Resources Policy 99 (2024) 105367

Contents lists available at ScienceDirect

Resources Policy

journal homepage: www.elsevier.com/locate/resourpol

Institutions as a determinant of FDI and the role of natural resources

Jonathan Bothner

University of Bayreuth, Universitätsstraße 30, 95447 Bayreuth, Germany

ARTICLE INFO

Keywords:
Institutions
Corruption
Foreign direct investment
Natural resources

ABSTRACT

This study examines the link between institutional quality and foreign direct investment (FDI) flows to developing countries. The link is investigated at different levels of host countries' natural resource endowment. Weak institutions can be expected to attract FDI in natural resource abundant countries since they facilitate rent seeking behavior which is commonly thought to be prevalent in the natural resources sector. However, weak institutions also increase uncertainty, thus discouraging investments involving initial sunk costs as large as they commonly are in the natural resources sector. The aim of this study is to empirically assess how natural resource endowment moderates the effect of institutions on FDI. Using data on 117 developing and emerging countries over the time period 1996–2019, I estimate a dynamic panel model using the system generalized method of moments (GMM) estimator. I find a positive effect of institutional quality on FDI inflows only for countries with relatively high levels of natural resource endowment. The results are significant as they provide evidence for a narrative which is inconsistent with the results of earlier empirical research. They indicate that a higher natural resource endowment increases the importance of institutional quality as a determinant of FDI.

1. Introduction

Over recent decades, worldwide foreign direct investment (FDI) has increased immensely. As Table 1 shows, average yearly global FDI inflows rose from about 992.8 billion USD over the time period 2000–2004 to about 2043.9 USD over the time period 2015–2019, an increase of approximately 106 per cent. High-income countries still receive the majority of global FDI. Yet, FDI flows to developing and emerging countries have also increased substantially. The average share of global FDI received by those countries which the World Bank classifies as low and middle income countries increased from 17.6 per cent over the time period 2000–2004 to 33.4 per cent over the time period 2015–2019. The majority of these FDI flows to non-high-income countries goes to countries classified as upper middle income countries which received on average about 24.7 per cent of global FDI over the time period 2015–2019. However, low income countries and lower middle income countries have also seen their FDI inflows increase substantially, relatively speaking, with the average share going to low income countries increasing from 0.4 to 0.8 per cent and the average share going to lower middle income countries increasing from 2.6 per cent to 7.9 percent. For poorer countries, FDI inflows can bring a lot of benefits. They are a source of capital and can thus contribute to economic growth. Also, FDI can be linked to technological spillovers (Blomström and Kokko, 1998; Wang, 1990; de Mello Jr., 1999; Barrell and Pain, 1999) and it can have positive employment effects (Nunnenkamp and Bremont, 2007). Hence, the question of what determines FDI inflows is especially relevant for less developed countries.

One potential determinant of FDI flows that has received much attention in the literature is the host country's institutional environment. North (1991) outlines the role of institutional frameworks in reducing uncertainty for investors. This is especially relevant to foreign investment since any activity on foreign markets already implies higher risks. Hence, it is plausible that institutions that reduce uncertainty, e.g. by constraining arbitrary decision-making and opportunistic behavior by government agents, lead to more FDI.

Extractive industries are often thought to have a special relationship with a country's institutional framework. As a strategically important sector, the natural resource sector is typically strictly controlled and regulated by host country governments. This can raise the incentive for industry agents in this sector to influence host country government officials in their favor. Thus, it seems plausible that institutions which enable corruption and rent-seeking by politicians or bureaucrats make a country a more attractive destination for FDI in the natural resource sector. Asiedu and Lien (2011) find empirical evidence that democracy only affects FDI positively in developing countries with low natural resource endowments, which might be a finding in support of this rent-seeking hypothesis.

At the same time, however, investments in extractive industries are typically characterized by high sunk costs and uncertainty regarding the profitability of the investment (Barham et al., 1998). When a multinational enterprise's (MNE) access to natural resources is strongly dependent on decisions by a host country's government and its agents,

E-mail address: jonathan.bothner@uni-bayreuth.de.

https://doi.org/10.1016/j.resourpol.2024.105367
Received 4 August 2023; Received in revised form 22 November 2023; Accepted 16 October 2024
Available online 4 November 2024

Table 1
Stylized facts.
Source: Author's own calculations using data from the World Development Indicators (WDI) by the World Bank (2022).

	2000–2004	2005–2009	2010–2014	2015–2019
Global net FDI inflows (in billion USD)	992.8	2,164.7	2,094.5	2,043.9
FDI share: low & middle income (in %)	17.6	21.3	32.5	33.4
FDI share: low income (in %)	0.4	0.4	0.9	0.8
FDI share: lower middle income (in %)	2.6	4.5	5.5	7.9
FDI share: upper middle income (in %)	14.6	16.4	26.1	24.7

All values are yearly averages over the respective time period. All values are rounded to the first decimal.

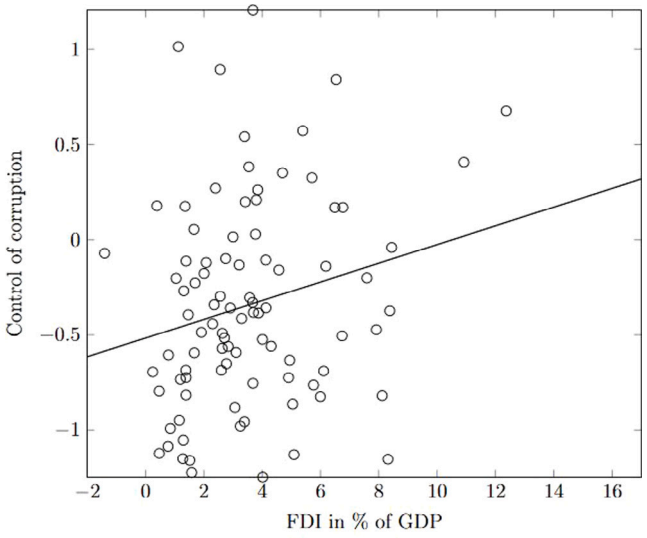

Fig. 1. Countries with less than 50 per cent natural resource exports
Note: For the 117 countries listed in table 5 the variables control of corruption, FDI as a percentage of GDP, and natural resource exports as a percentage of total merchandise exports are averaged over the time period 1996–2019. Depicted are only those 90 countries with a natural resource export share of less than 50 per cent.

