Does aid fuel corruption? New evidence from a cross-country analysis*

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ABSTRACT
This study estimates the effect of foreign aid on corruption using a Two-Step Least Squares method. We address endogeneity using instrumental variables that capture geographical and cultural proximities between donor and recipient countries. Based on a panel framework of 122 countries for the period 2005–2017, we find no significant impact of foreign aid on corruption. Our benchmark results remain insignificant even after checking with respect to different samples, estimation techniques, and the types of aid.

1. Introduction
A large strand of aid effectiveness literature after the 1990s focuses on the link between aid, development, and good governance outcomes in the recipient economies. The findings by Burnside and Dollar (2000) that aid can have a positive effect on growth in countries with good institutions sparked debate about the importance of institutions for both, aid effectiveness and aid allocation in developing countries. Overall, the literature on aid and good governance examines the impact of aid on three dimensions of good governance, namely political, administrative, and judicial (Dijkstra 2018). Similar to other questions in aid literature, the research on aid and good governance offers mixed evidence. The disagreements revolve on how aid flows affect the good governance outcomes in the recipient economies. Some scholars argue that foreign aid supports developing countries by strengthening their institutions and enabling them to fight corruption and become more accountable (Tavares 2003). Other scholars argue that certain time periods matter for aid effectiveness in reducing corruption. For example, Charron (2011) finds that the increased efforts of international organizations on reducing corruption in developing countries after 1997 (the so-called Anti-Corruption Movement) led to multilateral aid being effective in combating corruption in these countries. Indeed, in a systemic review on the aggregate effects of aid on governance over 1995–2016, Dijkstra (2018) finds an improved effect of aid on certain dimensions of good governance such as democracy, governance capacities, corruption and political stability. On the other end of spectrum, scholars contend that foreign aid has done more harm than good to developing countries by reducing the quality of their institutions and abilities to mobilize their domestic resources; as well as by increasing rent seeking behavior and corruption (Alesina and Weder 2002; Knack 2001; Moyo 2009). Aid might also lead to elite capture as shown by high amounts of foreign assistance being linked to higher deposits held in offshore bank accounts (Andersen, Johannesen, and Rijkers 2020). And yet, more aid flows do not seem to go to less corrupt countries (Alesina and Weder 2002); instead, more aid is received by more corrupt countries (De la Croix and Delavallade 2014).

The relationship between foreign aid and corruption is the focus of this paper. While aid remains an important source of finance for many developing countries, the debate whether aid should be allocated only to countries with good institutions is unsettled as there is no clear evidence on how aid affects governance indicators in the recipient economies. Thus, the impact of aid on corruption remains an important empirical question and this paper contributes into this research in two aspects. First, it examines the role of aid on corruption by using a more recent dataset (2005–2017) on a larger sample of countries (122 countries). As aid to the developing countries has tripled during the examined period and the reviewed evidence shows an improved effect of aid on reducing corruption over time, findings from this research present a fresh outlook on this relationship. Second, it addresses the issue of endogeneity in

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estimating the causal effect of foreign assistance in the level of corruption as per Tavares (2003) by using instrumental variables that capture geographical and cultural similarities between donors and recipient countries; and, it performs broad robustness testing to check the validity of the results.

The main hypothesis of this paper is that foreign aid increases the level of corruption. Our empirical findings do not support this hypothesis. The 2SLS results show that the coefficient sign of instrumented foreign aid is positive and significant, indicating that foreign aid actually decreases the level of corruption. However, the significance of these results vanishes when we include time fixed-effects. The relationship between aid and corruption remains positive but statistically insignificant even after checking for certain sub-samples, such as African countries sub-sample; sub-sample without African countries; as well as sub-samples with low and middle-income level countries. Finally, robustness checks using alternative measures of aid and corruption produce similar results.

The rest of the paper is organized as follows: Section 2 reviews the literature on corruption and foreign aid; Section 3 describes the data and their sources; Section 4 presents the main 2SLS results and the robustness test results; Section 7 concludes.

2. Literature review

Studies on aid and corruption differ based on the time periods examined, the sample of countries covered (whole sample versus sub-samples from certain regions), the modality of aid (aggregate aid versus multilateral and bilateral aid); the estimation techniques; as well as the measurements used for the corruption index. Overall, the results on aid and corruption nexus are inconclusive and can generally be divided into three strands of literature.

One strand of literature on aid and corruption concludes that aid reduces the quality of institutions and increases corruption in recipient economies. In most of these studies, the quality of institutions is measured through the International Country Risk Guide index (ICRG) which covers three dimensions, namely, bureaucratic quality, corruption, and the rule of law. For example, Knack (2001) investigated the influence of aid on the quality of governance through the ICRG index for 80 countries covering 1975–1995 and finds that higher aid inflows lower the quality of governance and increase corruption. Similarly, Alesina and Weder (2002) investigate the influence of aid on corruption on a sample of 63 countries from 1981 to 1995 and they find that an increase in foreign aid leads to a greater level of corruption. Additionally, although more aid leads to more corruption, Alesina and Weder (2002) suggest that less corrupt countries receive less aid.

