The curse of aid

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Abstract   Foreign aid provides a windfall of resources to recipient countries and may result
in the same rent seeking behavior as documented in the "curse of natural resources" literature.
In this paper we discuss this effect and document its magnitude. Using panel data for 108
recipient countries in the period 1960–1999, we find that foreign aid has a negative impact
on institutions. In particular, if the foreign aid over GDP that a country receives over a period
of 5 years reaches the 75th percentile in the sample, then a 10-point index of democracy is
reduced between 0.5 and almost one point, a large effect. For comparison, we also measure
the effect of oil rents on political institutions. We find that aid is a bigger curse than oil.

1 Introduction

Many studies have shown a negative correlation between economic growth and natural
resources, a finding often dubbed "the curse of natural resources." However, oil and other
minerals may not be the biggest curse in developing countries. In many of them, the amount
of foreign aid is a far larger share of government revenues. In Burkina Faso, for example,

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aid accounted for two-thirds of the government budget and 8% of GDP over the period 1985–1989. In Mauritania, it accounted for 60% and 22%, respectively, for the period 1980–1984. In Rwanda, Vanuatu, Gambia, Niger, Tonga and Mali, foreign donors provided over a third of the government budget during some 5-year periods between 1960 and 1999. Some countries are chronically dependent on aid. Aid accounted for 40% of the government budget and 6.2% of GDP in Burkina Faso during 1960–1999. In Mauritania, for 37% and 12%, respectively.

A recent empirical literature has investigated the role of institutions on development. Mauro (1995, 1998), Knack and Keefer (1999), Hall and Jones (1999), Acemoglu et al. (2001, 2002), Easterly and Levine (2003), Dollar and Kraay (2003) and Rodrick (2004), among others, show a positive relationship between good institutions and development. The literature on political institutions and growth is less developed. Papaioannou and Siourounis (2004) find strong effects of democracy on growth. Persson (2004) shows that the form of democracy, rather than democracy versus non-democracy has important consequences for the adoption of structural policies that promote growth. Barro (1991) and Glaeser et al. (2004) find weaker effect of political institutions on growth.

In this paper we investigate the relationship between aid and political institutions.[1] One view of this relationship suggests that aid is needed to advance democratic institutions in developing countries. In the words of Boutros Boutros Ghali: "We must help states to change certain mentalities and persuade them to embark on a process of structural reform. The United Nations must be able to provide them with technical assistance enabling them to adapt institutions as necessary, to educate their citizens, to train officials and to elaborate regulatory systems designed to uphold democracy and the respect for human rights." A second view holds that foreign aid could lead politicians in power to engage in rent-seeking activities in order to appropriate these resources and try to exclude other groups from the political process. By doing so political institutions are damaged because they became less democratic and less representative.

Rajan and Subramanian (2007b) argue that foreign aid may reduce the need for taxes of governments and, therefore, be associated with weak governance. They propose an IV methodology to show that governance matters, using the growth of governance-dependent industries. Knack (2004), using information on the Freedom House index, argues that there is no evidence that aid promotes democracy. By contrast, we use two variables, Checks and Balances of the Database of Political Institutions (DPI) and the democratic score of the Polity IV, to calculate the democratic stance of a country. In addition, we consider simultaneously the effect of foreign aid and other easily extractable resources (in particular oil) to avoid an omitted variable problem. Our findings support the view that foreign aid can damage institutions. The magnitudes of the effect are striking. If a country receives the average amount of aid over GDP over the whole period, then the recipient country would have gone from the average level of democracy in recipient countries in the initial year to a total absence of democratic institutions. Since most foreign aid is not contingent on the democratic level of the recipient countries, there is no incentive for governments to keep a good level of checks and balances in place.

This is not to say that promoting better institutions should be the objective of foreign aid.[2] However, as argued in Collier and Dollar (2004), at a minimum donors and international agencies should abide by the Hippocratic oath: do no harm.

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[1] This paper is related to the recent work on aid and growth. See Roodman (2007a) for a summary of the previous literature.

[2] Indeed, the constitution of the World Bank prohibits such targeting.

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The paper is organized as follows. Section 2 discusses several theoretical arguments that can justify the effect of foreign aid on institutions. Section 3 presents the data and some preliminary findings. Section 4 contains the basic results. Section 5 considers a large set of robustness tests, like including additional controls, using alternative institutional variables and eliminating outliers. Section 6 includes a long discussion on the appropriateness of the instruments and the effect of using alternative instrumentation strategies. Section 7 contains the conclusions.

2 The curse of natural resources and the effect of foreign aid

The curse of natural resources has been documented in several studies. Sachs and Warner (2001) show that resource-rich countries grow slower than other countries and that this finding is robust to controlling for geography, resource abundance per capita and mineral versus agricultural resources. This corroborates previous studies, among them Sachs and Warner (1999) and Auty (1990). Some case studies also provide compelling explanation of the relationship between natural resources and civil wars (Ross 2003).

Natural resources and foreign aid share a common characteristic: they can be appropriated by corrupt politicians without having to resort to unpopular, and normally less profitable, measures like taxation. However, there is less agreement with respect to the economic impact of aid. The literature on the effect of aid on growth is mixed. Boone (1996) finds, using a sample of developing countries, that aid has no effect on investment or growth. Burnside and Dollar (2000) qualify this result by including the role of policies: aid has a positive effect on growth in developing countries with "good" policies while it has no effect when countries follow "poor" policies. This latter result has been challenged recently by Easterly et al. (2004), who find the result of Burnside and Dollar (2000) sensitive to sample size. Easterly (2003a) points out that the findings in Burnside and Dollar (2000) are also sensitive to the definition of foreign aid, policies and output per capita. Easterly (2003b, 2006) makes a broader argument on why aid frequently fails. A very recent study of Rajan and Subramanian (2007a) finds little evidence of a positive (or a negative) effect of aid on economic growth. These authors do not find either evidence of aid being effective in countries with good policies or good geographical environment.

Existing studies have documented several mechanisms that can explain why sudden windfalls of resources in developing countries have led to a decline in their growth rate. Although the specific description of the model is different the basic elements are common: individuals engage in rent-seeking activities to appropriate part of the resources windfall and, by so doing, reduce the growth rate of the economy. In addition most of the theoretical arguments rely in the so-called tragedy of the commons. Lane and Tornell (1996) describe a growth model that incorporates "common access" to the aggregate capital stock as a reduced form of a situation where other groups can appropriate part of the returns of a group of individuals. They document the existence of the voracity effect: if powerful interest groups exist and the intertemporal elasticity of substitution is not too low, then the growth rate of the economy will decline when there is a windfall of resources.

One reason that can justify the small effect of foreign aid on growth is the generation of many rent-seeking activities. The success of this rent seeking activities requires a low degree of accountability (checks and balances) and weak institutions. There is a large body of evidence on the rent-seeking activities generated by foreign aid. Svensson (2000) is concerned specifically with the effect of foreign aid in the context of economies with powerful social groups. In Svensson (2000) the different groups of the economy have common access to the

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government's budget constraint. The utility function of the individuals is the sum of their private consumption plus the part of the public good that corresponds to their locality. Individuals can increase their consumption by performing rent seeking activities to appropriate the revenue of the government. However, by doing that, they reduce the amount of local public goods provided. A large inflow of aid does not necessarily increase welfare since there is an increase in rent-seeking activities that is costly in aggregate terms. Reinnika and Svensson (2004) analyze using panel data from a unique survey of primary school in Uganda, the extent to which the foreign aid for education purposes actually reached the schools. They find that during the period 1991–1995 schools on average received only 13% of the grants received by the government. Moreover they show that other surveys in other African countries confirm that Uganda is not a special case. These results provide case studies evidence of the rent-seeking activities generated by the reception of foreign aid. In extreme cases the extent of the rent seeking activities could lead to a civil conflict. Maren (1997) provides evidence that Somalia's civil war was caused by the desire of different factions to control the large food aid that the country was receiving.

As we have shown above, the economics literature has documented several mechanisms that can explain why sudden windfalls of resources in developing countries could lead to a decline in their growth rate. But, it can also affect the level of democracy and institutional development. The appropriation of foreign aid and the rent seeking behavior associated with it requires weak institutions. Therefore, it is reasonable to believe that foreign aid has some impact on institutions. Brautigam and Knack (2004) have recently summarized some mechanisms that could explain a negative relationship between foreign aid and democracy. "High levels of aid can make it more difficult to solve the collective action problems that are inherent in reform efforts, create moral hazards for both recipients and donors, perpetuate both a "soft budget constraint" and a "tragedy of the commons" with regards to the future budget, and weaken the development of local pressures for accountability and reform." Therefore, a large amount of aid can reduce the incentives for democratic accountability. When revenues do not depend on the taxes raised from citizens and business, there is less incentive for accountability. At the same time corrupt government officials will try to perpetuate their rent seeking activities by reducing the likelihood of losing power.