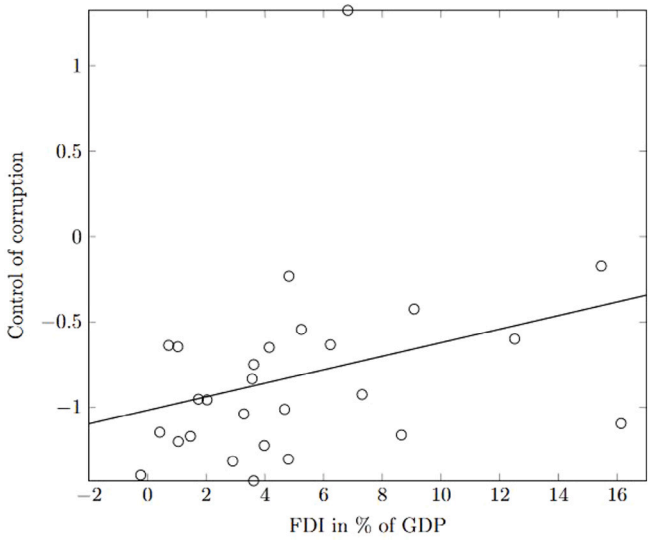

Fig. 2. Countries with more than 50 per cent natural resource exports
Note: For the 117 countries listed in table 5 the variables control of corruption, FDI as a percentage of GDP, and natural resource exports as a percentage of total merchandise exports are averaged over the time period 1996–2019. Depicted are only those 27 countries with a natural resource export share of more than 50 per cent.

this creates a potential hold-up problem. The investor may fear that the host country government will exploit the initial specific investment, for example by renegotiating contracts after the sunk costs have been incurred or even by expropriation of the foreign investor. Governments that are not constrained in their capability to interfere in economic activity or to exploit investments of MNEs can thus present an element of uncertainty in the foreign investor's decision to engage in a host country. Investments in activities with high asset specificity, as in the natural resource sector, are especially at risk to be negatively impacted by such unconstrained behavior of government agents. High-quality institutions may reduce the likelihood of such exploitation occurring in the eyes of the investor. Thus, higher institutional quality may be especially relevant as a determinant of FDI in the natural resources sector.

To get an idea of the overall relationships between FDI, institutional quality and natural resource endowment in developing countries, let us split a sample of 117 non-high-income countries into two groups based on their resource endowment. Fig. 1 shows the relationship between FDI inflows and the control of corruption index of the Worldwide Governance Indicators (WGI) by the World Bank (2022) for those developing countries with a share of natural resources in their total merchandise exports of less than 50 per cent. Fig. 2 provides the analogous scatter plot for those countries with a share of natural resources in their total merchandise exports of more than 50 per cent.

Comparing the two figures, we can see that countries with high natural resource endowments are, on average, characterized by lower institutional quality, as indicated by the control of corruption index. Regarding the relation between FDI and the measure of institutional quality in the two groups, it is interesting to note that in both cases the slope of the line of best fit is positive. Looking only at the raw data, it does not seem implausible that institutional quality positively affects FDI in countries which are not resource endowed as well as in those with high natural resource endowments.

As outlined above, it is theoretically unclear whether institutional quality affects natural-resource-seeking FDI positively or negatively. Perhaps this is the reason why the empirical evidence on this question does not consistently point in one direction. Carril-Caccia et al. (2019) find that institutions have a stronger positive effect on FDI in oil-producing countries, a result that seems to contradict that of Asiedu and Lien (2011). The lack of conclusive empirical evidence shows that further examination of this issue is warranted. The study at hand aims to contribute to the closure of this gap in the literature by examining the effect of institutional quality on FDI inflows at different levels of host countries' natural resource endowment.

The remainder of this article is structured as follows: Section 2 provides a review of related literature. In Section 3, the data and the empirical framework are presented. Section 4, shows and discusses the results. In Section 5, some robustness checks are conducted. Section 6 concludes.

2. Literature review

The relationship between institutional quality and economic development has been the subject of a vast body of literature. Empirical evidence indicates an overall positive effect of institutions on economic growth (Dawson, 1998; Dollar and Kraay, 2003; Rodrik et al., 2004; Acemoglu et al., 2005; Vianna and Mollick, 2018; Gründler and Potrafke, 2019; Röthel and Leschke, 2023). When it comes to

the particular effect of institutions on FDI, however, the nature of the relationship is not as clear. In fact, there are theoretical arguments for a positive effect of institutional quality on FDI, while others predict a negative relationship between the two. In this section, I first review the literature on the different channels through which institutions may affect FDI in general. I then present existing literature examining the heterogeneity of these effects with respect to the natural resource endowment of the host country.

Let us first turn to channels through which institutions may positively affect FDI. A common argument for a positive effect of institutional quality on FDI emphasizes uncertainty as a deterrent of investment. A state seeking to attract FDI faces a time-inconsistency problem: FDI is ex post immobile and thus, once the investment has been made, disinvestment is costly (Vernon et al., 1971; Jensen, 2003). The state thus needs to credibly commit to not infringing on the foreign investor's property rights after the investment has been made and sunk costs have been incurred. Without institutions which constrain the executive, the foreign investor lacks assurance that their property rights will be respected in the long term. Property rights infringements by the host country government need not necessarily take the form of outright expropriations of firms or industries. They may also occur through 'creeping expropriation' (Graham et al., 2018) with the state changing taxes or renegotiating contracts or through corruption and rent-seeking by government officials placing additional costs on MNEs. The increase in MNEs' costs through government corruption and rent-seeking is unpredictable in magnitude and thus increases uncertainty for the foreign investor also with regard to their budgeting (Li and Resnick, 2003).

On the other hand, an institutional framework that protects private property rights and limits the state's ability to opportunistically engage in rent-seeking can serve as a commitment device, making the intention of the host state to not exploit the private investment more credible in the eyes of the foreign investor (Henisz and Williamson, 1999; Henisz, 2000). Strong institutions can thus decrease uncertainty and encourage private investment (North, 1991). While this argument holds for any kind of private investment – domestic or foreign – Henisz and Williamson (1999) show that it is especially relevant for FDI because additionally to the general insecurity of private assets associated with weak institutions, MNEs face the 'liability of foreignness'. According to Henisz and Williamson (1999), the political risk a foreign investor faces in a host country with weak institutions consists of a 'direct political hazard' and an 'indirect political hazard'. The direct political hazard results from the host state's politicians' and bureaucrats' ability to opportunistically seek rents for their own benefit. While this may imply raised costs for local and foreign firms, foreign firms can be expected to be affected worse since they have worse access to the political process. This is in line with Aizenman and Spiegel (2006) modeling weak institutions as raising all firms' costs like a tax, with the cost increase being larger for foreign firms. They argue that domestic firms are more familiar with the institutional environment of the host country and thus find it easier to circumvent the obstacles put up by weak institutions and corruption. The indirect political hazard, according to Henisz and Williamson (1999), is associated with weak institutions creating an uneven playing field to the advantage of local competitors and to the disadvantage of the MNE. Weak institutions might enable host country firms to opportunistically influence political decision makers to grant them favors at the expense of foreign firms. Host country politicians may be willing to follow suit because favoring a domestic firm at the expense of a foreign firm might be associated with relatively low political cost or could even be beneficial in terms of public opinion.

The idea that weak institutions can create an uneven playing field to the favor of domestic firms is also expressed in the international business literature concerned with regulatory capture. Here it is suggested that weak institutional environments can lead to national competition agencies being influenced by domestic industry in order to receive protection from foreign competition (Mariotti, 2023; Carpenter and Moss, 2013).