By focusing their analysis on Sub-Saharan Africa, Bräutigam and Knack (2004) find that aid to these recipient countries has deteriorated both, the quality of institutions and tax efforts as measured by tax as a share of GDP. Similarly, Asongu (2012) examines the effect of aid on corruption on a sample of 52 African countries over 1996–2010 and shows that aid does not mitigate corruption. He concludes that previous studies which show a positive effect of aid on corruption may not hold for the African continent. Furthermore, Asongu and Jellal (2013) examine the aid-corruption nexus for 53 African countries using the same time period as Asongu (2012). They extend the debate to the channels through which foreign aid impacts corruption, namely aid channeled through government consumption versus private sector investments and tax efforts. Their two main findings are that, foreign aid, which is channeled through government consumption, leads to more corruption; however, this is not the case for foreign aid channeled through private investments and tax breaks (Asongu and Jellal 2013).

Another strand of studies on aid and corruption suggests a positive relationship between the two. Tavares (2003) finds that aid reduces corruption in recipient countries. He uses a Two-Stage Least Squares technique and instruments aid in the first stage with geographical and cultural distance to the donor countries.

The time periods under consideration seem to matter for the type of relationships between aid and corruption. Dijkstra (2018) performed a systemic review of the literature on aid and governance in the Web of Science database covering 1995–2016, and she concludes that the effect of aid in reducing corruption improves over time. According to Dijkstra (2018), these improvements are present after the Cold War period, and this holds true not only for the corruption index but also for other governance dimensions such as democracy, government capacity, and political stability. For example, Charron (2011) examines whether aid and corruption relationship changes when considering different time periods. He divides the time periods before and after 1997 and also distinguishes between bilateral and multilateral aid. His results indicate that while bilateral aid does not have any significant impact on corruption, multilateral assistance decreases corruption, but only after 1997. Findings from Charron (2011) support previous evidence that aid conditionality of donors improved
after the Cold War, that is, aid allocation driven by donors’ geopolitical interest changed as donors started to condition aid flows on countries’ institutional reforms (Dunning 2004; Dijkstra 2018). Findings by Charron (2011) that aid reduces corruption after the 1990s are further confirmed by Okada and Samreth (2012) who focused in the period 1995–2009. Okada and Samreth (2012) distinguish between multilateral and bilateral aid and introduce the Quantile Regression approach to test for different levels of corruption distribution. Their findings show that aid allocated by multilateral organizations is more efficient in fighting corruption and it has a greater effect on less corrupted countries with better policies.

A third strand of studies offers insignificant or mixed results on the relationship between aid and corruption index. Covelli and Islam (2006) find no significant effect of aid on institutional quality measured through the ICRG indicator. They suggest that the effect of aid on institutional quality/corruption vanishes when using different estimation and specification methods. Ear (2007) investigates the relationship between aid dependency and the quality of institutions and his results are mostly insignificant and sensitive to different specifications. Menard and Weill (2016) also find an insignificant relationship between aid and corruption. They use data for 71 countries during 1996–2009 and perform a Granger causality test to examine the sign and direction of aid and corruption. Their main finding is that there is no causal relation between aid and corruption (Menard and Weill 2016).

When testing for non-linear relationship between aid and corruption, Dalgaard and Olsson (2008) find that, a low level of aid is efficient on reducing corruption; however, this relationship diminishes for a higher quantity of aid. Kangoye (2013) also offers mixed results on aid and corruption nexus. His study analyzes data during 1984–2004 and finds that high aid inflows might decrease the level of corruption; however, aid unpredictability intensifies it. Kangoye (2013) suggests that uncertainty among recipient country’s leadership about future aid fuels corruption as these leaders want to over-extract rents from foreign inflows before they are cut.

Overall, studies, which analyze time periods that are more recent, show either a tendency for the aid-corruption relationship to has improved or it has vanished, as the results are insignificant or dependent on certain model specifications. To reinvestigate the relationship between aid and corruption we focus on a more recent time-period and apply several robustness checks through different estimation techniques as well as different model specifications. We also test our results on certain sub-samples, as well as distinguish between multilateral and bilateral donors.

3. Data description

This study includes a panel of 122 low-income and middle-income countries covering 2005–2017. Countries are selected conditional on whether they received foreign aid during the analyzed period. Turkey is not included as an aid recipient country given that it is one of the twelve largest OECD economies. Due to the missing data, aid recipient countries such as Montenegro, Kosovo, South Sudan, Syria, Yemen, are not included in the analysis. Table A1 in the appendix shows the summary statistics for the main variables used in the model.

Corruption Perception Index (CPI) is our dependent variable, provided by the Transparency International Agency since 1995. This index is based on perceptions and aims to capture corrupt behaviors such as bribery, diversion of public funds, the use public office for private gain, nepotism in the civil service and the so-called state capture (Transparency International 2019). There are 1374 observations for corruption, ranging from 2 to 67 index points, implying a considerable variation in the sample. In 2012, Transparency International changed the methodology of measuring the corruption index, by scaling it from 0 to 100, where the lowest values are associated with very corrupt countries. Since the index was scaled from 0–10 before 2012, we multiply it by ten in order to standardize the outcome variable. World Bank Worldwide Governance Indicators provide another measure of corruption, ranging from −2.5 to 2.5 with high values suggesting indicating a low level of corruption. This different measure of corruption is employed for the robustness checks, and there are 1534 observations.

The primary explanatory variable of interest is the Official Development Assistance (ODA), measured by the Organization for Economic Cooperation and Development (OECD) since 1961. In this study, official development assistance is expressed as a percentage of GNI. Later, we divide foreign aid into multilateral and bilateral aid to examine any differences in their impact on corruption index. The summary statistics table shows few countries which received more than 90 percent of their GNI in foreign aid. We treat these observations as outliers and drop them from the sample. As a robustness check, we also use the measure of foreign aid expressed in millions of constant dollars.