3 Some empirical evidence

Traditionally the literature that analyzes the effect of foreign aid on development has used official development assistance (ODA) data. ODA measures aid flows that arrive to the recipient country in a given year, irrespective of what part, if any, has to be repaid. Data are in current US dollars.[3] Following Burnside and Dollar (2000) we use the IMF's Import Unit Value index to transform data in constant dollars and to purchasing power parity.[4] Table 1 shows the 20 most aid dependent countries in the world. The numbers indicate the average share of aid to GDP over the 1970–1999 period. Comoros received around 16%,

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[3] Whether aid should be adjusted for purchasing power parity depends on whether the funds are spent on tradable or non-tradable goods. In practice donor money is spent on both so there is equal justification for adjusting or not adjusting. We use PPP-adjusted aid but find that our results are robust to the use of non-adjusted aid.

[4] The Unit Value Import index (UVI) is the ratio between the Import Unit values and import prices. In order to have the aid data in constant dollars and in purchasing power parity we multiply by the Unit Value Import Index of 1985 for the world and then divide by the UVI index for the world of the current year. Finally, we divide the aid value by real GDP in constant 1985 prices using the Penn World Tables 5.6.

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Table 1 The 20 most aid or oil-dependent countries

Country	Aid over GDP	Country	Oil revenue over GDP
Comoros	16.1	Kuwait	49.5
Guinea-Bissau	13.9	Saudi Arabia	48.2
Mauritania	12.3	Gabon	44.6
Chad	8.1	Angola	38.5
Gambia, The	8.1	Oman	35.6
Zambia	8.0	Iraq	22.6
Central Afr. Rep.	7.2	Congo, Rep.	19.5
Mali	7.1	Algeria	15.5
Somalia	7.0	Venezuela	14.4
Jordan	7.0	Nigeria	12.9
Niger	6.2	Iran, Islamic Rep.	12.2
Burkina Faso	6.2	Trinidad and Tobago	11.5
Malawi	6.1	Ecuador	7.1
Lesotho	6.1	Papua New Guinea	7.1
Tanzania	5.9	Egypt, Arab Rep.	6.2
Togo	5.9	Cameroon	6.1
Nicaragua	5.8	Mexico	4.4
Senegal	5.3	Syrian Arab Rep.	4.4
Burundi	5.2	Indonesia	4.4
Rwanda	5.1	Malaysia	4.2

Note: ODA over GDP is the average annual share of GDP during 1970–1999. Oil revenue over GDP is the average annual share of GDP during 1973–1999

Guinea-Bissau near 14%, and Mauritania more than 12%. None of these countries have oil resources.

The share of primary exports over GDP is the variable most widely used as a proxy for natural resource dependence. But the data are missing in many developing countries, especially during years of civil conflict. Additionally, among all natural resources, oil is the one that provide largest rents, specially, after 1973. For these reason we consider only rents from oil and not rents from all natural resources.[5] This is very important because as aid, rents from oil are a new phenomenon after 1960 and 1973, respectively. The fact that countries are not dependent from aid and oil rents before 1960 is very convenient, especially if we are interested in knowing how the windfall of resources from oil and aid affect institutional development. An alternative measure of rents from oil is the barrel production per day and the price per barrel, available from British Petroleum. Prices are in current dollars and are converted into constant dollars using the IMF's Import Unit Value index, as in the case of aid. Table 1 shows the 20 most oil-revenue dependent countries in the world. Kuwait tops the list. During 1973–1999, the rents from oil in Kuwait represent 49% of GDP. Saudi Arabia (48%) and Gabon (44%) are close behind. Oil producers seldom receive aid.

There are two basic sources of data on political institutions. The first source of information is the Database of Political Institutions (DPI) constructed by Keefer et al. (2001), which provides information after 1975. The variable CHECKS captures the number of decision makers whose agreement is necessary before policies can be changed (checks and balances).[6]

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[5] The rents of oil are more than three times the value of the rents from exports of other natural resources like ore and metals. For this calculation we use the data on rents from primary commodities export of the World Bank.

[6] Another relevant set of variables on judicial checks and balances are developed in La Porta et al. (2004). Unfortunately, their 71-country sample covers less than half of the countries in our sample.

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Table 2 Top and bottom 10 recipients of aid and changes in institutions

Country	Oda	Democracy lag	ΔDemoc
Zambia, 1996	29.52	6	−3
Comoros, 1999	14.30	5	−4
Gambia, The, 1990	11.99	7	1
Nicaragua, 1995	10.33	6	2
Gambia, The, 1994	9.34	8	−8
Lesotho, 1970	9.04	9	−9
Botswana, 1971	8.89	7	2
Madagascar, 1998	8.84	8	−1
Jordan, 1992	8.05	1	1
Mali, 1997	7.78	7	−1
Venezuela, 1992	0.017	9	−1
Venezuela, 1999	0.025	8	−1
Argentina, 1976	0.025	6	−6
Brazil, 1985	0.031	2	5
Argentina, 1999	0.032	7	1
Mexico, 1988	0.034	1	1
Mexico, 1997	0.041	4	2
Brazil, 1988	0.043	7	1
Trini. Tobago, 1984	0.044	8	1
Malaysia, 1995	0.044	5	−1

The construction of the variable is based on legislative and executive indices of electoral competitiveness and the number of the parties in the government coalition. Countries with multiple decision makers offer greater protection of individuals from arbitrary government actions. The lower is the value of checks and balances, the higher is the level of political exclusion. It takes values from 1 to 9 in our sample, 1 being countries with the lowest number of key decision makers. For example in 1999 Liberia, Nigeria, Haiti and Honduras scored 1 or 2 in CHECKS. Madagascar, Kenya, Cameroon, and Sierra Leone had a score of 3, and Ecuador, Nepal, Thailand 4 or 5. We alternatively use the measures of legislative and executive electoral competitiveness, also in DPI, and find that quantitatively similar results (not reported) are obtained when using these variables.

Another source of information on political institutions is the Polity IV project. It constructs scales of democracy (DEMOC) through the aggregation of authority characteristics, the procedure for recruitment of chief executives, and the centralization of government structure.[7] The variable DEMOC ranges from 0 to 10. For example in 1999, Sudan, China and Uganda were countries with 0 level of democracy, while Malaysia was coded with an intermediate level of 4. Uruguay and Mauritius are examples of full democracy, scoring at 10. Several examples help explain its construction. In Fiji, a 1987 military coup led by Stivenu Rabuka installed a government ruled by indigenous Melanesians. The democracy score dropped from 9 to 0. In Niger, a 1996 coup led by Colonel Mainassara ousted the elected government. The democracy score dropped from 8 to 0. In Thailand, student protests in 1992 forced the military to call depoliticize and call elections. Thailand's democracy score went from 1 to 8. In Indonesia, the authoritarian regime of General Suharto collapsed in 1998 and new elections were called the following year. Indonesia's democracy score jumped from 0 to 8.

The two variables previously discussed (CHECKS and DEMOC) are linked. Countries that become more democratic tend to display an increase in checks and balances on the

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[7] Freedom House also has a democracy variable. It is cruder, yet the correlation between the Polity and Freedom House variables during our sample period is 0.88.
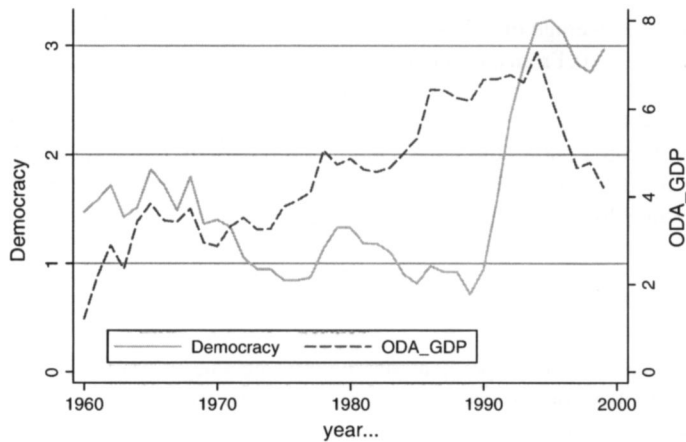
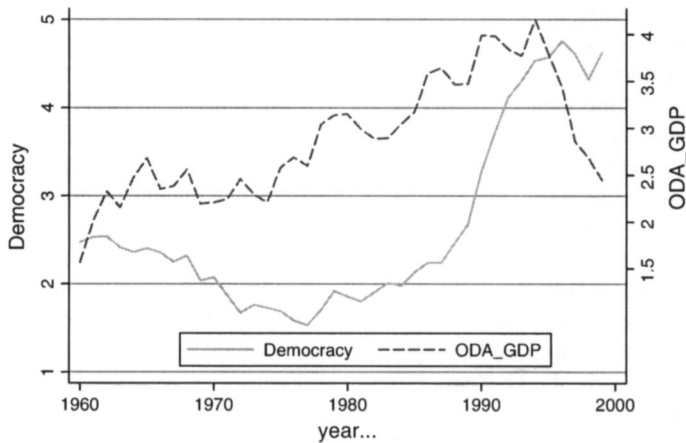**Fig. 1** Tracking aid and democracy in Africa

Fig. 2 Tracking aid and democracy in the world

government and have a more decentralized structure. In fact, we could consider CHECKS and DEMOC as two alternative proxies of the level of democracy.[8]

We have a sample of 108 recipient countries. Among them 43 are sub-Saharan African countries, 29 from Latin America, and 13 from Asia. With these data in hand, we analyze what happens in the countries that receive the largest amount of aid. Table 2 ranks the 10 countries that receive the largest and least amount of aid conditional on having any institutional change during that 5-years period. On average, aid-dependent countries suffer a 2 points reduction in democracy. In contrast, the countries least dependent on aid suffer a 0.9 points reduction in democracy. These results suggest a positive correlation between aid and reduction in the democratic level of countries.