The theoretical arguments outlined above posit a positive effect of institutions on FDI. In the terms of the eclectic paradigm of international production by Dunning (1977, 1988), one could say these arguments show that a host country's institutions can constitute a location-specific advantage attracting FDI. Many empirical studies have found evidence for such a positive effect of institutional quality on FDI (Bayraktar, 2013; Biglaiser and Staats, 2010; Jensen, 2008; Huynh et al., 2020; Tunyi and Ntim, 2016; Wei, 2000; Bénassy-Quéré et al., 2007; Asiedu, 2006).

There are, however, also hypotheses positing a negative effect of institutions on FDI. One argument is based on the idea of 'greasing-the-wheel'-corruption. Proponents of this idea suggest that corruption can facilitate investment if it helps the investor to circumvent regulatory obstacles by paying 'speed money', i.e. bribing officials (Egger and Winner, 2005; Zhu and Shi, 2019). Aidt (2009) argues, however, that even if corrupt practices can lead to efficiency gains in restrictive institutional environments, that does not mean corruption or institutions enabling corruption are efficient. The argument is that the same obstacles that are circumvented with 'speed money' are often put in place by politicians or bureaucrats with the intention of seeking rents in the first place. That is, the obstacles themselves are a result of corruption and rent-seeking and the incentive to invest would thus be larger if there was no corruption at all.

Another argument for weak institutions enabling FDI is based on the idea that, unlike suggested by Henisz and Williamson (1999), institutions enabling rent-seeking behavior by decision makers can give foreign firms a competitive advantage over local firms in the host country. According to the eclectic paradigm by Dunning (1977, 1988) firms need an ownership specific advantage in order to engage in multinational activity. This ownership specific advantage may grant the MNE relatively large market power compared to local firms in the host country. Thus, the MNE may have a better bargaining position in interactions with the host country government which it can use to secure a monopoly or oligopoly position in the host country. In countries with institutions that facilitate rent-seeking by government officials, it is argued, MNEs will find it easier to use their market power to secure monopoly rents or otherwise gain favors at the expense of local competitors or the population (Li and Resnick, 2003). Several authors have argued that this facilitation of sharing higher rents between governments and MNEs makes autocracies more attractive as FDI destinations than democracies (O'Donnell, 1978; Escribà-Folch, 2017; Resnick, 2001). Indeed, it has been argued that a large market power and a strong bargaining position of the MNE can help solve the commitment problem of corrupt host country governments regarding the protection of MNEs' investments after sunk costs have been incurred (Fagre and Wells, 1982; Lecraw, 1984; Gomes-Casseres, 1990; Murtha, 1993). Given that FDI is sunk after investment, however, this should only be the case if the ex ante bargaining power of the MNE over the host country government persists after the sunk costs of investment have been incurred (Henisz and Williamson, 1999; Teece, 1986). That is, if, due to the ex post immobility of FDI (Vernon et al., 1971), investment in the host country implies a 'fundamental transformation' (Williamson, 1987) of the market structure with the host government gaining bargaining power over the MNE, then ex ante bargaining power of the MNE may not solve the commitment problem.

Thus far, we have identified three general channels through which the quality of a host country's institutions may affect FDI which are discussed in the literature: first, the positive effect of reduced uncertainty creating a friendlier investment climate; second, the positive effect of better institutions discouraging local firms to opportunistically influence host country decision makers at the expense of foreign firms; and third, the negative effect of better institutions limiting the ability of the foreign investor to influence host country government officials to

their own benefit. We now turn to the question of how natural resource endowment may influence the relevance of these channels.

There are two characteristics of the natural resources sector which may alter the relationship between institutions and FDI: first, as a strategic sector, the natural resources sector is usually tightly regulated by host country governments. Thus, government officials can usually exercise control over private access to the natural resources sector. Second, natural resource investments have characteristics which, in theory, make them vulnerable to the hold-up problem described by Williamson (1987). That is, they are highly specific and characterized by high asset immobility, asset specificity, high capital intensity, high initial sunk costs, high risk regarding the profitability of the investment, long periods of costly exploration without revenue, and a long-term orientation (Barham et al., 1998; Otto, 2006; Andrews-Speed, 1998; Saidu, 2007; Vivoda, 2011). Barham et al. (1998) identify several factors leading to relatively high sunk costs and specificity in the natural resource sector: the facilities that need to be installed to extract natural resources are large and costly to relocate, leading to high site-specificity. In the natural resources sector, installations also tend to be specifically tailored to extracting certain raw materials. These investments are often accompanied by investments in supporting infrastructure, like transport or storage systems, which cannot be put to a different use. The necessity of investing in complementary assets such as transport infrastructure is intensified by the fact that the extraction of natural resources tends to occur in remote areas. Moreover, investments in the natural resources sector are characterized by high transaction costs. For example, in the exploration stage, searches for natural resources are conducted, the outcomes of which are uncertain. The search costs incurred are sunk. Another relevant factor is the high price volatility of natural resources which can impact the profitability of specific investments and raises uncertainty. These characteristics identified by Barham et al. (1998) lead to high sunk costs, asset specificity, and uncertainty of revenues of investments in the natural resource sector.

Given the tight control host country governments tend to have over natural resources, it has been suggested, that natural resources seeking FDI may be attracted to weak institutions. A common argument for why this might be the case is based on the idea that the government's control over natural resources invites rent-seeking behavior and corruption. The relation between a country's natural resource endowment and incentives for rent-seeking behavior has received a lot of attention in studies examining the so-called 'resource curse' (Ramsay, 2011; Busse and Gröning, 2013). This literature typically treats institutional quality and rent-seeking behavior or corruption as endogenous and examines how they are affected by the presence of natural resources. One argument why this might be the case is that governments that experience high revenues from natural resources do not develop an effective tax system, thus weakening state capacity and establishing an environment promoting rent-seeking activities (Karl, 1997). Also, the presence of large natural resource rents themselves may give government agents the incentive not to establish institutions which make it harder for them to inappropriately extract these rents (Ross, 2009). Several empirical studies have found evidence for a positive link between natural resources and corruption (Arezki and Brückner, 2011; Sala-i Martin and Subramanian, 2013).[1]

The vulnerability of the natural resources sector to rent-seeking and corruption shown by the resource curse literature may alter the relationship between a host country's institutions and FDI. Wright and Zhu (2018) point out that the large capital requirements and the high sunk costs associated with natural resource investment constitute market entry barriers. Thus, the natural resources sector tends to be highly concentrated and there is the possibility for firms to retain monopoly or oligopoly positions. Weak institutions can then be attractive to natural resource seeking FDI, the argument goes, because in such an institutional environment the MNE may find it easier to opportunistically influence rent-seeking government officials in order to gain access to the natural resources sector, secure monopoly or oligopoly positions, and extract the corresponding monopoly or oligopoly rents. In other words, weak institutions may raise the potential benefit from opportunistic behavior by government officials or MNEs. This moderation effect of natural resources is essentially one of the explanations provided by Asiedu and Lien (2011) when they only find a positive effect of democratization on FDI for countries with low natural resource endowments but not for countries with high natural resource endowments. They argue that in autocracies multinational firms may find it easier to benefit from personal ties to decision-makers when engaging in FDI in the natural resource sector.[2] Kucera and Principi (2014) also examine the link between democracy and FDI while differentiating between different industries. While they find the aggregate effect of democracy on FDI to be positive, they find a negative effect of democracy on FDI for mining and oil and gas extraction.