This study’s instrumental variables are religion, border, language, and distance – CEPII research center provides gravity datasets based on country
characteristics. Three of these variables – religion, border, and language – are dummies, reported as constructed instruments in the summary statistics table. They are multiplied with the aid inflows that recipient countries received from the 12 largest OECD economies.

Controlling variables considered in the model are inflation, GDP, government effectiveness, democracy index, military spending, natural resources, and consumption. Inflation captures macroeconomic distortions. Government effectiveness is a variable provided by World Bank that takes values from −2.5 to 2.5, where high values are associated with more efficient governments. Data on the democracy index, are retrieved from the Polity IV Project; the index is scaled from 0 to 10, with higher values associated with advanced democracies. Military spending and consumption are measured as a percentage of GDP provided by World Bank; natural resources are proxied by the natural resource export value relative to GDP. Finally, a dummy provided by La Porta et al. (1999) indicating whether the country has a British or French legal system is used to control corruption differences and consumption is measured as a percentage of GDP.

4. Model specification
Reverse causality is the main issue while investigating the aid-corruption relationship. More corrupt countries are also less developed, and that leads to more aid, which in return may affect the level of corruption. Two-Stage Least Squares is considered as a popular method of addressing this issue. However, this technique requires the challenging task of finding instruments, which affect aid but not corruption. Charron (2011) used colonial origin, regional dummies, and two to five years averaged lagged corruption variable as instruments. Although these instruments may be relevant in the first stage, it is hard to determine their direct impact on the level of corruption. For instance, many developing countries have a stable corruption index and the average of past values is positively correlated with the current index. Furthermore, regional dummies are correlated with the level of GDP per capita and economic development overall. Higher income level is associated with a lower level of corruption. Regional indicators are sometimes included in the basic specification. Finally, the colonial origin is associated with the legal system, a significant explanatory variable in this study. In other words, whether a country has a UK or French legal system can make a difference in the level of corruption.

The population’s size is another popular instrument used in previous studies (Goldsmith 2001; De la Croix and Delavallade 2014; Svensson 1999). The idea is that the size of the population does not determine the country’s corruption level. Knack and Azfar (2003) found that corruption indices are oversampled in large countries in terms of population and areas. This oversampling leads to a sample selection bias and may have potential problems as an instrument for aid. Bräutigam and Knack (2004) try to overcome this problem by using the initial log of population.

This paper addresses the endogeneity issue following Tavares (2003), who uses geographical and cultural proximities as instrumental variables. The instruments are constructed using the bilateral distance between donor and recipient country. Then, three dummy variables are used to capture the same majority religion, common border, and common language between the donor and the recipient country.1 The main aim of employing these variables is them affecting the level of foreign aid received by the donor country while being exogenous to the level of corruption. Tavares (2003) argues that when an OECD country increases the total aid outflows, recipient economies that are closer culturally and geographically will have an exogenous increase in aid inflows. Consequently, different from other studies, cultural and geographical factors are not included in the first stage directly, but after being multiplied with the 12 OECD countries aid outflows.

Before applying the 2SLS estimation, we run a panel fixed-effects model to compare the difference in the interest coefficient, specified as follows:

\[ y_{it} = \alpha_i + \pi_t + \beta_1 \text{TotalAID}_{it} + \sum_{k=2}^{K} \beta_k X_{k,lt} + u_{it} \]  

where \( y \) is corruption index in the country \( i \) at year \( t \), \( \alpha_i \) are all individual intercepts (fixed for a given \( N \)), \( \pi_t \) denotes year fixed-effects, \( \beta_1 \) is our interest coefficient, representing foreign aid variable as a percentage of GNI and \( \beta_k X_k \) embodies other controlling variables as reported in the previous section. All results are reported with robust standard errors in order to control for potential heteroscedasticity.

The following equation denotes the first stage of the 2SLS estimation:

\[
\text{TotalAID}_{it} = \phi_1 + \phi_4 \text{Religion}_{it} + \phi_2 \text{Border}_{it} + \phi_3 \text{Language}_{it} + \sum_{k=5}^{K} \phi_k X_{k,lt} + \epsilon_{it}
\]

where \( \phi_1, \phi_2, \phi_3 \) and \( \phi_4 \) are constructed instruments for the endogenous variable. These instruments must have
explanatory power with respect to foreign aid conditional on all other controlling variables, denoted by \( \phi_k X_i \) – which are the same with controlling variables described in equation 1 described above.

The validity of instruments is confirmed by computing three tests: underidentification LM test, weak identification test reported by F statistic and Sargan-Hansen test. The LM tests whether the equation is identified, implying that excluded instruments are relevant – correlated with the endogenous variable, which in our case is foreign aid. A rejection of the null indicates that instruments are not appropriate. F statistic shows the correlation between instruments and the endogenous variable. The value ten is taken as a threshold for accepting the relevance of the instruments (Anderws, Stock, and Sun 2019). Finally, the Sargan-Hansen test is used for overidentifying restrictions.