African countries are the largest recipients of foreign aid. In addition they are among the least democratic. Therefore it seems reasonable to look at the time series behavior of foreign aid and the level of democracy among these countries. Figure 1 shows a negative relationship

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[8] The correlation between these two variables is 0.76.

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between the annual average of aid over GDP and the level of democracy during the 1960s until the end of the 1980. From the end of the 1980s until the end of the sample we observe the democratization wave that took place on that period, which was accompanied by a reduction in the average level of aid over GDP. This result is robust to calculating the average weighted by population. Figure 2 shows the same relationship but for all the recipients countries, not only the ones in Africa. The relationship between the annual average aid over GDP and the level of democracy follows the same pattern.

4 Estimation

The descriptive statistics in the previous section indicate a negative correlation between the changes in the stock of foreign aid and changes in political institutions. Next, we investigate econometrically whether changes in the stock of foreign aid and rents from oil have an effect on changes in political institutions. In the empirical analysis we use a sample of recipient countries and data of two different periods: 1977–1999 when using the DPI database, and 1960–1999, when using the Polity IV database.

   We consider several explanatory variables besides foreign aid and oil. Sudden changes in the terms of trade are shocks that can lead to social unrest and political instability. This effect is related to the reduced ability of corrupt governments to benefit from exports of natural resources. Negative shocks pressure governments to reduce democracy and checks and balances in order to increase their capture of resources. On the other hand positive shocks imply an increase in the size of rents that can be appropriated. Finally, we control for the initial quality of political institutions. Table 3 describes the main variables used in the analysis.[9]

   As aid may flow to countries whose institutions are getting worse, we need instruments for foreign aid. We follow Burnside and Dollar (2000) and Easterly et al. (2004) and use the logarithm of initial income, the logarithm of population and a group of variables that the literature labels as "donors' strategic interests"—represented by dummy variables for sub-Saharan Africa, the Franc Zone, Egypt, and Central American countries.[10] All those instruments are standard in the study of the effect of foreign aid on economic growth. Therefore, the exclusion restrictions implied by the instruments in the case of the effect of aid on the change in institutions are different. However, it is reasonable to maintain the hypothesis that the strategic interest variables affect the change in institutions only through their impact on foreign aid.[11] In the case of income and population the exclusion restriction could be more problematic, although these variables have been extensively used as instruments in the literature.[12] Section 6 presents a lengthy discussion of alternative instrumentation strategies and shows that the choice of this particular set of instruments is not decisive for the results.

   Following the theoretical arguments exposed above, our basic specification is the following:

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[9] Knack (2001) analyzes the effect of aid on the change on the ICRG index, but using a different specification.

[10] Notice that these variables are essentially regional dummy variables.

[11] This is the basic assumption that justify the use of other instruments for aid that have been proposed recently in the literature, like arms imports or the predicted aid based on the characteristics of the donor countries. Section 6 discusses these alternative instruments.

[12] The WP version of this paper presents a long discussion on the appropriateness of these instruments from a statistical viewpoint with many tests and empirical strategies to justify their usefulness.

Table 3 Variables

ΔChecks: change in institutions between period t and $t - 1$. Proxy for the level of democracy (checks and balances) taken from the database of political institutions 2002.

ΔDemoc: change in institutions between period t and $t - 1$. Proxy for democracy taken from the database Polity IV.

Oda: share of ODA over GDP. ODA comes from OECD database. ODA is converted to 1985 dollars with world import unit value index from IMF 2002, series 75. GDP comes from PWT5.6. We update GDP using GDNGD.

Oil: share of rents from oil over GDP. Rents from oil comes from British Petroleum database. We compute barrels per years and multiply by the barrel price. Rents of oil are concerted to 1985 dollars with world import unit value index from IMF 2002, series75. GDP comes from PWT5.6. We update GDP using GDNGD.

Sh_tot_neg: mean absolute value of the negative growth rate of the terms of trade over a 5-years period. Terms of trade shows the national accounts exports price index divided by the imports price index, with 1995 equal to 100. Data comes from GDF, The World Bank.

Sh_tot_pos : mean value of the positive growth rate of the terms of trade over a 5-years period. Terms of trade shows the national accounts exports price index divided by the imports price index, with 1995 equal to 100. Data comes from GDF, The World Bank.

Lpop: log of the population at the beginning of the period from the Penn World Tables 5.6. Updated using the data of the Global Development Network Growth Database.

Lgdp: log of real GDP per capita at the beginning of the period from the Penn World Tables 5.6. Updated using the data of the Global Development Network Growth Database.

$$\Delta INST_{it} = \beta_0 + \beta_1 aid_{it} + \beta_2 OIL_{it} + \beta_3 SHOCKS(-)_{it}$$
$$+ \beta_4 SHOCKS(+)_{it} + \delta INST_{it-1} + \lambda_t + \varepsilon_{it} \qquad (1)$$

$$aid_{it} = \gamma_y y_{it-1} + \phi_p p_{it-1} + z_i' \gamma_z + \zeta_{it} \qquad (2)$$

where $\Delta INST_{it}$ is the change on institutions, *aid* is a measure of the change in the stock of aid received by a country measured as the net ODA (flow) over GDP, *OIL* is the size of rents of oil over GDP, SHOCKS(.) is the size of the absolute negative (positive) shock to the terms of trade and INST is the level of institutional development at the beginning of the period.[13] The excluded instruments are logarithm of initial income (y), the logarithm of population in the initial period (p) and the group of variables that capture donors "strategic interests" (z). In the following section on the robustness of the results, we check the sensitivity of the basic results to the inclusion of the additional variables proposed in the empirical literature on democratization. As we will see, most of these potential additional variables turn out not to be statistically significant in the specification in first differences, which is consistent with results found by many other researchers.

Knack (2004) and Brautigam and Knack (2004) have also recently studied the determinants of changes in institutions and the quality of democracy. Our study is different in many respects. First, these studies consider a different sample period from ours. Knack (2004) considers a cross section of changes of the Freedom House index from 1975 to 2000. Brautigam and Knack (2004) work with a cross section of African countries from 1982 to 1997. By contrast, our basic result is obtained from a panel of 5 years periods instead of a single cross-section. Second, we only include in the specification sources of a sudden windfall of resources (aid, oil and shocks to the terms of trade) that may generate an institutional change in order to increase the chances of the groups in power to control these resources. Knack (2004) includes

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[13] The specification can be interpreted as regressing changes on changes. Aid is the net change in the stock of foreign aid over GDP; oil is the annual rents from oil over GDP and the shocks are, by definition, changes in the levels.