There is, however, also an argument in favor of the moderation of the institutions–FDI relationship by natural resource endowment to work in the opposite direction. The high sunk costs and the high asset specificity of investments in the natural resources sector make FDI in natural resources highly vulnerable to hold-up (Williamson, 1987). The credible commitment problem of host country governments described by Henisz and Williamson (1999) and Henisz (2000) in attracting FDI is more relevant for more specific investments. Thus, it can be argued, that FDI in natural resources is exposed to risks associated with opportunistic behavior by host country governments or local firms (Hefeker and Kessing, 2017) and should be more sensitive to uncertainty inducing institutions than other types of investment. This is in line with Carril-Caccia et al. (2019) finding the positive effect of institutional quality on greenfield FDI to be larger for oil-abundant countries. The high initial sunk costs and the high asset specificity in the natural resources sector suggest that investors in this sector need a lot of assurance regarding the long term security of their assets (Vivoda, 2011). This is consistent with studies identifying strong institutions, secure property rights, low corruption, and policy stability as determinants of the location decision of firms in extractive industries (Morgan, 2002; Tole and Koop, 2011).

The elaborations above show that, theoretically, the direction of the effect of natural resource endowment on the link between institutions and FDI is unclear. The empirical evidence appears to be inconclusive, with the findings of Asiedu and Lien (2011) and Carril-Caccia et al. (2019) being seemingly at odds with each other.

In this paper, I aim to contribute to the literature by empirically examining the relationship between institutional quality and FDI and the moderation of this relationship by natural resource endowment. The methodology is based on the one applied by Asiedu and Lien (2011) to examine the relationship between democracy, FDI, and natural resources. However, the common hypotheses which posit positive effects of democracy (Jensen, 2003) or autocracy (Li and Resnick, 2003; O'Donnell, 1978; Resnick, 2001) on FDI overall and on FDI in natural resource abundant countries in particular (Asiedu and Lien, 2011) tend to rely on hypotheses about effects of institutional characteristics often associated with democracy or autocracy on FDI and not on effects of democratization itself. I thus consider it worthwhile to examine the effect of institutions on FDI directly. This is consistent with Biglaiser and Staats (2010) finding that institutional environments and political risk commonly associated with democracies are more relevant as determinants of FDI than democratization itself. Hence, whereas Asiedu

[1] For an overview of the literature on the natural resource curse, see Ross (2015).

[2] In a similar study, Asiedu (2013) examines whether there is a resource curse in FDI in developing countries and whether a higher institutional quality mitigates such a resource curse. She finds that natural resource endowment negatively affects FDI and that this resource curse is mitigated by higher institutional quality.

and Lien (2011) examine the relationship between democracy and FDI, I examine whether natural resource endowment moderates the relationship between institutional quality, measured by a corruption indicator, and FDI.

3. Data and empirical approach

The sample covers 117 developing and emerging countries over the time period 1996–2019. Table 5 in the Appendix lists the countries included in the sample. All the data stem from the World Development Indicators (WDI) of the World Bank (2022). In the estimation approach and in the choice of control variables, I closely follow Asiedu and Lien (2011). The dynamic panel model to be estimated is the following:

$$\mathbf{FDI}_{it} = \gamma \mathbf{FDI}_{it-1} + \beta_1 \mathbf{inst}_{it} + \beta_2 \mathbf{resource}_{it} + \beta_3 \mathbf{inst}_{it} \times \mathbf{resource}_{it} + \beta_4 \mathbf{X}_{it} + \delta_t + \epsilon_{it} \quad (1)$$

The dependent variable FDI_{it} is defined as inward FDI flows as a percentage of GDP in country i and year t to account for differences in market size. To account for cyclical fluctuations in FDI flows, all variables are averaged over 4-year periods, resulting in the sample covering six time periods: 1996–1999, 2000–2003, 2004–2007, 2008–2011, 2012–2015, and 2016–2019.

The variable $inst_{it}$ indicates the quality of institutions. The literature review in Section 2 has shown that the channel through which institutions may affect FDI negatively is by restricting the feasibility of rent-seeking by government officials and by limiting the influence MNEs have over politicians or bureaucrats. This is why I measure institutional quality using the control of corruption index of the Worldwide Governance Indicators (WGI) by Kaufmann et al. (2010). This index captures "perceptions of the extent to which public power is exercised for private gain" (Kaufmann et al., 2010, p. 4). It ranges from about −2.5 to 2.5 with higher values indicating less perceived corruption, i.e. a higher quality of institutions. The choice of this institutional variable thus speaks to the rent-seeking argument: If it is indeed the possibility of influencing government officials which makes a country with weak institutions an attractive destination for FDI, and if it is this channel which is more relevant for FDI in natural resource abundant countries, as suggested by authors such as Asiedu and Lien (2011), then I expect the control of corruption index to adequately capture this mechanism. The control of corruption index and all other institutional variables used in this study are normalized to range from zero to one.

The variable $resource_{it}$ measures a country's natural resource endowment. Following Asiedu and Lien (2011), natural resource endowment is measured as natural resource exports as a percentage of total merchandise exports. The World Bank (2022) provides data on fuel exports as a percentage of merchandise exports as well as on ores and metals exports as a percentage of merchandise exports. These two percentages are summed up to construct the natural resource variable. Due to the way these variables are defined by the WDI the natural resource endowment variable thus includes commodities in the SITC sections 3 (mineral fuels, lubricants, and related materials), 27 (crude fertilizer and crude minerals), 28 (metalliferous ores and scrap), and 68 (non-ferrous metals). $inst_{it} \times resource_{it}$ is the interaction of the institutional variable and the natural resource variable. Including the interaction term allows us to evaluate the relationship between institutions and FDI at different levels of the natural resource variable. If higher institutional quality discourages FDI in host countries with high natural resource endowments, we would expect negative estimates on control of corruption at high levels of the natural resource variable. If, on the other hand, higher institutional quality is especially relevant for FDI in countries with high natural resource endowments, we would expect positive estimates on control of corruption at high levels of the natural resource variable.

X_{it} is a vector of control variables, δ_t is a time-period fixed effect and ϵ_{it} is the country- and year-specific error term, which is assumed to include a country-specific component.

The following control variables are included in the regression: the trade volume (exports plus imports) as a percentage of GDP as a measure of a country's trade openness, GDP per capita in constant 2015 USD, a measure of infrastructure development, and inflation volatility.