The second stage equation is as follows:

\[
y_{i,t} = \alpha_i + \pi_t + \beta_1 \text{TotalAID}_{i,t} + \sum_{k=2}^{K} \beta_k X_{k,i,t} + \mu_{i,t} \tag{3}
\]

The sign and the significance of the \( \beta_1 \) is debatable as researchers have reached opposite conclusions based on the different methodologies applied. Regarding the controlling variables, GDP per capita is usually associated positively with corruption, meaning that high-income countries have less corruption level. The model also includes the democracy index, scaled from 0 to 10, where higher values are associated with more advanced and stable democracies. Several studies confirm that advanced democracies have a lower level of corruption (Kolstad and Wiig 2011; Rock 2009; Saha and Campbell 2007); thus, we expect the democracy index to have a positive sign. Likewise, we expect that more effective institutions lead to less corruption. Inflation is included in the model as a proxy for macroeconomic distortions and this variable is expected to have a negative effect on the corruption index.

Furthermore, we control for military expenditures as a percentage of GDP. It has been argued that foreign aid dedicated to assisting the poor and promoting development is fungible to military investments because corrupted governments want to increase their power by modernizing the military and then controlling the state’s resources (Moyo 2009). In our analysis, we also control for the effect of natural resources on the level of corruption, proxied by the value of natural resources exports relative to GDP. When a country is rich in terms of natural resources, then corrupted regimes benefit from the resource rent, leading to more corruption. Hence, this coefficient is expected to be negative.

Finally, we controlled for consumption expressed as a percentage of GDP.

5. Empirical evidence

Table A2 in the appendix shows the results from the first stage regression with robust standard errors. Three out of four instrumental variables, namely instruments for the same majority religion, common border, and common language are statistically significant at 1 percent level. However, the fourth instrument capturing geographical proximity appears to have lower explanatory power to foreign aid because it is significant only at a 10 percent significance level. This is in line with previous evidence as the relationship between aid and distance is not clear, depending on donor’s interest to allocate more aid to their own neighborhood or extend their power to countries beyond their neighborhood (Blodgett Bermeo 2017).

Furthermore, in Table A3 in the appendix, an auxiliary regression explains that none of the instruments have explanatory power with respect to retrieved residuals after the second stage. In the beginning, we run the second stage regression where corruption is regressed on instrumented aid and other controlling variables. Then, we retrieve residuals and run the auxiliary regression when the predicted residuals are regressed on instruments and control variables. The auxiliary regression shows that none of the coefficients appear to be statistically significant.

The fixed-effects model and the 2SLS results without time fixed-effects (regressions 1–4 in Table 1) suggest a positive relationship between aid and corruption. The aid coefficient is statistically significant and depending on the estimation technique and model specification, it implies that a ten-percentage point increase in aid relative to GNI in recipient countries is associated with an improvement in corruption index by about 1.8–2.6 index points, on average. In the third regression, foreign aid interacts with a dummy indicating if the country is from the African continent. This interaction suggests a negative relationship for aid and corruption which is in line with findings by Asongu (2012) who found that aid increases corruption in African countries.

However, when including the time fixed-effects (regressions 5 and 6 in Table 1) the significance of the relationship between aid and corruption disappears and r-squared more than doubles, from 0.149 to 0.339, implying that time dummies explain a considerable amount of variation. The sign on the foreign aid coefficient is still positive, but insignificant. The same happens with the Aid x Africa interaction term when
we include the time fixed-effects. The sign of the interaction term is positive; however, its significance vanishes (regression 6).

The regression results in Table 1 suggest that while the impact of aid on reducing corruption seems to be positive, the statistical significance of the aid variable is not robust when including time fixed-effects. This rather fragile relationship between aid and corruption, unlike in Tavares (2003), could prevail for several reasons. First, our analysis covers a more recent period and more countries than Tavares (2003). Our study has 867 observations, while Tavares (2003) has 182 observations.

Second, we use a different measure of corruption. While Tavares (2003) uses ICRG index, we use the CPI by the Transparency International. Third, in the period after Tavares (2003) was published, the amount of foreign aid to developing countries more than tripled, from 50 to 150 billion dollars per year (see Figure A1 in the appendix). The increasing foreign assistance may have had different effects over the years; it may have assisted capacity building or created aid dependency in recipient economies and the ongoing rise in aid programs might have reduced the effectiveness of institutions to fight corruption in aid recipient countries. Lastly, corruption may not be the most significant determinant for donor countries when allocating aid to recipient countries. Given that considerable amounts of aid allocation is driven by political and strategic motives, donors might still give more aid to more corrupt countries.

Indeed, our findings are consistent with a more recent study by Menard and Weill (2016), who find no causal relationship between aid and corruption. Similar to Menard and Weill (2016), year dummies in our analysis explain a significant amount in the variation of corruption, mitigating the significance of the aid variable. The importance of aid might decrease when the country reaches, as Deaton (2013) calls, conditions for development. Studies published in 2000s were largely concentrated on the period when international institutions such as World Bank shifted their focus toward improving the quality of governance in the recipient economies. Thus, aid might have had a stronger impact on lowering corruption in the first decade (i.e. end of 1990s and 2000s) but the impact might have vanished over time.

To check the validity of our results produced with 2SLS with time fixed-effects, we perform broad robustness testing and present the results in Section 6.