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Table 4 Basic regression (5-year periods) endogenous variable: Δchecks

	OLS (1)	IV (cluster robust) (2)	GMM (3)	GMM (cluster robust) (4)
Oda$_t$	−0.03 (−2.06)	−0.09 (−2.67)	−0.08 (−3.35)	−0.08 (−3.35)
Oilrents$_t$	−0.003 (−0.43)	−0.01 (−1.35)	−0.01 (−0.80)	−0.01 (−1.31)
Sh_tot_neg$_t$	−1.88 (−1.37)	−1.57 (−1.19)	−1.44 (−1.25)	−1.29 (−1.06)
Sh_tot_pos$_t$	0.92 (0.63)	0.43 (0.30)	0.29 (0.22)	0.21 (0.15)
Checks$_{t-1}$	−0.35 (−7.64)	−0.39 (−6.03)	−0.39 (−6.96)	−0.41 (−6.63)
Sargan test		$p = 0.78$		
Hansen J test			$p = 0.65$	$p = 0.57$
N	368	356	356	356

Note: Oda is a measure of the change in the stock of aid received by a country (net ODA (flow) over GDP), Oilrents is the size of rents of oil over GDP, Sh_tot_neg (pos) is the size of the absolute negative (positive) shock to the terms of trade and checks($t − 1$) is the level of institutional development at the beginning of the period as described by the DPI database. The instruments are basically the ones used by Burnside and Dollar (2000): the log of initial income, the logarithm of initial population and the group of variables that capture donors "strategic interests" (z), which are basically regional dummies. Time dummies are included in all the regressions

Table 5 First stage

Constant	33.69 (12.05)
Oilrents$_t$	−0.03 (−1.63)
Sh_tot_neg$_t$	−1.96 (−0.56)
Sh_tot_pos$_t$	2.12 (0.54)
Checks$_{t-1}$	−0.15 (−1.33)
y_{t-1}	−1.47 (−7.39)
p_{t-1}	−1.26 (−11.45)
z_Egipt	2.29 (1.76)
z_Franc Zone	−0.09 (−0.16)
z_Central America	−0.37 (−0.57)
z_Safrica	1.10 (2.29)

aid together with income and other indicators of the level of development of a country (for instance illiteracy). These variables are included in levels and first differences but turn out to be not significantly different from 0.[14] By contrast, Knack (2004) does not include rents of oil as an explanatory variable. We use ODA from the OECD and we transform it into constant dollars and PPP, following Burnside and Dollar, and we do the ratio over real GDP in constant 1985 prices using Penn World Tables. Knack (2004) uses aid over GNP from the World Development Indicators.[15] Moreover, we compare the effect of ODA with the effect of rents from oil using the production and price information from British petroleum. Finally, our instrumentation strategy is different from the one presented in Knack (2004).

We first estimate the effect of aid on political institutions using the variable checks and balances. The column 1 in Table 4 presents the OLS estimation.[16] The effect of aid on democracy is significant although, given our previous comment, this estimator is likely to be biased. The results of the IV estimation[17] appear in column 2. Table 5 contains the results of

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[14] If we include income per capita as an additional regressor it is insignificantly different from 0 as in Knack (2004).

[15] The correlation across these different variables is high. For instance, our aid over GDP variable has a correlation of 0.85 with the ratio of aid over GDP (both in current dollars).

[16] All the specifications include time dummies.

[17] The IV estimation and diagnostic tests have been obtained using the routine ivreg2 written by Baum et al. (2003).

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Table 6 Cross section regressions (1977–1999) endogenous variable: ΔChecks

	OLS (1)	Ord. Prob (2)	IV (3)
Oda_t	−0.11 (−2.01)	−0.09 (−2.68)	−0.22 (−1.94)
$Oilrents_t$	−0.02 (−0.82)	−0.01 (−1.01)	−0.02 (−0.64)
$Sh\_tot\_neg_t$	4.22 (0.33)	3.95 (0.50)	8.17 (0.50)
$Sh\_tot\_pos_t$	−14.6 (−1.07)	−13.13 (−1.57)	−14.7 (−0.86)
$Checks_{t-1}$	−0.65 (−3.76)	−0.75 (−5.25)	−0.70 (−3.58)
R^2	0.13	0.14	
N	73	73	64

Note: Oda is a measure of the change in the stock of aid received by a country (net ODA (flow) over GDP), Oilrents is the size of rents of oil over GDP, Sh_tot_neg (pos) is the size of the absolute negative (positive) shock to the terms of trade and checks($t - 1$) is the level of institutional development at the beginning of the period as described by the DPI database. For the IV estimation the instruments are basically the ones used by Burnside and Dollar (2000): the log of initial income, the logarithm of initial population and the group of variables that capture donors "strategic interests" (z), which are basically regional dummies

the first stage of the estimation. As expected, the initial income has a negative effect on the change in ODA received by a country. On the contrary, the Sub-Saharan Africa dummy has a positive effect. The F test for excluded instruments is large ($F(6,341) = 41.57$) and above usual thresholds which implies that the instruments are relevant. Notice that it is quite likely that there is intra-group correlation. Under this circumstance IV estimators are still consistent but the usual standard deviation will not be consistent. For this reason in column 2 we present the z-statistics obtained using a cluster-robust standard deviation. The results show that foreign aid has a negative and statistically significant effect on the changes of the checks and balances stance of a country. The coefficient on the past level of checks is negative and significantly different from 0. Finally Sargan's test shows that the overidentification restrictions cannot be rejected even at levels well above the conventional level.

Column 2 in Table 4 indicates that the more aid a country received the worse its political institutions get. If the average amount of aid over GDP that a country receives over a period of 5 years reaches the 75th percentile, then the index of democracy is reduced by close to half a point (0.41). By contrast, if aid over GDP reaches the 25th percentile then the reduction in the index of democracy is a modest 0.04 points. Countries in the 75th percentile are, for example, Bolivia, Chad, Senegal, Central African Republic and Haiti. Countries in the 25th percentile are, for example, Chile, Turkey, Ecuador and Malaysia. The effect of oil revenues is not significant.

However, IV estimators under heteroskedasticity may not be efficient. For this reason column 3 presents the results of the estimation using the generalized method of moments (GMM). The estimator for aid is similar to the one shown in column 2: foreign aid has a negative and significant coefficient. The J test cannot reject the overidentifying moment conditions generated by the instruments. We can also calculate a GMM estimator assuming the presence of arbitrary intra-cluster correlation (column 4). The results are also similar to the ones reported in column 2. In addition the J test confirms that the instruments pass the test of over-identification.

To check the robustness of the findings with 5-year periods, Table 6 presents the results of different estimation procedures using a cross section of countries for the period 1977–1999 (long differences). We present the estimation using OLS, ordered probit and IV estimators. As in previous tables, foreign aid, and the initial level of democracy have a negative and significant coefficient.

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The effect of aid over GDP in the long run is large: if a country received the average amount of aid over GDP over the period 1977–1999, then the recipient country would have gone from the average level of democracy in the initial year to a total absence of democratic institutions. The effect of oil in the long-run is not significant.

5 Robustness of the results

This section presents a large set of robustness checks of the main results using additional explanatory variables for democratization, alternative variables to represents institutions, different estimation procedures, alternative samples of countries and the elimination of outliers. These robustness tests are designed to check if the results discussed before are altered by reasonable changes in the specification or the use of other proxy for institutional development.

5.1 Using additional explanatory variables

In this section we introduce a discussion of the democratization literature and its implications on the specification proposed in Sect. 4. We show that our results are robust to the inclusion of other potential determinants of democratization that are still under discussion in this literature. The starting point of the paper was to investigate whether a sudden windfall of resources, mainly from foreign aid and rents of oil, has any effect on the institutional development of aid-recipient countries. The literature on democratization has proposed some variables that could help to explain the democratic stance of a country. We are going to analyze initially the covariates included by Barro (1999), and discussed by later papers.[18] Table 7 presents the results of these regressions.

The first candidate is education. There is a recent debate on whether democracy needs education. We do not enter into this debate since our purpose is not to analyze whether more educated countries end up with high levels of democracy, but to investigate whether countries where the level of education increases experience any democratization process. Barro (1999), using a SUR estimator, finds that the years of primary education have a positive effect on the level of democracy but upper schooling have no effect. Papaioannou and Siourounis (2004) investigate the economic and social factors driving the third wave of democratization. While they find that education is important to consolidate democracies, as Glaeser et al. (2004), it turns to be insignificant to explain democratic transitions.[19] Acemoglu et al. (2008) find that education has no explanatory power for democracy in a specification with lagged democracy as explanatory variable. We also find that the change in education does not have a significant effect on institutional changes (Table 7, column 2).

The third column of Table 7 analyzes the effect of including two variables considered in Barro (1999) and used by Acemoglu et al. (2008): years of primary education and the gap between male and female primary schooling. The coefficient estimate for aid is still negative, while the new explanatory variables are not statistically significant.

Barro (1999) also includes the urbanization rate as an additional regressor. In his regressions this variable does not have a significant effect, which is also the case in column 4 of our Table 7. Finally, Barro (1999) finds that the level of GDP has a positive effect on the indices of electoral rights and civil liberties. Papaioannou and Siourounis (2004) reach a different

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[18] In order to make the results comparable we include as explanatory variable the dummy for oil countries (as in Barro 1999) instead of the rents of oil.

[19] This is the analysis that is closer to ours in the sense that we investigate the determinants of changes in democracy in countries in democratic transition.