The effect of trade openness on FDI is theoretically unresolved. In accordance with the tariff jumping hypothesis, trade openness is expected to be positively related to vertical FDI and negatively associated with horizontal FDI (Helpman et al., 2004). Since all the countries in the sample are developing and emerging countries which tend to be more attractive destinations for vertical FDI, one might expect the estimated coefficient on trade openness to be positive.

GDP per capita and economic growth can be considered indicators of the attractiveness of a country's market and are thus expected to be positively linked to FDI. As there is evidence that the relationship between FDI and economic development might not be linear (Asiedu and Lien, 2003; Davies, 2008) I follow the approach of Asiedu and Lien (2011) and also control for the square of GDP per capita.

Inflation volatility is controlled for as a proxy for overall macroeconomic stability. It is measured as the absolute year-to-year difference in the inflation rate. In a robustness check, the absolute value of the inflation rate itself is used instead. The absolute values of the inflation rate are used because otherwise positive and negative inflation rates would cancel each other out when taking the 4-year average of the variable, thus creating an inadequate proxy for macroeconomic stability.

Gross fixed capital accumulation as a percentage of GDP is used to measure infrastructure development. According to the World Bank (2022), this variable includes "land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings". This is a very broad measure of infrastructure development, and it raises obvious concerns about endogeneity, since the FDI inflows, by definition, lead to capital accumulation. To account for these issues, two other measures of infrastructure development are employed in robustness checks: the number of fixed telephone subscriptions per 100 people and the number of broadband subscriptions per 100 people.

In further robustness checks, I control for a different measure of corruption from the V-Dem dataset by Coppedge et al. (2022a), three different democracy indices from Freedom House (2023), the Polity project of the Center for Systemic Peace (2022), and the V-Dem dataset by Coppedge et al. (2022a), and the political constraint index by Henisz (2002), which was also obtained from the V-Dem dataset by Coppedge et al. (2022a).

With the exception of the institutional variables, all variables enter the equation in logarithmic form. Since some of the variables include negative and zero values, the natural logarithm of each variable is constructed using the following inverse hyperbolic sine transformation[3]:

$$y = ln(x + \sqrt{(x^2 + 1)}) \quad (2)$$

Table 2 shows the summary statistics of the used variables.

Estimating the dynamic model indicated by Eq. (1) using the pooled OLS or the within estimator results in dynamic panel bias due to the individual-specific component of the error term (Nickel, 1981). The difference generalized method of moments (GMM) estimator proposed by Arellano and Bond (1991) circumvents this problem by first-differencing the data and using lagged levels of the regressors as

[3] This transformation approximates the logarithmic function without encountering its problems when dealing with negative or zero values (Bellemare and Wichman, 2020).

Table 2
Summary statistics.

	Mean	SD	Min	Max	N
ln(FDI/GDP)	1.61	0.91	−2.50	4.13	697
Control of corruption	0.38	0.19	0.00	1.00	697
Political corruption	0.61	0.26	0.00	1.00	683
ln(Natural resources)	3.06	1.49	0.00	5.30	631
ln(fuel)	2.06	1.67	0.00	5.30	632
ln(ores and metals)	1.97	1.43	0.00	5.06	642
ln(GDP p.c.)	8.54	1.00	6.24	10.46	701
ln(Trade openness)	4.93	0.50	1.11	6.05	677
ln(|Δ Inflation|)	1.89	0.92	0.21	7.38	699
ln(|Inflation|)	2.39	0.87	0.49	6.45	699
ln(Broadband subscriptions)	1.23	1.29	0.00	4.20	520
ln(Telephone subscriptions)	2.34	1.31	0.00	4.55	699
ln(Fixed capital)	3.75	0.38	1.03	4.78	663
Political rights	0.47	0.32	0.00	1.00	694
Polity	0.67	0.28	0.00	1.00	648
Electoral democracy	0.51	0.24	0.06	0.99	684
Political Constraints	0.31	0.30	0.00	0.96	682

FDI/GDP indicates FDI inflows in % of GDP. Control of corruption is the control of corruption index of the Worldwide Governance Indicators by Kaufmann et al. (2010). Natural resources is the percentage share of fuels, ores, and metals in total exports. Trade openness is the trade volume in % of GDP. The variables Broadband subscriptions and Telephone subscriptions indicate the number of broadband subscriptions per 100 people and the number of fixed telephone subscriptions per 100 people, respectively. Fixed capital indicates fixed capital accumulation as a percentage of GDP. |Δ Inflation| is the absolute year-to-year change in the inflation rate. | Inflation| is the absolute value of the inflation rate. Political rights indicates the political rights index by Freedom House. Polity is the polity index. Electoral democracy is the electoral democracy index from the V-Dem dataset. Political constraints indicates the political constraint index by Henisz (2002). The institutional variables were normalized so that they range from 0 to 1. All variables appearing in logarithmic form were transformed using the transformation indicated by Eq. (2).

instruments for the first differences. The system GMM estimator proposed by Blundell and Bond (1998) takes this approach further by building a system of two equations: The equation in first differences and the original equation in levels. Past differences are used to instrument levels to estimate the equation in levels. The introduction of more instruments leads to efficiency gains compared to the difference GMM estimator, especially in situations in which the path of the dependent variable is close to a random walk (Roodman, 2009). In this study, I use the system GMM estimator to estimate the model given by Eq. (1).

Using the system GMM estimator has the additional advantage, that it can address some further endogeneity issues arising in this study. The two variables of interest, natural resource endowment and control of corruption, can be expected to be endogenous. If FDI in resource-rich countries occurs primarily in the natural resources sector, then more FDI can be expected to positively affect the share of natural resources in total exports, since more FDI will then lead to more natural resource extraction. Regarding the endogeneity of corruption, there is literature suggesting that FDI may impact the quality of institutions in a host country (Donaubauer et al., 2018).

For the variables suspected to be endogenous – i.e. natural resources, institutions, and the interaction term of natural resources and institutions – the first lag is not included in the instrument sets. All other explanatory variables (with the exception of the time dummies) are treated as predetermined and all available lags are used as instruments. That is, in the first differences equation, the first lag and all further lags (up until the fifth lag) of the predetermined variables are used as instruments and the second lag and all further lags of the endogenous variables (and the lagged dependent variable) are used as instruments. In the levels equation, first differences of the predetermined variables and lagged differences of the endogenous variables are used as instruments. The time period dummies enter the instrument set in the levels equation but not in the first differences equation. In robustness checks, the sensitivity of the main results to adjustments in the number of lags used is examined.

I use the two-step estimator, which is asymptotically efficient, with Windmeijer (2005) finite sample correction of the standard errors.