As expected, the controlling variables related to democracy and government effectiveness are positive and statistically significant. The coefficient sign on the Polity IV’s index confirms that increasing the democracy index will lower the level of corruption. Similarly, the World Bank indicator for government effectiveness shows a positive and considerable impact on the corruption index. Inflation variable, which proxies for macroeconomic stability also enters with the expected sign, however, it becomes insignificant when using fixed-effects. The coefficient on the natural resources exports is negative and insignificant in regressions (3–4),

### Table 1. Fixed effects and 2SLS regression results.

|                      | (1)          | (2)          | (3)          | (4)          | (5)          | (6)          |
|----------------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Total AID            | 0.259***     | 0.242***     | 0.178*       | 0.220***     | 0.070        | 0.018        |
|                      | (0.058)      | (0.068)      | (0.092)      | (0.103)      | (0.093)      | (0.120)      |
| Gov effectiveness    | 2.136***     | 2.411***     | 2.179***     | 2.153***     | 2.443***     | 2.449***     |
|                      | (0.750)      | (0.791)      | (0.647)      | (0.641)      | (0.602)      | (0.604)      |
| GDP per capita       | 0.002***     | 0.000        | 0.002***     | 0.002***     | 0.000*       | 0.000**      |
|                      | (0.000)      | (0.000)      | (0.000)      | (0.000)      | (0.000)      | (0.000)      |
| Inflation            | −0.104**     | −0.058*      | −0.127**     | −0.112**     | −0.046       | −0.038       |
|                      | (0.046)      | (0.034)      | (0.034)      | (0.033)      | (0.040)      | (0.038)      |
| Democracy            | 0.552***     | 0.315*       | 0.499***     | 0.531***     | 0.284**      | 0.282**      |
|                      | (0.196)      | (0.169)      | (0.113)      | (0.111)      | (0.131)      | (0.134)      |
| NR rent              | −0.013       | 0.048        | −0.016       | −0.014       | 0.062*       | 0.067*       |
|                      | (0.046)      | (0.041)      | (0.042)      | (0.040)      | (0.037)      | (0.037)      |
| Military spending    | 0.152        | 0.189        | 0.159        | 0.156        | 0.224        | 0.238        |
|                      | (0.391)      | (0.354)      | (0.277)      | (0.276)      | (0.303)      | (0.304)      |
| Consumption          | −0.002       | −0.003       | 0.008        | 0.002        | 0.013        | 0.017        |
|                      | (0.062)      | (0.049)      | (0.040)      | (0.040)      | (0.028)      | (0.029)      |
| Aid x Africa         | −0.316**     | −0.205*      | −0.188*      | −0.107*      | 0.032        | 0.145        |
|                      | (0.124)      | (0.104)      | (0.107)      | (0.145)      |              |              |
| _cons                | 19.518***    | 25.553***    | 18.485***    | 19.099***    | 24.814***    | 24.584***    |
|                      | (4.993)      | (4.788)      | (5.415)      | (5.020)      | (2.955)      | (2.980)      |
|Obs.                  | 867          | 867          | 867          | 867          | 867          | 867          |
| R-squared            | 0.152        | 0.296        | 0.134        | 0.149        | 0.339        | 0.346        |
| Time fixed-effects   | No           | Yes          | No           | No           | Yes          | Yes          |
| Country fixed-effects| Yes          | Yes          | Yes          | Yes          | Yes          | Yes          |

Robust standard errors are in parenthesis.

*** p < 0.01, ** p < 0.05, * p < 0.1.
however, in regression (5–6) the coefficient changes the sign and becomes statistically significant at 10 percent. These rather unclear results are not in line with most of the existing evidence as larger natural exports in developing countries have turned out to be a curse rather than a blessing for these countries.

Instruments pass all three tests, and these results are shown in Table A4 in the appendix. Prob-value for the underidentification is less than 0.05 in all regressions, suggesting that the model is identified and instruments are relevant. In all cases, the F statistic is above 59, suggesting a strong correlation between instruments and the endogenous variable. However, the power of the Sargan-Hansen test weakens as soon as we include the interaction terms.

6. Robustness checks

One of the strengths of our analysis is that we verify the validity of the main results through several robustness checks reported in Tables 2 and 3. Selection of the variables and periods used in performing the tests draws largely on those used by existing studies (e.g. Menard and Weill 2016; Tavares 2003). All the tests confirm our main results presented in regressions 5–6 in Table 1.

In regression 1, we used the World Bank Governance Indicator as an alternative measure for corruption (Figure A2 in the appendix shows a high correlation between Transparency International and World Bank corruption indexes). The coefficient on aid variable is positive (albeit much smaller) and insignificant.

In regressions 2–4, we consider an alternative aid measure expressed in millions, as well as bilateral and multilateral aid modalities and we confirm their insignificant impact on the corruption index. Although the coefficient on total aid (regression 4) enters with a negative sign, it remains insignificant. Most of the other controlling variables in regressions 2–4 confirm our main estimates.

In the next step (regression 5–6), we construct three and five-year averages of aid flows to see whether our main results are driven by aid fluctuations. Again, the results are insignificant.

To check whether relationship between aid and corruption changed during the examined period, we analyze data before and after 2009, as well as before and after 2012. There are two main reasons for doing this: first, it is relevant to check if the financial crises of 2007–2009 had any possible implication on the aid and corruption relationship; second, we rescaled the

| Table 2. Robustness checks regression results. |
|-----------------------------------------------|
| (1)   | (2)   | (3)   | (4)   |
| CPI_WB | CPI_TI | CPI_TI | CPI_TI |
| Total AID | 0.001 | (0.003) | .207 | (1.82) |
| Gov effectiveness | .079*** | 2.42*** | 2.43*** | 2.37*** |
| GDP per capita | .376*** | 0.001* | 0.001* | 0.000 |
| Inflation | −0.002* | −0.042 | −0.008 | −0.050 |
| Democracy | .021*** | 0.295** | 0.254 | 0.306** |
| NR rent | −0.002 | 0.065* | 0.068 | 0.064* |
| Military spending | 0.000 | 0.267 | 0.427 | 0.193 |
| Consumption | 0.000 | 0.020 | 0.000 | 0.012 |
| Bilateral Aid | 0.070 | (0.094) | 0.017 | (0.236) |
| Multilateral aid | 0.017 | (0.236) | −0.5329 | (0.669) |
| Log of Total AID (in $mil) | −3.8*** | 24.08*** | 24.66*** | 25.97*** |
| _cons | (0.545) | (2.914) | (2.985) | (3.025) |
| Obs. | 994 | 868 | 793 | 852 |