Table 7 Regressions with additional explanatory variable (5-year periods) endogenous variable: Δchecks

	Method of estimation GMM (cluster)				
	(1)	(2)	(3)	(4)	(5)
Oda$_t$	−0.07 (−2.60)	−0.07 (−2.17)	−0.07 (−2.12)	−0.08 (−2.45)	−0.08 (−2.39)
Checks$_{t-1}$	−0.39 (−6.16)	−0.33 (−4.98)	−0.34 (−5.15)	−0.31 (−4.70)	−0.31 (−4.72)
Oil dummy	0.03 (0.30)	0.05 (0.35)	0.07 (0.44)	−0.01 (−0.09)	−0.004 (−0.03)
Δeduc		−0.18 (−1.34)		−2.47 (−1.53)	−0.25 (−1.53)
Δprim_educ			−0.27 (−1.31)		
Δgap(male-female)			0.02 (1.48)		
Δurban_rate				0.004 (0.18)	0.002 (0.10)
Δln(GDP)					0.12 (0.28)
N	412	307	306	246	246

Note: Oda is a measure of the change in the stock of aid received by a country (net ODA (flow) over GDP), Oilrents is the size of rents of oil over GDP, Sh_tot_neg (pos) is the size of the absolute negative (positive) shock to the terms of trade and Checks($t − 1$) is the level of institutional development at the beginning of the period as described by the DPI database. The instruments are basically the ones used by Burnside and Dollar (2000): the log of initial income, the logarithm of initial population and the group of variables that capture donors "strategic interests" (z), which are basically regional dummies. The additional explanatory variables are taken from Barro (1999): the oil country dummy, average schooling years in total population, average years of primary schooling in total education, the gap between male and female primary education, and the urbanization rate. Time dummies are included in all the regressions

result using the specification in differences: changes in income levels are not significant to explain democratic transitions. The latest result is supported by Acemoglu et al. (2008).[20] In line with these recent results we also find that economic growth has no significant effect in explaining changes in democracy. It is important to notice that the effect of ODA is robust to the inclusion of economic growth and the parameter estimate is very similar in all the regressions. Our results are also robust to the inclusion of other regressors that do not change over time like the legal origin, latitude and religious fragmentation (Papaioannou and Siourounis 2004).[21]

The sensitivity analysis included in this section indicates that our specification seems to capture the basic determinants of the changes on democracy, and that our results are robust to the inclusion of many different variables that could have a potential effect on democratization. In line with Papaioannou and Siourounis (2004) and Acemoglu et al. (2008), most of the potential explanatory variables for democratization seem to be insignificant when using the specification in differences. It seems that flows of ODA and natural resources, together with shocks in the terms of trade, and the initial level of democracy, capture reasonably well the basic determinants of changes in democracy. For this reason, we are going to keep the basic specification in the following sections, and check the sensitivity of the results to alternative institutional variables, estimation procedures, sample of countries and the elimination of outliers.

5.2 Using alternative institutional variables

We start by checking the sensitivity of the results to an alternative measure of institutional development. We perform the analysis of the Sect. 4 but using the proxy for democracy from

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[20] We included a lengthy discussion on the role of GDP as an excluded instrument in the working paper version of this article.

[21] Results are available under request.

Polity IV instead of checks and balances. We consider the estimation using the 5-years period (Table 8) and the cross-section of countries (Table 9). In column 1 of Table 8 we present the results using OLS. It shows a negative and marginally significant negative effect of foreign aid on the change in the democratic stance of the countries. The second column presents the instrumental variables estimation. The F test for excluded instruments is large ($F(6, 442) = 65.91$)) which indicates that the relevance of the instruments is statistically acceptable. As explained before it is likely that there is intra-group correlation, therefore we present the z-statistics obtained using cluster-robust standard deviation. The results show that foreign aid has a negative and statistically significant effect on the changes on the level of democracy of a country. The effect of rents of oil is also negative and statistically significant. As in Sect. 4, the initial level of institutional development, in this case the level of democracy measure by the indicator in POLITY IV, is negative and significantly different from zero. Sargan's test of over-identification cannot reject the orthogonality conditions at the conventional levels of significance.

Given that the previous IV results will not be efficient under heteroskedasticity, we present the GMM estimator in column 3 of Table 8. The results are similar: flows of aid have a negative and significant effect of the changes on democracy. However, in this regression, the rents of oil are statistically insignificant. The J test of over-identification cannot reject the null hypothesis that the instruments satisfy the orthogonality conditions at least at the conventional level. In column 4 we present the results of the GMM estimations assuming the presence of arbitrary intra-cluster correlation. The results again are similar, and the J test of over-identification leads to a p-value around 0.2 which is above the conventional level.

Table 9 presents the results using a cross-section of countries for the period 1960–1999. It shows the results of the OLS, ordered probit and the IV specification. As before, flows of foreign aid have a negative and significant effect on the change on the proxy for institutions coming from Polity IV. Rents of oil have also a negative effect on democracy. The sample from 1960 to 1999 is small because there are many countries for which there is no information on Polity IV for 1960. For this reason we also include the cross section that covers the period 1975–1999. In this case we can work with 79 observations. The basic results are unaffected by

Table 8 Alternative definition for institutional change (5-year periods) endogenous variable: ΔDemoc

	OLS	IV (cluster robust)	GMM	GMM (cluster robust)
	(1)	(2)	(3)	(4)
Oda_t	−0.06 (−1.92)	−0.12 (−2.69)	−0.11 (−2.01)	−0.11 (−2.57)
$Oilrents_t$	−0.01 (−0.91)	−0.02 (−2.03)	−0.01 (−0.97)	−0.02 (−2.40)
$Sh\_tot\_neg_t$	−3.61 (−1.55)	−2.98 (−1.20)	−2.38 (−1.09)	−2.34 (−1.00)
$Sh\_tot\_pos_t$	0.57 (0.27)	1.02 (0.63)	1.50 (0.79)	1.34 (0.86)
$Democ_{t-1}$	−0.22 (−7.86)	−0.24 (−5.46)	−0.21 (−6.31)	−0.21 (−5.24)
Sargan test		$p=0.11$		
Hansen J test			$p=0.15$	$p=0.20$
N	474	459	459	459

Note: Oda is a measure of the change in the stock of aid received by a country (net ODA (flow) over GDP), Oilrents is the size of rents of oil over GDP, Sh_tot_neg (pos) is the size of the absolute negative (positive) shock to the terms of trade and Democ($t-1$) is the level of institutional development at the beginning of the period as described by the Polity IV database. The instruments are basically the ones used by Burnside and Dollar (2000): log of initial income, the logarithm of initial population and the group of variables that capture donors "strategic interests" (z), which are basically regional dummies. Time dummies are included in all the regressions

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Table 9 Cross section regressions (1960–1999, 1975–1999) endogenous variable: ΔDemoc

Sample	1960–1999			1975–1999		
Method	OLS (1)	Ord. Prob (2)	IV (3)	OLS (4)	Ord. Prob (5)	IV (6)
Oda_t	−0.67 (−3.65)	−0.26 (−3.68)	−0.91 (−3.01)	−0.42 (−3.31)	−0.15 (−3.44)	−0.63 (−3.10)
$Oilrents_t$	−0.19 (−2.87)	−0.07 (−2.72)	−0.21 (−2.95)	−0.08 (−1.77)	−0.03 (−1.88)	−0.13 (−2.05)
$Sh\_tot\_neg_t$	−44.75 (−1.73)	−13.94 (−1.46)	−6.91 (−0.21)	−28.80 (−1.26)	−7.25 (−0.94)	−24.52 (−0.92)
$Sh\_tot\_pos_t$	43.18 (1.54)	12.42 (1.19)	32.6 (1.00)	16.68 (0.73)	3.12 (0.40)	27.08 (1.01)
$Democ_{t-1}$	−0.83 (−7.01)	−0.32 (−5.96)	−0.84 (−6.28)	−0.73 (−7.22)	−0.28 (−6.53)	−0.75 (−6.82)
R^2	0.54	0.15		0.48	0.14	
N	57	57	48	79	79	69

Note: Oda is a measure of the change in the stock of aid received by a country (net ODA (flow) over GDP), Oilrents is the size of rents of oil over GDP, Sh_tot_neg (pos) is the size of the absolute negative (positive) shock to the terms of trade and Democ($t − 1$) is the level of institutional development at the beginning of the period as described by the dataset Polity IV. For the IV estimation the instruments are basically the ones used by Burnside and Dollar (2000): the log of initial income, the logarithm of initial population and the group of variables that capture donors "strategic interests" (z), which are basically regional dummies

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the period or the estimation procedure used.[22] However, notice that the size of the coefficient in the cross-section regression is somehow larger than the coefficient obtained using the panel data structure because the impact is supposed to represent the full temporal extension instead of just 5 years.