An assumption for system GMM to be valid is the joint validity of the moment conditions arising from the choice of the instrument set (Roodman, 2009). For each system GMM estimation in this study, I report the *P*-value of the Hansen (1982) *J* Test statistic for the joint validity of the moment conditions. A potential problem in the application of system GMM is instrument proliferation. While one cannot generally say how many instruments are too many, an arbitrary rule of thumb states that the number of instruments should not exceed the number of individuals in the sample. In each estimation I conduct, I bring down the number of instruments by collapsing the instrument sets (Roodman, 2009). Moreover, for each system GMM estimation I report the number of instruments and the number of individuals, i.e. the number of countries. I also check the robustness of the main results to further reductions in the number of instruments by limiting the number of lags used in the construction of the instrument sets.

The use of some lags as instruments for first differences may be invalid if there is first-order autocorrelation in the idiosyncratic component of the error term (Roodman, 2009). To address this potential concern I also report the P-values of the Arellano–Bond tests for first-order and second-order serial correlation in differences for each system GMM estimation.

4. Results

In a first step, I estimate the model indicated by Eq. (1) without including any control variables beyond the lagged dependent variable, control of corruption, natural resources, and the time period dummies, using the pooled OLS estimator, the within estimator, and the system GMM estimator. The results are shown in columns 1, 2, and 3 of Table 3, respectively. In column 1, the OLS estimate on control of corruption is positive and statistically significant at the 10 per cent level. The statistical significance of control of corruption disappears in the fixed effects estimation, the results of which are shown in column 2. In the system GMM estimation in column 3, which accounts for the dynamic panel bias, the estimate on control of corruption is positive and statistically significant at the 5 per cent level. The OLS estimate and the within estimate on the lagged dependent variable indicate the upper bound and the lower bound of the unbiased estimate. It is thus not surprising that the system GMM estimate on the lagged dependent variable lies between the OLS estimate and the within estimate. The result of the system GMM estimation reported in column 3 of Table 3 indicates an overall positive effect of institutional quality on FDI.

Next, I estimate the model indicated by Eq. (1), including the interaction of control of corruption and natural resources among the control variables. This allows for the effect of control of corruption on FDI to be moderated by a country's natural resource endowment. Columns 4, 5, and 6 of Table 3 show the OLS estimates, the within estimates, and the system GMM estimates, respectively. Only the within estimate on the interaction term is statistically significant at the 10 per cent level. However, including the interaction term allows us to estimate the coefficient on control of corruption at different levels of the natural resource variable, which provides us with estimates on control of corruption at different levels of the natural resource variable even if the interaction term itself is insignificant.

Finally, the system GMM estimation is conducted while additionally controlling for GDP per capita, the square of GDP per capita, trade openness, inflation volatility, and fixed capital accumulation. This should be considered the baseline specification, and its results are presented in column 7 of Table 3. The estimate on the interaction of control of corruption and natural resources is positive and statistically significant at the 10 per cent level, indicating a positive moderation effect. The estimates on the other control variables have the expected signs.

Table 3
Baseline results.

Dependent variable: ln(FDI/GDP)	(1) OLS	(2) FE	(3) GMM	(4) OLS	(5) FE	(6) GMM	(7) GMM
ln(FDI/GDP)$_{-1}$	0.686***	0.168***	0.567***	0.687***	0.171***	0.594***	0.378***
	(0.039)	(0.059)	(0.072)	(0.039)	(0.061)	(0.085)	(0.095)
Control of corruption	0.308*	0.310	1.432**	0.308*	0.158	1.820***	1.071
	(0.162)	(0.689)	(0.617)	(0.162)	(0.694)	(0.678)	(1.005)
ln(Resources)	−0.007	0.101*	0.073	−0.007	0.080	−0.038	0.151
	(0.021)	(0.051)	(0.165)	(0.021)	(0.055)	(0.132)	(0.129)
Control of corruption × ln(Resources)				0.112	0.609*	0.284	0.875*
				(0.119)	(0.331)	(0.544)	(0.498)
ln(GDP p.c.)							−0.253
							(0.175)
ln(GDP p.c.) × ln(GDP p.c.)							0.097
							(0.134)
ln(Trade openness)							0.832**
							(0.413)
ln(|Δ Inflation|)							−0.127
							(0.086)
ln(Fixed capital)							0.600**
							(0.277)
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time period FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.513	0.138		0.515	0.151		
Number of observations	539	539	539	539	539	539	520
Number of instruments			20			25	55
Number of countries			117			117	117
P-value of Hansen J Statistic			0.875			0.770	0.249
P-value of AR(1) statistic			0.000			0.000	0.000
P-value of AR(2) statistic			0.337			0.306	0.140

The dependent variable is FDI as a percentage of GDP. In the Pooled OLS estimations, standard errors are clustered at the country level. In the system GMM estimations, the standard errors are two-step Windmeijer corrected. In the system GMM estimation, control of corruption and natural resource endowment are treated as endogenous, while all other regressors are treated as predetermined. All variables other than Control of corruption are constructed in logarithmic form in accordance with the transformation given in Eq. (2). All variables which appear in interaction terms are centered around their respective means so that the estimates on the non-interacted variables are the estimates at the respective means. *, **, and *** denote significance at 10-, 5-, and 1 per cent level, respectively.

For the specifications in which the interaction of control of corruption and natural resources is controlled for, I estimate the coefficient on control of corruption at different levels of the natural resource variable.

Table 4 shows the estimates on control of corruption at the 10th percentile of the natural resource variable, at the 25th percentile, at the mean, at the 50th percentile, at the 75th percentile, and at the 90th percentile. Column 1 of Table 4 shows the estimated marginal effects corresponding to the pooled OLS estimation in column 4 of Table 3. Since the pooled OLS estimate on the interaction term is positive, the estimated marginal effect of control of corruption increases in magnitude with higher levels of the natural resource variable. However, for relatively low levels of the natural resource variable, i.e., at the 10th percentile and at the 25th percentile, the estimated coefficient on control of corruption is not statistically different from zero. At the mean and at higher percentiles of the natural resource variable, control of corruption is statistically significant at least at the 10 per cent level; at the 75th percentile, control of corruption is significant at the 5 per cent level.

Column 2 of Table 4 shows the marginal effects of control of corruption estimated by system GMM. These estimates correspond to the specification of the system GMM estimation without any additional control variables, the results of which are shown in column 6 of Table 3. The results in column 2 of Table 4 seem to qualitatively confirm the results in column 1. At the 10th percentile and at the 25th percentile of the natural resource variable, the estimated marginal effect of control of corruption is not statistically significant at the 10 per cent level. At the mean and at the 50th percentile, the 75th percentile, and at the 90th percentile of the natural resource variable, the estimate on control of corruption is positive and statistically significant at the 1 per cent level. Lastly, column 3 of Table 4 shows the marginal effects of control of corruption estimated by system GMM, when controlling for other potentially confounding variables. These estimates correspond to the baseline specification in column 7 of Table 3. Fig. 3 provides a visual representation of the point estimates on control of corruption and the 95 per cent confidence intervals at different percentiles of the natural resource variable. Again, we see that the marginal effect of control of corruption is positive and statistically significant only at relatively higher levels of the natural resource variable. At the 75th percentile and at the 90th percentile of the natural resource variable, the estimate on control of corruption is statistically significant at the 5 per cent level.