Robust standard errors are in parentheses. *** p < .01, ** p < .05, * p < .1
Transparency International index, by multiplying pre-2012 values by 10, because the index underwent changes in its estimation methodology in 2012. Thus, we separate observations in two groups to check for any potential implication of the index’s rescaling. The regression results (7–8) show no significant changes in the relationships between aid and corruption for these two different periods. This suggests that the effect of financial crises and the evolution of corruption index calculation are not significant factors influencing the investigated relationship.

Several countries that do not have enough observations of corruption data are dropped from the sample. We also investigate for extreme values within variables and remove all possible outliers that may change our results. After having removed countries with low number of observations of the corruption index as well as all the extreme values within variables, the regression results in column 9 show no significant relationship between aid and corruption.

Asongu (2012) argues that aid affects corruption differently in African countries. To check for these differences, we dropped all other countries and ran the regression with 49 African countries (regression 10); then in regression 11 we estimated the results on a sample without African countries. In the first case, the relationship between aid and corruption is insignificant whereas in the second case we find a weak positive relationship between aid and corruption (significant at 10%).

To check for differences with respect to income level among the recipient countries, we divided countries based on World Bank income categories: low-income and low middle-income countries in first group, and upper middle-income countries in the second one. The regressions for these two groups – those with GDP per capita less or more than $4045 (regression 12–13) – show an insignificant relationship.

Finally, we estimated the aid relationship through Arellano and Bond (1991) GMM estimation technique. Although tests for autocorrelation and instruments’ relevance are passed in the first three regression, the foreign aid coefficient is not statistically significant. Table A5 in the appendix reports GMM regression results.

### 7. Conclusion

The empirical evidence on the relationship between foreign aid and corruption is inconclusive, although more recent evidence suggests that there is a tendency for this relationship to have improved over time. While most of the empirical papers on aid and

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### Table 3. Robustness checks regression results.

|                | (8) Pre 2012 sample | (9) Without possible outliers | (10) African sample | (11) Without African countries | (12) Low middle income | (13) Upper middle income |
|----------------|---------------------|-------------------------------|---------------------|--------------------------------|-----------------------|-------------------------|
| Total Aid      | .116                | .063                          | −.001               | .192*                          | −.113                 | .087                    |
| CPI_TI         | (.17)               | (.094)                        | (.122)              | (.107)                         | (.136)                | (.116)                  |
| Gov effectiveness | 6.02***          | 2.45***                       | 3.21***             | 1.90**                        | 3.19***               | 2.11**                  |
| CPI_TI         | (1.791)            | (.604)                        | (.892)              | (.824)                         | (.955)                | (.86)                   |
| GDP per capita | 0                   | 0                             | 0                   | .001***                        | .003***               | .001***                 |
| CPI_TI         | 1. (0)              | 1. (0)                        | (.001)              | 1. (0)                         | (.001)                | 1. (0)                  |
| Inflation      | −.024               | −.048                         | −.04                | −.04                           | .057                 | −.102*                  |
| CPI_TI         | (.056)              | (.04)                         | (.061)              | (.053)                         | (.057)                | (.059)                  |
| Democracy      | .162                | .281**                        | .212                | .426**                         | .43***                | −.099                   |
| CPI_TI         | (.18)               | (.133)                        | (.201)              | (.179)                         | (.166)                | (.24)                   |
| NR rent        | .03                 | .064*                         | .123**              | −.123**                        | .086*                 | .031                    |
| CPI_TI         | (.051)              | (.038)                        | (.049)              | (.061)                         | (.049)                | (.059)                  |
| Military spending | .336               | .286                          | .46                 | .098                           | .267                 | .328                    |
| CPI_TI         | (.46)               | (.305)                        | (.378)              | (.598)                         | (.428)                | (.471)                  |
| Consumption    | .046                | .015                          | −.069               | .063                           | .062                 | .043                    |
| CPI_TI         | (.039)              | (.028)                        | (.043)              | (.039)                         | (.042)                | (.045)                  |
| _cons          | 23.39***            | 24.76***                      | 35.26***            | 16.47***                       | 14.53***              | 23.374***               |
| CPI_TI         | (4.914)             | (2.983)                       | (4.554)             | (4.104)                        | (4.8)                 | (5.133)                 |

Obs. 538 859 424 443 389 478
R-squared 0.47 0.33 0.08 0.39 0.17 0.27
Time fixed-effects Yes Yes Yes Yes Yes Yes
Country fixed-effects Yes Yes Yes Yes Yes Yes

Robust standard errors are in parentheses.

*** p < .01, ** p < .05, *p < .1.
corruption relationship cover a time framework until the early 2000s, the volume of aid after mid-2000 has more than tripled. This rise might have had a significant average impact on the aid and corruption relationship.