5.3 Panel data estimation with lagged dependent variable

Since changes of institutions are regressed on lagged institutions, the estimation using the panel of countries but without considering the correlation between a possible country specific effect and the lagged endogenous variable will be inconsistent. Therefore, in this section we consider the specification

$$INST_{it} = \beta_0 + \beta_1 aid_{it} + \beta_2 OIL_{it} + \beta_3 SHOCKS(-)_{it} + \beta_4 SHOCKS(+)_{it}$$
$$+ (\delta + 1)INST_{it-1} + \lambda_t + \mu_i + \varepsilon_{it} \qquad (3)$$

This is basically Eq. 1 but introducing country specific effects. In order to accommodate the standard formulation of the specification we consider the regression of the level of institutional development on the past level. Obviously, the interpretation of the parameter of the lagged institutional variable is different from the previous section.

In order to address this issue we use the system GMM estimator proposed by Blundell and Bond (1998).[23] The system GMM estimator uses the orthogonality conditions implied by the Arellano and Bond estimator, but including also additional orthogonality conditions derived from the panel data lagged dependent variable specification.[24] Recently, Acemoglu et al. (2005) have used the Arellano and Bond estimator to show that education is not a significant explanatory variable for democracy. This finding has been challenged by Bobba and Coviello (2007) using the additional orthogonality conditions proposed by Blundell and Bond (1998).

The system GMM estimation includes the orthogonality conditions of the first-differenced GMM estimator plus some extra moments, which depend on restrictions on the initial conditions generating the dependent variable. In particular, they imply that the system is stationary and that temporary deviations from the steady state value are uncorrelated with the fixed effects.[25]

Table 10 present the results of the system GMM estimation.[26] We consider ODA and the initial level of checks and balances as potentially endogenous variables. Table 10 reports the second stage estimator and the standard error between parentheses. It is well-know that the Arellano and Bond two-stage procedure, as most of the two-stage GMM estimators, generates estimates of the standard deviation which are biased. For this reason we report the estimated standard deviation using the Windmeijer (2005) correction.

In column 1 we include the instruments considered in the previous section together with the instruments generated by the system GMM procedure. The results show that flows of aid have a negative and significant effect on the institutional development of recipient countries. The

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[22] Notice that using IV we have fewer observations because for some countries we do not have some of the instruments.

[23] We use this estimator following the suggestion of one referee. The working paper version of the paper presents the estimation using the standard Arellano–Bond estimator with level instruments for the difference specification.

[24] In particular, it includes as additional moment conditions the level equation with instruments in first differences.

[25] Although this is not the only possible scenario for the satisfaction of those extra moment conditions.

[26] We use the routine XTABOND2 written by Roodman.

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Table 10 System GMM estimation (5-year periods) endogenous variables: Democ and checks

	GMM Democ (1)	GMM collapsed Democ (3)	GMM Checks (2)
Oda$_t$	−0.11 (−2.34)	−0.12 (−2.48)	−0.10 (−2.65)
Oilrents$_t$	−0.02 (−2.22)	−0.02 (−2.32)	−0.00 (−0.48)
Sh_tot_neg$_t$	−3.57 (−1.34)	−0.42 (−0.10)	−4.05 (−2.42)
Sh_tot_pos$_t$	−0.75 (−0.29)	2.04 (0.71)	3.69 (1.32)
Democ$_{t-1}$	0.74 (10.15)	0.86 (10.08)	
Checks$_{t-1}$			0.44 (4.40)
Constant	0.40 (1.09)	−0.19 (−0.43)	1.19 (4.05)
Instruments	70	30	41
Hansen J test	$P=0.15$	$P=0.21$	$P=0.37$
Diff. Hansen test			
a. Level eq.	$P=0.57$	$P=0.88$	$P=0.30$
b. Exog. inst.	$P=0.21$	$P=0.21$	$P=0.48$
c. Diff. eq.	$P=0.33$	$P=0.17$	$P=0.46$
m_2	$P=0.11$	$P=0.12$	$P=0.31$
N	456	456	295

Note: Oda is a measure of the change in the stock of aid received by a country (net ODA (flow) over GDP), Oilrents is the size of rents of oil over GDP, Sh_tot_neg (pos) is the size of the absolute negative (positive) shock to the terms of trade, and democ $(t-1)$ and checks$(t-1)$ is the level of institutional development at the beginning of the period. The standard instruments are the ones used by Burnside and Dollar (2000) (log of initial income, logarithm of initial population and the group of variables that capture donors "strategic interests", which are basically regional dummies) and the instruments generated by the system GMM method considering ODA and the lag institutions as endogenous variables. Z-tests based on Windmeijer's robust standard errors estimation are included between parentheses. Time dummies are included in all the regressions. Difference-in-Hansen tests: a. Level eq. represents the test for the instruments of the level equations (exogenous variables and time dummies are not included); b. Exogenous instruments: tests the exogenous variables and the time dummies; c. Diff. eq: test for the moment conditions generated by the differences equations (exogenous variables and time dummies are not included)

rents of oil have also a statistically significant negative effect. The coefficients estimated are almost identical to the ones presented in Table 8. The coefficient of initial democracy is also very similar to the one derived from the transformation of the coefficient of lagged democracy in Table 8. The specification passes the usual Hansen test, indicating that the overidentifying orthogonality conditions are not rejected. Table 10 reports also several difference-in-Hansen tests for subsets of instruments. The first row presents the test for the subset of instruments of the moment conditions based on the level equations generated by the procedure (without considering in this set the exogenous variables). The test cannot reject the null hypothesis. The test for the set of exogenous variables and for the set of orthogonality conditions generated by the difference endogenous variables cannot reject either the appropriateness of those instruments.

However, in the system GMM estimator the number of orthogonality conditions grow fast with the number of periods and lags available. Roodman (2007b) notices that if there are many instruments but the sample size is small, then there may be a downward bias in the two-step standard error and the Hansen test becomes a weak indicator of the validity of the model. Calderon et al. (2002) and Beck and Levine (2004) consider a reduction in the instrument set based on using only one instrument for each lag distance and instrumenting variable. This approach implies collapsing the instruments in the terminology of Roodman (2007b).[27] The

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[27] See Roodman (2007b) for a discussion on techniques to reduce the number of instruments when working with the system GMM estimator.

standard instruments for the differences equations includes a separate instrument for each time period. The matrix of instruments Z corresponding to the endogeneous variable and the third difference, and above,

$$E(y_{i,t-s}\Delta\varepsilon_{it}) = 0 \quad \vee \quad t \geq 3; s \geq 2$$

has the form[28]

$$Z = \begin{bmatrix} y_{i1} & 0 & 0 & 0 & 0 & 0 & \cdots \\ 0 & y_{i1} & y_{i2} & 0 & 0 & 0 & \cdots \\ 0 & 0 & 0 & y_{i1} & y_{i2} & y_{i3} & \cdots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \ddots \end{bmatrix}$$

We could collapse the instruments to get the following matrix of instruments[29]

$$Z = \begin{bmatrix} y_{i1} & 0 & 0 & \cdots \\ y_{i1} & y_{i2} & 0 & \cdots \\ y_{i1} & y_{i2} & y_{i3} & \cdots \\ \vdots & \vdots & \vdots & \ddots \end{bmatrix}$$

The estimation of column 1 in Table 10 implies 70 moment conditions. This is not a particularly large number considering that we have 456 observations. Nevertheless, we have estimated the specification collapsing the moment conditions as explained above. Column 2 of Table 10 presents the results. The main result is unchanged: foreign aid has a negative and statistically significant effect on democracy. The number of instruments has been reduced to 30. All the Hansen tests are satisfactory. The J-test cannot reject the validity of the overidentifying moment restrictions. The moment conditions generated by the level equation, the differences equation and the exogenous variables are not rejected by the data.

The results using our preferred proxy for institutional development are reassuring. Columns 3 of Table 10 present the same estimations as columns 1 but using the index of checks and balances as proxy for institutions. In this case, since there are data for fewer time periods than for the previous proxy, the number of instruments is low (41) even without collapsing the matrices of instruments. The coefficient estimated for ODA is quite similar to the one reported in Table 4. In this case, the rents of oil do not have a statistically significant effect on checks and balances. The Hansen test is well above the conventional level. The difference in Hansen test for the instruments of the level equations (excluding the exogenous variables) cannot reject those overidentifying restrictions. The second difference in Hansen test shows that the moment conditions generated by the exogenous variables are not rejected by the data. Finally, the difference-in-Hansen test for the difference equations cannot reject the validity of those moment conditions.

5.4 Sensitivity of the results to the sample of countries and the elimination of outliers

Table 11 tests the sensitivity of the results when we reduce the sample of countries to the ones that have had a change in the level of democracy.[30] We perform the same analysis but considering only the countries, years and periods in which institutions changed. The

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[28] Without considering the rows of 0's on top of the matrix.

[29] The moment conditions associated with the equation in levels can also be collapsed in a single column.

[30] Therefore, we do not include in the sample the observations when the change in democracy in the period is 0. This exercise was suggested by one of the referees.