Table 4
Baseline results — marginal effects.

Percentile	(1) OLS	(2) System GMM	(3) System GMM
10th	0.061	1.192	−0.866
	(0.306)	(1.724)	(1.599)
25th	0.195	1.533	0.186
	(0.200)	(1.117)	(1.190)
Mean	0.308*	1.820***	1.071
	(0.162)	(0.678)	(1.005)
50th	0.320*	1.852***	1.169
	(0.163)	(0.641)	(0.999)
75th	0.447**	2.173***	2.161**
	(0.221)	(0.567)	(1.099)
90th	0.519*	2.356***	2.724**
	(0.279)	(0.781)	(1.270)
Controls	No	No	Yes

The dependent variable is FDI as a percentage of GDP. Reported are the estimates on control of corruption at different values of the natural resource variable. The estimates of the marginal effect in column 1 correspond to the regression specified in column 4 of Table 3. The estimates of the marginal effect in column 2 correspond to the regression specified in column 5 of Table 3. The estimates of the marginal effect in column 3 correspond to the regression specified in column 6 of Table 3. In the Pooled OLS estimations, standard errors are clustered at the country level. In the system GMM estimations, the standard errors are two-step Windmeijer corrected. *, **, and *** denote significance at 10-, 5-, and 1 per cent level, respectively.

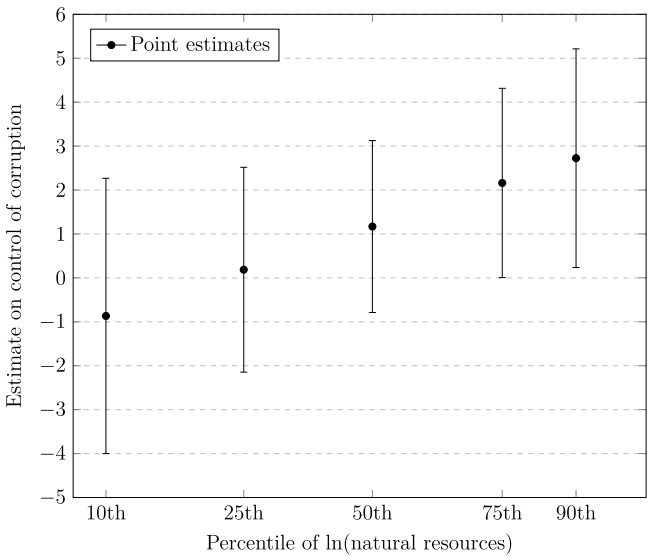

Fig. 3. Marginal effect of control of corruption.

At lower values of the natural resource variable, the estimate on control of corruption is not statistically different from zero.

The results indicate a positive effect of control of corruption on FDI only for countries with a sufficiently high level of natural resource endowment. This result appears to be somewhat inconsistent with the results of Asiedu and Lien (2011), who find the effect of democracy on FDI to be negative for countries with high natural resource endowments. This apparent discrepancy in the results is interesting, considering that the approach of this study is very similar to the approach of Asiedu and Lien (2011). This study, however, examines the effect of control of corruption on FDI and not that of democracy on FDI, which may explain this apparently contradictory finding. The positive estimates on control of corruption only for countries with relatively high levels of natural resource endowment indicate that institutional quality is especially important as a determinant of FDI in resource abundant countries. This can be explained by foreign investors facing a potential hold-up problem in the natural resource sector, which leads them to value institutions which decrease uncertainty in destinations for FDI. Moreover, the results seem to be in line with the finding by Carril-Caccia et al. (2019) that institutional quality positively affects greenfield FDI in oil-abundant countries.

5. Robustness checks

Estimating a model using system GMM involves several decisions that may seem somewhat arbitrary but can potentially influence the results. Hence, in a first set of robustness checks, I check the robustness of the baseline results to changes in the specification of the system GMM estimation.

In the baseline system GMM estimations, the instrument count was reduced by collapsing the instrument sets, and up to 5 lags were used in their construction. The instrument count can be further reduced by limiting the number of lags used to construct the instrument sets. I check the robustness of the main results to a reduction in the number of lags used in the system GMM estimation. The results are reported in Table 6 in the appendix.

In two separate estimations, I limit the number lags of all control variables used to construct the instrument sets in the first difference equations to 4 and 3. The estimation results are reported in columns 1 and 2 of Table 6, respectively. The number of lags can also be reduced by not using the first lag of the control variables that were treated as predetermined in the main specification as instruments in the first difference equation. In a further robustness check, I repeat the estimation, using only lags 2 and 3 of all control variables to construct the instrument set in the first difference equation. Thus, in this estimation, all control variables – including those previously treated as predetermined – are treated as endogenous.[4] The results of this estimation are shown in column 3 of Table 6

Table 7 reports the marginal effects corresponding to the three estimations with reduced instrument counts. The baseline system GMM estimates on control of corruption at different levels of natural resource endowment appear to be robust to the reduction in instruments.

Table 7 shows that only at the 75th and at the 90th percentile of the natural resource variable the coefficient on control of corruption is positive and statistically significant at the 5 per cent level. It is not statistically different from zero for countries with relatively low levels of natural resource abundance. This confirms the implication of the main results that only for countries with relatively high natural resource endowments, control of corruption is found to positively affect FDI.

Since this study is mainly interested in examining a moderation effect, it is appropriate to consider other potential moderation effects among the control variables. I thus repeat the system GMM estimation while additionally controlling for interactions of the natural resource variable with all of the other control variables. The estimation results are shown in column 1 of Table 8 and the corresponding marginal effects of control of corruption estimated at different levels of natural resources are shown in column 1 of Table 9. The estimated marginal effects are similar to those derived in the baseline approach. Once again, the results indicate that control of corruption positively affects FDI only at relatively large levels of the natural resource variable.

The variable used to measure natural resource endowment is constructed as the sum of the share of fuels in total merchandise exports and the share of ores and metals in total merchandise exports. To see whether any one of these components is the main driver behind the results, I repeat the estimation while replacing the previously constructed natural resource variable once by the share of fuels in total merchandise exports and once by the share of ores and metals in total merchandise exports. The estimation results are shown in columns 2 and 3 of Table 8 with the corresponding marginal effects of control of corruption reported in columns 2 and 3 of Table 9. When decomposing the natural resource variable into its two components and repeating the estimation separately for each, I do not find the same pattern as before. The effect of control of corruption on FDI is insignificant at each level of the two individual natural resource variables. Hence, it does not seem to be the case that it is predominantly oil or predominantly minerals driving the main results, but that the main results are only observable when both aspects, fuels and minerals, are considered.