To test the relationship between aid and corruption we follow a 2SLS procedure as per Tavares (2003) and use instrumental variables that capture geographical and cultural proximities between donor and recipient countries. We find a positive relationship between aid and corruption however; the significance of this positive relationship vanishes when using time fixed-effects. Thus, unlike Tavares (2003), we find no significant impact of aid on corruption. Our benchmark results remain insignificant even after checking with respect to different samples, estimation techniques, and the modality/types of aid.

There might be several reasons explaining why our results display a statistically insignificant relationship between aid and corruption. First, the number of observations in our case is higher than in Tavares (2003); second, the amount of foreign aid after 2003 has been rising sharply, hence the relationship between aid and corruption might have changed; third, we consider a more recent period and include more countries; and fourth, we use a different corruption measure, namely the Transparency International corruption index.

Findings of our paper are in line with a more recent study by Menard and Weill (2016), who find insignificant causal relationship between aid and corruption. The insignificant relationship between aid and corruption index in more recent periods suggests that this relationship might have changed and that the average positive effect of aid in corruption, as reported in previous studies, has been vanishing over time.

As our analysis focuses on a period when aid to developing countries has tripled, results from this study are insightful to the discussions about aid dependency and its potential impact on the quality of institutions in the recipient countries.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Notes

1. For more details regarding construction procedure, see Tavares (2003). In our analysis, Mexico is excluded since it does not have any legacy as a donor country. Instead, we include Turkey which has an active aid program and is among few other nations in the world who gives more than 0.7 of their GNI in aid.

2. Belize, Democratic Republic of Congo, Eswatini, Fiji, Grenada, Kiribati, Maldives, Marshall Islands, Micronesia, Samoa, Solomon Islands, Tonga, Turkmenistan, and Vanuatu.
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Appendix

Table A1. Summary statistics.

| Variable                  | Obs  | Mean  | Std.Dev. | Min | Max |
|---------------------------|------|-------|----------|-----|-----|
| Corruption                | 1374 | 30.681| 10.181   | 2   | 67  |
| Total AID/GNI             | 1550 | 6.098 | 8.196    | −48 | 49.41|
| Multi AID/GNI             | 1311 | 16.601| 13.616   | −26 | 49.9 |
| NR rent/GDP               | 1542 | 10.735| 12.92    | −8975 | 44.357|
| Inflation                 | 1431 | 6.413 | 6.009    | −5 | 49.41|
| Gov effectiveness         | 1235 | 1.806 | 1.232    | 0.146 | 9.159|
| Democracy                 | 1542 | 10.735| 12.92    | 0.001 | 74.132|
| IV_religion               | 1572 | 36.593| 213.621  | −680.77 | 5375.84|
| IV_border                 | 1573 | 14.403| 242.804  | 0.001 | 7246.78|
| IV_language               | 1573 | 110.355| 255.262  | −25.02 | 3680.71|
| IV_distance               | 1573 | 0.075 | 0.285    | −0.267 | 7.349|
| Population                | 1586 | 34425.59 | 118000  | 55.258 | 1340000|
| Legal system UK           | 1430 | .318  | .466     | 0    | 1   |
| Legal system FR           | 1430 | .5    | .5       | 0    | 1   |
| Legal system SD           | 1430 | .182  | .386     | 0    | 1   |
| Total AID mil             | 1566 | 621.843| 791.428  | −128.74 | 4948.46|
| Corruption WB             | 1534 | −607  | .545     | −1.826 | 1.16 |
| DAC AID mil               | 1540 | 359.227| 452.921  | −136.46 | 2493.8|
| Multi AID mil             | 1573 | 219.247| 295.136  | −181.94 | 2052.73|
| GDP per capita            | 1335 | 5560.58| 3885.146 | 593.704 | 14284.12|
| Consume/GDP               | 1361 | 18.287| 255.262  | −25.02 | 3680.71|

Source: OECD, World Bank, CEPII, Transparency International.
Please note that IVs used in the study are multiplied by aid flows, so they do not have 0 and 1 values.

Table A2. First stage results.

| Total AID | Coef. | St.Err. | t-value | p-value | [95% Conf Interval] | Sig |
|-----------|-------|---------|---------|---------|----------------------|-----|
| IV_religion | 0.009 | 0.001 | 7.55 | 0.000 | 0.007 | 0.012 | * ** |
| IV_border | −0.497 | 0.121 | −4.10 | 0.000 | −0.735 | −0.259 | *** |
| IV_language | 0.004 | 0.001 | 5.26 | 0.000 | 0.002 | 0.005 | *** |
| IV_distance | 2.016 | 1.155 | 1.75 | 0.081 | 0.251 | 4.284 | * |
| Gov effectiveness | −0.521 | 0.418 | −1.25 | 0.213 | −1.342 | 0.300 | |
| GDP per capita | 0.000 | 0.000 | −3.65 | 0.000 | −0.001 | 0.000 | *** |
| Inflation | 0.156 | 0.021 | 7.29 | 0.000 | 0.114 | 0.198 | *** |
| Democracy | 0.004 | 0.088 | 0.04 | 0.966 | −0.170 | 0.177 | |
| NR rent | 0.071 | 0.023 | 3.04 | 0.002 | 0.025 | 0.117 | *** |
| Military spending | 0.499 | 0.208 | 2.40 | 0.016 | 0.092 | 0.907 | * |
| Consumption | 0.094 | 0.018 | 5.11 | 0.000 | 0.058 | 0.130 | *** |
| Constant | −3.679 | 1.937 | −1.90 | 0.058 | −7.481 | 0.123 | * |

Mean dependent var 5.560, SD dependent var 6.838.