Table 11 Regressions for the sample of countries with changes in democracy or checks and balances (IV estimation)

	ΔDemoc	ΔChecks
5–Year periods	−0.32 (−2.16)	−0.24 (−2.88)
Cross section 1960–1999	−1.07 (−3.84)	
Cross section 1965–1999	−0.91 (−2.69)	
Cross section 1970–1999	−0.98 (−3.59)	
Cross section 1975–1999	−0.77 (−3.39)	
Cross section 1977–1999		−0.30 (−2.00)

Note: This table presents the parameter estimate for ODA in the basic regression where the sample has been constrained to the countries which have a positive (negative) change in institutions. Time dummies are included in all 5-year regressions

rows indicate the frequency of the data (5-year panels or cross-section). In the cross-section, we include different starting years, 1960, 1965, 1970, and 1975. We use IV and standard errors corrected by clusters. The columns indicate which institutional variable is used as the dependent variable. The numbers of the table are the coefficient of foreign aid and the t-statistic. The results indicate that institutional development worsens with increased aid flows.[31] In fact, the size of the parameters is higher than in the basic specification, which was expected since we are only considering the sample with actual changes in the degree of democratization.

We also check whether results may be caused by countries scoring below the median on democracy at the beginning of the period. For that purpose we run the regressions for countries scoring above the median on democracy, and we find qualitatively the same results. This indicates that countries with good democratic institutions are not immune to the "curse of aid".[32]

Finally, we consider the effect of eliminating the outliers on the results of the estimation. Following Roodman (2007) and Easterly et al. (2004), outliers are chosen by applying the Hadi (1992) procedure, using 0.05 as the cut-off significant level. Table 12 presents the results of different estimation procedure in the cross section sample once the outliers are eliminated. Columns 1 and 2 consider the OLS estimator for the cross section of countries during the full period. Figure 3 shows the partial correlation between change in institutions (checks and balances) and aid obtained using the OLS regressions in column 1. Figure 4 corresponds to the partial correlation between change in the democracy proxy in POLITY IV and foreign aid once the outliers (Jordan and Mauritania) have been eliminated. The slope of this relationship continues being negative.

Neither the OLS estimators nor the ones in the following columns (IV and GMM estimators) imply any qualitative change of the basic findings: foreign aid has a negative and significant effect on the democratic stance of the aid-receiving countries.

6 Alternative instruments

Previous sections have shown the results of the estimation using the standard instruments for foreign aid. In this section we perform a sensitivity analysis in which we investigate whether

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[31] We only include one cross section in the case of changes in checks and balances since the temporal extension of the endogenous variable is shorter than the one for changes in democracy.

[32] Results are available upon request.

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Table 12 Robustness to the elimination of outliers endogenous variables: ΔChecks, ΔDemoc

Endogenous variable	OLS cross section ΔChecks (6)	OLS cross section Δdemoc 1960–1999 (7)	IV cross section ΔChecks (3)	IV cross section Δdemoc 1960–1999 (4)	IV cross section Δdemoc 1975–1999 (5)	GMM 5-years ΔChecks (1)	GMM 5-years Δdemoc (2)
Oda_t	−0.11 (−2.22)	−0.71 (−2.59)	−0.13 (−1.91)	−0.98 (−2.59)	−0.64 (−2.78)	−0.07 (−3.03)	−0.16 (−3.04)
$Oilrents_t$	−0.02 (−1.04)	−0.19 (−2.84)	−0.01 (−0.37)	−0.22 (−2.93)	−0.13 (−2.01)	−0.00 (−0.43)	−0.01 (−1.15)
$Sh\_tot\_neg_t$	3.47 (0.41)	−40.9 (−1.42)	6.17 (0.63)	−3.11 (−0.09)	−23.72 (−0.81)	−1.54 (−1.42)	−4.98 (−2.43)
$Sh\_tot\_pos_t$	−14.01 (−1.60)	40.6 (1.38)	−15.77 (−1.53)	31.06 (0.93)	26.89 (0.97)	0.61 (0.45)	2.84 (1.58)
$Checks_{t-1}$	−0.88 (−8.07)		−0.90 (−7.50)			−0.38 (−6.82)	
$Democ_{t-1}$		−0.83 (−6.76)		−0.86 (−6.12)	−0.75 (−6.71)		−0.18 (−5.52)
Sargan test			P=0.40	P=0.08	P=0.22		
Hansen test						p=0.42	p=0.17
R^2	0.51	0.54					
N	70	55	63	47	67	353	444

Note: Oda is a measure of the change in the stock of aid received by a country (net ODA (flow) over GDP), Oilrents is the size of rents of oil over GDP, Sh_tot_neg (pos) is the size of the absolute negative (positive) shock to the terms of trade and Checks($t − 1$), and Democ($t − 1$) are the level of institutional development at the beginning of the period. The instruments are basically the ones used by Burnside and Dollar (2000): log of initial income, the logarithm of initial population and the group of variables that capture donors "strategic interests" (z) which are basically regional dummies. Time dummies are included in all the regressions

coef = -.10592353, se = .04777124, t = -2.22
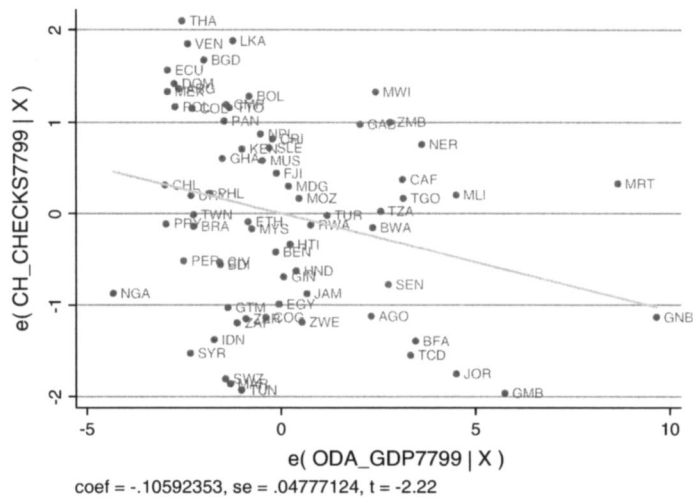
Fig. 3 Partial correlation of aid and change in political institutions (checks and balances) sample without outliers

coef = -.70800014, se = .27380025, t = -2.59
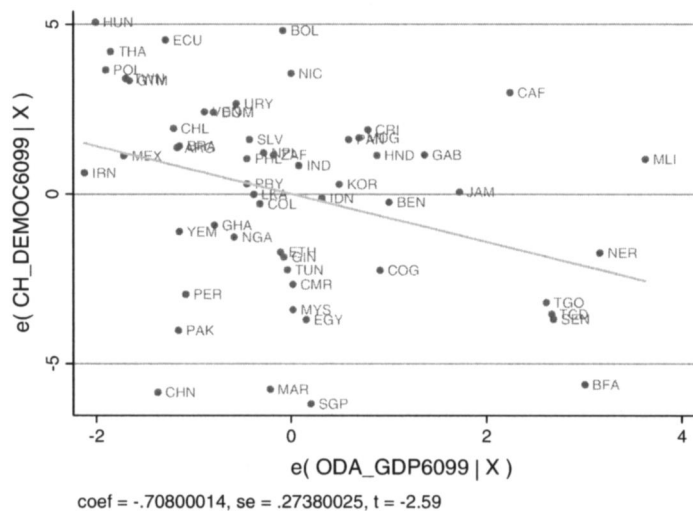
Fig. 4 Partial correlation of aid and change in institutions (democracy) sample without outliers

the results are robust to the use of alternative instrumentation strategies. When we use the standard instrumentation for foreign aid the results of the tests indicate that the orthogonality conditions generated by these instruments are not rejected. However, overidentification tests may have low power if there are too many instruments. In Sect. 5.3 we already discussed the robustness of the estimation to the instruments generated by the orthogonality conditions associated with the Blundell and Bond (1998) estimator. In this section we propose new identification strategies that use still another set of instruments.

Our first approach to address the problems of endogeneity between foreign aid and changes of political institutions was to use the set of standard instruments proposed by Burnside and Dollar (2000) and used in Easterly et al. (2004), Hansen and Tarp (2001) and Clemens et al.

(2004). Those instruments include the logarithm of initial income, the logarithm of population and a group of variables that captures donors "strategic interests"—represented by dummy variables for Sub-Saharan Africa, the Franc Zone, Egypt, and Central American countries. Even though the overidentification tests indicate that the orthogonality constrains generated by these instruments are not statistically rejected we check the robustness of the results using an alternative instrumentation strategy. Initially, we substitute the regional variables (strategic interest variables) by a colonization variable. It is reasonable to think that countries that have been a colony might receive more foreign aid from their old colonizers, than countries that have never been under any European power. We construct a dummy that has value 1 if the recipient country has ever been a colony, and zero otherwise. Therefore, in column 1 of Table 13 we use as instruments the logarithm of initial income, the logarithm of population and the dummy of ex-colony. We follow the basic estimation procedures described in Sect. 4. In Table 13 we reproduce the estimation of column 2 of Table 4 with the new set of instruments. That is, we perform the IV estimation, and the z-statistics obtained using a cluster-robust standard deviation. The F-test of excluded instruments is quite high ($F = 32.27$). The Sargan's test is well above conventional levels. The results corroborate that foreign aid has a negative and significant effect on the changes of political institutions of a country.

