. This result is consistent with previous findings of Zhao and Xu (2015). The same seems to be true for stronger public accountability. Thus, it seems likely that corruption is a less-serious phenomenon when citizens are able to freely express their views on politics, freely select their government, and actively participate in politics. The assumed negative correlation between a stronger rule of law and corruption is strongly supported by our analysis. However, political stability in the country seems to have no significant effect on corruption.

Our results also strongly suggest that higher incidences of corruption in a country may increase individual tolerance of corruption. Hence, a corrupt environment could have a significant effect on an individual's tolerance of corruption, which in turn could have further consequences on the incidence of corruption in a country. Thus, we arrive at a vicious circle, with corruption feeding upon itself in this respect.

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## Appendix 1



Source: Author based on the Eurobarometer 79.1 (2013).

The representation of respondents in the sample based on the residence country. Source: Author based on the Eurobarometer 79.1 (2013)

## Appendix 2

Description of socio-economic variables included in the regressions. Source: Author based on the Eurobarometer 79.1 (2013)

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All data are retrieved from Eurobarometer 79.1 (2013)

Name of the variable	Description of dependent variables and their coding
Experienced corruption	In the last 12 months, have you experienced any case of corruption? Yes = 1; no = 0
Reported corruption (exclusively victims)	Did your reported experienced corruption to anyone or not? Those that reported corruption = 1 Those that did not report a case of experienced corruption or did not experience corruption in the last 12 months = 0
Corruption tolerance (recoded as follows: acceptable or tolerated = 1, unacceptable = 0)	Talking more generally, if you wanted to get something from the public administration or public services, to what extent do you think it is acceptable to do any of the following money (always acceptable = 3; sometimes acceptable = 2; never acceptable = 1): (1) to give money, (2) to give a gift, (3) to do a favour. Based on the answers to previous question the index of tolerance to corruption is calculated. (recoded to binary variable as follows: acceptable or tolerated = 1; unacceptable = 0)
Know where to report	If you were to experience or witness a case of corruption, would you know where to report it to? Yes = 1; no = 0
Education	How old were you when you stopped full-time education? (exact age)
Married	Married = 1; unmarried = 0
Gender	Male = 1; female = 0
Age	How old are you? (exact age)
Rural/urban	Would you say you live in a...? Rural area or village = 1; Small or middle sized town = 2; Large town = 3
Children	Are there any children less 14 years old living in the household? (yes = 1; no = 0)
Tv	Which of the following goods do you have?...Television (yes = 1; no = 0)
Car	Which of the following goods do you have?...Car (yes = 1; no = 0)
Problems with paying bills	During the last twelve months, would you say you had difficulties to pay your bills at the end of the month...? Most of the time (coded = 3), From time to time (=2); almost never/never (=1)

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continued

Unemployed	Did you do any paid work in the past? What is your current occupation?... Unemployed or temporarily not working (yes = 1, no = 0)
Self employed	Did you do any paid work in the past? What is your current occupation?... Self employed (yes = 1, no = 0)
Top management	Did you do any paid work in the past? What is your current occupation?... General management, director or top management (yes = 1, no = 0)
Employed professional	Did you do any paid work in the past? What is your current occupation?... Employed professional (employed doctor, lawyer, accountant, architect...) (yes = 1, no = 0)
Contact with authorities	Over the last 12 months, have you had any contact with any of the following: police, customs, tax authorities, social security and welfare authorities, public prosecution service, politicians, political parties, officials awarding public tenders, officials issuing building or business permits, health-care system, the education sector and inspectors in your country (yes = 1, no = 0)

### Appendix 3

Country-specific variables included in the regressions. Source: Author

Variable name	Description of dependent variables and the coding	Source
Corruption perception (the country average)	How widespread do you think the problem of corruption is in your country? We calculated the country specific means of corruption as perceived by the respondents in each country	Eurobarometer 79.1 (2013)
Internet interaction with government	Individuals using the internet for interaction with public authorities within 12 months before the survey (% of individuals aged 16–74)	Eurostat database (code: tin00013)
Tertiary education	Population with tertiary educational attainment level (% of total population)	Eurostat database (code: edat_ifse_07)
Rule of law	Rule of Law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. The estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution	World bank database: Worldwide Governance Indicators. <a href="http://databank.worldbank.org/data/reports.aspx?source=worldwide-governance-indicators">http://databank.worldbank.org/data/reports.aspx?source=worldwide-governance-indicators</a>

continued

Variable name	Description of dependent variables and the coding	Source
Government effectiveness	Government Effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. The estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution	
Public voice accountability	Public voice and Accountability captures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. The estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution	
Political stability	Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism. The estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution	

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