R-squared 0.353, Number of obs 878000.

F-test 4908.823, Prob > F 0.000.

Akaike crit. (AIC) 4156.154, Bayesian crit. (BIC) 4156.154.

*** p < 0.01, ** p < 0.05, * p < 0.1.

Table A3. Auxiliary regression after the second stage.

| uhat_iv | Coef. | St.Err. | t-value | p-value | [95% Conf Interval] | Sig |
|---------|-------|---------|---------|---------|----------------------|-----|
| religion | −0.001 | 0.002 | −0.48 | 0.630 | −0.005 | 0.003 | |
| border | −0.184 | 0.137 | −1.35 | 0.182 | −0.456 | 0.088 | |
| lan | 0.000 | 0.001 | 0.03 | 0.979 | −0.003 | 0.003 | |
| dist | −0.033 | 2.447 | −0.01 | 0.989 | −4.904 | 4.839 | |
| gov_effect | −0.051 | 0.763 | −0.07 | 0.947 | −1.570 | 1.469 | |
| GDPpc | 0.000 | 0.000 | 0.01 | 0.993 | −0.001 | 0.001 | |
| inflation | −0.003 | 0.046 | −0.07 | 0.948 | −0.005 | 0.089 | |
| demo | −0.014 | 0.208 | −0.07 | 0.946 | −0.427 | 0.399 | |
| rent | −0.001 | 0.050 | −0.03 | 0.977 | −0.102 | 0.099 | |
| mil | −0.009 | 0.379 | −0.02 | 0.981 | −0.264 | 0.746 | |
| consumption | 0.000 | 0.062 | 0.00 | 1.000 | −0.123 | 0.123 | |
| Constant | 0.164 | 5.235 | 0.03 | 0.975 | −10.257 | 10.585 | |

Mean dependent var 0.000, SD dependent var 3.898.

R-squared 0.002, Number of obs 878000.

F-test 4908.823, Prob > F 0.000.

Akaike crit. (AIC) 4156.154, Bayesian crit. (BIC) 4891.619.

*** p < 0.01, ** p < 0.05, * p < 0.1.
### Table A4. Testing instrumental variables.

|                      | (1)    | (2)    | (3)    |
|----------------------|--------|--------|--------|
| F-test of Instruments| 59.19  | 63.92  | 59.36  |
| Sargan-Hansen        | 1.164  | 2.023  | 3.308  |
| Chi-squared P-value: | 0.761  | 0.567  | 0.347  |
| Underidentification test | 12.97  | 12.18  | 6.994  |
| Chi-squared P-value: | 0.014  | 0.016  | 0.136  |

### Table A5. GMM estimator.

|                      | (1)         | (2)         | (3)         | (4)         |
|----------------------|-------------|-------------|-------------|-------------|
| Lcpi_ti              | .029 (.184) | −.149 (.174)| .384* (.219)| .475** (.219)|
| Total AID            | .138 (.108) | −.079 (.089)| .08 (.074)  | .153 (.1)    |
| Military spending    | −1.383 (.961)| −.266 (.653)| .037 (.388) | −.709 (.886) |
| Inflation            | −.08** (.035)| −.083** (.039)| .029 (.023) | −.025 (.082) |
| Democracy            | .153 (.184)| 5.425*** (.608)| −.718 (.788)| .028 (.129) |
| GDPpc                | .003*** (.001)| 0 (.001)     | 0 (.004)    | (0.001)     |
| Consumption          | .402 (.247) | 0 (.247)    | (0.247)     | (0.247)     |
| Gov effectiveness    | 3.914*** (1.303)| (1.303)    | (1.303)     | (1.303)     |
| NR rent/GDP          | .173 (.224) | −.556 (.827)| −.556 (.827)| (1.127)     |
| y_7                  | −.267 (1.172)| −.556 (1.172)| (1.172)     | (1.224)     |
| y_8                  | −.203 (1.808)| −.599 (1.065)| (1.065)     | (1.127)     |
| y_9                  | −.331 (1.899)| −.741 (1.422)| (1.422)     | (1.127)     |
| y_10                 | −.169 (2.526)| −.457 (1.127)| (1.127)     | (1.127)     |
| y_11                 | .138 (2.931)| −.681 (1.795)| (1.795)     | (1.795)     |
| y_12                 | 4.367 (3.494)| 3.797* (2.115)| (2.115)     | (2.115)     |
| y_13                 | 2.565 (4.439)| 1.407 (2.523)| (2.523)     | (2.523)     |
| y_14                 | 3.575 (4.628)| 2.52 (2.297)| (2.297)     | (2.297)     |
| y_15                 | 3.246 (4.957)| 2.081 (2.464)| (2.464)     | (2.464)     |
| y_16                 | 3.155 (5.347)| 2.098 (2.322)| (2.322)     | (2.322)     |
| y_17                 | 3.345 (5.665)| 2.399 (2.167)| (2.167)     | (2.167)     |
| Observations         | 707        | 742        | 742        | 707         |
| Pseudo R²            | z          | z          | z          | z           |

Robust standard errors are in parentheses.

*** p < .01, ** p < .05, * p < .1.
Figure A1. Foreign aid expressed in billions of dollars

Figure A2. Correlation between World Bank and Transparency International corruption indexes