In column 2 we check weather the sub-Saharan African dummy is driving the identification. Therefore, we drop this dummy from the set of instruments. The instruments included are therefore the logarithm of initial income, the logarithm of population and the dummies for strategic interest excluding the dummy for Sub-Saharan African countries. The F of excluded instruments (27.66) points towards the relevance of the instruments. The results are similar to the ones obtained in Table 4, where aid has a negative and statistically significant effect on the change on political institutions.

In column 3 we add a measure of arms imports relative to total imports lagged one period, a variable that has been used as instrument for aid in other papers in the literature of aid and growth as Dalgaard et al. (2004), Clemens et al. (2004), and also Burnside and Dollar (2000). Rajan and Subramanian (2007a) argue that "the variable arms imports could be a proxy for strategic reasons for giving aid, and thus is plausibly orthogonal to motives for giving aid that relates to the underlying economic situation of the recipient country" (p. 12). A similar argument applies for the case of the underlying democratic situation of the recipient country. The F-test for the excluded instruments is high ($F = 23.86$). The p-value for the Sargan test is clearly above any conventional level of significance, and the results support the conclusions we obtained using the basic specification: foreign aid has a negative and statistically significant effect on the change in political institutions. The parameter estimate is just marginally larger than the one obtained in the basic regressions.

In columns 4, 5 and 6 we drop some instruments to show that results are robust to the exclusion of some potentially controversial instruments such as the logarithm of initial income and the logarithm of population. In column 4 we drop the logarithm of initial income from the set of instruments, leaving the logarithm of population, strategic interests and arms imports as instruments. In column 5 we drop the logarithm of initial income and the logarithm of population from the set of instruments leaving arms imports and strategic interests as instruments. Therefore, in this exercise we only consider variables that proxy for strategic reasons for giving aid, which are very likely to be orthogonal to the underlying factors affecting institutional development in aid-receiving countries. In both columns, 4 and 5, the F of excluded instruments is high (19.97 and 14.04, respectively), and the Sargan's test indicates that the overidentifying orthogonality conditions generated by the instruments are not rejected by the data at the conventional level of significance. In both cases the results indicate that foreign aid has a negative and statistically significant effect on the change in

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Table 13 IV with alternative instruments endogenous variable: ΔChecks

	IV (cluster robust) 5-year (1)	IV (cluster robust) 5-year (2)	IV (cluster robust) 5-year (3)	IV (cluster robust) 5-year (4)	IV (cluster robust) 5-year (5)	IV (cluster robust) 5-year (6)	IV 1980–1999 Cross Section (7)	IV 1990–1999 Cross Section (8)
Oda_t	-0.08 (-2.55)	-0.08 (-2.57)	-0.10 (-2.70)	-0.11 (-2.41)	-0.11 (-3.06)	-0.11 (-3.03)	-0.44 (-2.22)	-0.50 (-1.94)
$Oilrents_t$	-0.01 (-1.29)	-0.01 (-1.30)	-0.01 (-0.89)	-0.01 (-0.95)	-0.01 (-1.00)	-0.01 (-1.55)	-0.05 (-1.14)	-0.01 (-0.35)
$Sh\_tot\_neg_t$	-1.60 (-1.22)	-1.59 (-1.21)	-1.64 (-1.23)	-1.56 (-1.14)	-1.56 (-1.16)	-1.36 (-1.01)	1.08 (0.07)	8.29 (0.72)
$Sh\_tot\_pos_t$	0.40 (0.27)	0.40 (0.28)	0.73 (0.49)	1.57 (1.09)	1.59 (1.10)	1.38 (0.98)	3.59 (0.23)	13.16 (1.08)
$Checks_{t-1}$	-0.38 (-5.99)	-0.39 (-6.00)	-0.39 (-5.81)	-0.39 (-6.06)	-0.40 (-5.88)	-0.40 (-6.05)	-0.75 (-3.42)	-0.46 (-2.76)
Instruments included	Lgdp, Lpop, excolony	Lgdp, Lpop, strateg. without safrica	Lgdp, lpop, arms imports, strateg.	Lpop, arms imports, strateg.	Arms imports, strateg.	Strateg.	Rajan& Subramanian	Rajan& Subramanian
Sargan test	P = 0.63	P = 0.99	P = 0.88	P = 0.99	P = 0.97	P = 0.95		
N	356	356	339	349	349	368	61	58

Note: Oda is a measure of the change in the stock of aid received by a country (net ODA (flow) over GDP), Oilrents is the size of rents of oil over GDP, Sh_tot_neg (pos) is the size of the absolute negative (positive) shock to the terms of trade and checks($t − 1$) is the level of institutional development at the beginning of the period. The instruments are specified in each regression. Time dummies are included in all the regressions

political institutions with a coefficient very similar to the one in the basic Table 4. Finally, in column 6 we consider the strictest list of instruments: only the strategic interest variables. The Sargan test is again well above the conventional levels of significance. Foreign aid continues having a negative and significant coefficient on the change in institutions.

We also consider the robustness of our results to the use of the instruments proposed by Rajan and Subramanian (2007a,b) based on bilateral aid flows and donors' characteristics. Their instrumentation strategy is based on a clever idea, which is to model the supply of aid based on donor-related rather than recipient-specific characteristics. They base their instrumentation strategy on "considerations that drive individual donors to give aid to a country other than those related to a country's level of income or growth. So the construction of the instruments starts from the bilateral (donor-recipient) relationship and aggregates up. This is in contrast to the literature that picks instruments directly at the level of the recipient country" (p. 14). The construction of the instrument is based on two assumptions: the first assumption is that the greater the extent of historic relationships between a donor and a recipient the more likely that a donor will want to give aid. They capture this idea through colonial links and common language. The second assumption is that donors are more likely to want to give aid the more they expect to have influence over recipient. They proxy this influence, with the relative size of donor and recipient. They also include the interaction between relative size and colonial links.[33] In Table 13, columns 7 and 8, we consider the basic specification using as instrument for aid the one proposed by Rajan and Subramanian (2007a,b).[34] For that reason we use a cross-section specification to adapt the estimation to the availability of the instrument. The instrument is available for the periods 1960–2000, 1970–2000, 1980–2000 and 1990–2000. Since we have data on political institution from 1977, we perform two cross-section analyses: for the period 1980–2000 and the period 1990–2000. The F of excluded instruments is above the usual threshold ($F = 10.24$). The result in columns 7 and 8 shows that foreign aid has a negative and statistically significant effect on the change on political institutions. The magnitude of the coefficient on foreign aid is higher than the one found in Table 6. However, we should notice that in the cross-section estimation of Table 13 the sample is different from the one in Table 6: the instrument is not available for some countries and the sample period is also different.

In summary, Table 13 shows that the basic results are robust to the use of many alternative instrumentation strategies. In particular, eliminating some of the most controversial instruments used in the previous literature (like the log of per capita income) does not affect the results. More importantly, the basic results are robust to using only the variables that are driven by the interest of the donors (strategic interest) and are plausibly uncorrelated with the underlying factors that affect institutional development in aid-receiving countries. Finally, there are two very reassuring facts about these regressions: the size of the coefficient on foreign aid is basically unchanged no matter what set of instruments is used for the estimation; and the Sargan-Hansen tests are well above the conventional significance levels. The results of Table 13 are basically unchanged if we run the Arellano and Bond (1991) GMM estimator or the system estimator proposed by Blundell and Bond (1998).[35]

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[33] See Rajan and Subramanian (2007a) for details of the instrumentation process.

[34] We thank Rajan and Subramanian for sharing their instrument with us.

[35] Results are available upon request. We have also performed the same robustness analysis using the definition of democracy from Polity IV finding very similar results.

7 Conclusions

Using data on over one hundred countries and for over 40 years, this study quantifies the effects of aid on democracy. Being dependent on foreign aid seems to result in worsening democratic institutions. This effect is akin to the "curse of oil" effect established in previous work. We provide new evidence for the relative size of the curse of aid and the curse of oil on political institutions. The comparison is instructive as it highlights how little is known about the delivery of foreign aid, despite an estimated $2.3 trillion spent on aid in the second half of the 20th century. The specific mechanism why foreign aid has a negative effect on political institutions needs to be further investigated.

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