I also check the robustness of the results to the usage of a different indicator of corruption. Column 4 of Table 8 shows the estimation results obtained when measuring corruption using the political corruption index from the varieties of democracy (V-Dem) dataset by Coppedge et al. (2022b) and Pemstein et al. (2022). This index ranges from zero to one and measures the degree to which political corruption is pervasive in a given country, with lower values indicating less corruption and higher values indicating more corruption (Coppedge et al., 2022a). Column 4 of Table 9 shows the marginal effects of this measure of corruption on FDI at different levels of the natural resource variable. For relatively high values of the natural resource variable, the estimate on corruption is negative and statistically significant at the 10 per cent level, which is consistent with the main results.[5]

[4] To properly treat them as endogenous, I also use the lagged differences of all variables as instruments in the levels equation in this estimation.

[5] The difference in the sign of the marginal effects between the main results and the robustness check using the political corruption index from the V-Dem dataset stems from the fact that higher values of the control of corruption

Table 10 reports the estimation results obtained when controlling for different proxies for infrastructure development. Table 11 reports the corrensponding marginal effects of control of corruption. The results are consistent with the baseline results.

In the baseline estimation, I controlled for the absolute year-to-year change in the inflation rate to account for general macroeconomic stability as a confounding factor. As a further robustness check, I control for the absolute value of the inflation rate instead. The estimation results are reported in column 1 of Table 12. Moreover, since there is research suggesting that there might be a nonlinear effect of inflation on economic growth (Sarel, 1996; Eggoh and Khan, 2014) and on FDI in particular (Agudze and Ibhagui, 2021), I estimate two further specifications of the model, additionally controlling for the squares of the respective inflation variables. The estimation results of these two specifications are reported in columns 2 and 3 of Table 12. The corresponding marginal effects of control of corruption on FDI are reported in Table 13. In all three specifications, the results support the main results.

Since Asiedu and Lien (2011) find that the effect of democracy on FDI is moderated by natural resource endowment, democracy and the interaction of democracy and natural resources may be confounding variables here. To address this issue, I separately control for three indicators of democracy: the political rights index by Freedom House, the Polity index by the Polity V project, and the electoral democracy index from the V-Dem dataset. Columns 1 to 3 in Table 14 show the respective estimation results. Columns 1 to 3 in Table 15 report the corresponding marginal effects of control of corruption when democracy is controlled for. The marginal effects are qualitatively similar to those obtained in the baseline specification. However, since Asiedu and Lien (2011) find the effect of democracy to differ for different levels of natural resource endowment, it seems appropriate to also control for the interaction of democracy and natural resources in this analysis. Columns 4 to 6 in Table 14 show the estimation results when the interaction of democracy and natural resources is included as a control variable, and columns 4 to 6 in Table 15 show the corresponding marginal effects of control of corruption. The estimate on the interaction of control of corruption and natural resources is negative in two of the three estimations – i.e., those using the democracy indices from Freedom House and from the Polity project – so that the estimates on control of corruption reported in Table 15 decrease with higher values of the natural resource variable. However, consistent with the main results, in all three estimations, the estimate on control of corruption is only positive and statistically significant at the ten per cent level for relatively high values of natural resource endowment.

To account for political risk being a potential confounding variable, I control for the Political constraint index by Henisz (2002). Again, I control for the variable individually and interacted with the natural resource variable. The estimation results are reported in Table 16. The corresponding marginal effects of control of corruption are reported in Table 17. The results support the results of the baseline estimation.

I next check the robustness of the results to dropping certain country groups from the sample. The original sample includes several countries which have been transitioning from centrally planned economies to more market-oriented economies. Many of these countries have experienced substantial economic growth and increased investment in recent decades. To address the potential concern that FDI determinants in these countries might generally differ from those in other countries in the sample, I repeat the baseline estimation while excluding such transition economies from the sample. The original sample also includes countries that are commonly thought of as tax havens. Thus, in a second check, I repeat the estimation while excluding countries that appear on the European Union list of non-cooperative jurisdictions for tax purposes from 2017 as well as countries that avoided being listed in 2017 by making certain commitments. Table 5 indicates the countries included in each group.

Table 18 shows the estimation results, and Table 19 reports the corresponding marginal effects for each of the two estimations. Consistent with the main results, control of corruption appears to only positively affect FDI at relatively high levels of the natural resource variable.

Lastly, as a final robustness check, I split the sample at the median of the natural resource variable, creating one group of countries with relatively low natural resource endowments and one group of countries with relatively high natural resource endowments.[6] In these estimations the interaction of natural resources and institutions is not controlled for. Instead, we are interested in the estimate on control of corruption itself for each sub-sample. Table 20 shows the results of the system GMM estimations. The results are consistent with the main results. The estimate on control of corruption is positive and significant only for countries with high natural resource endowment. For countries with low natural resource endowment, the effect is insignificant.

6. Conclusion

This study has produced important insights regarding the link between institutional quality and FDI in developing and emerging countries. The results indicate an overall positive link between institutional quality and FDI inflows in developing countries. When allowing for the moderation of the effect of institutions by natural resource endowment, I find the positive effect of institutions on FDI only for countries with relatively high natural resource endowments. No significant effect can be found for countries with relatively low natural resource endowments. The results thus indicate a positive effect of institutional quality on FDI only if the natural resource endowment is above a certain level. They thus support the findings by Carril-Caccia et al. (2019).

The results are consistent with the idea that institutional quality is an especially relevant determinant of FDI in natural resources due to natural resource investments being characterized by high sunk costs and uncertainty.

On the other hand, the results are inconsistent with the hypothesis that institutions which encourage rent-seeking behavior make a country an attractive destination for natural resource investments. This is essentially the argument proposed by Asiedu and Lien (2011), who find the effect of democracy on FDI to be positive only for countries with low natural resource endowments. By using a corruption indicator as the variable of interest instead of a democracy indicator, I examine the effect of the propensity of rent-seeking on FDI more directly and do not find support for this hypothesis. Interestingly, the results are robust to controlling for democracy indicators.

The results of this study have important policy implications. There is a common idea that institutional quality is not an important determinant of FDI for countries with high natural resource endowments or that it can even be a deterrent of FDI in these countries. This can lead to the conclusion that if these countries want to attract more FDI, they do not need to make efforts to improve their institutions or even that they should refrain from doing so. The results of this study tell a different story. For countries with high natural resource endowments, I find institutional quality to have a significant positive effect on FDI.

index used to derive the main results indicate less corruption while higher values of the political corruption index indicate more corruption.

[6] To identify countries which can be considered natural resource endowed over the entire time period of interest, I first calculate the average natural resource endowment over the six time periods for each country in the sample. I then split the sample at the median of this average natural resource endowment, which is at a natural resource share in total merchandise exports of about 15.36%.

Table 5
Countries in the sample.

America	East/South Asia & Pacific	Europe & Central Asia	Middle East & North Africa	Sub-Saharan Africa
Argentina	Bangladesh	Albania[a,b]	Algeria	Angola
Belize	Bhutan	Bulgaria[a]	Egypt	Burundi
Bolivia	China[a]	Bosnia and Herzegovina[a,b]	Iran	Benin
Brazil	Fiji[b]	Belarus[a]	Iraq	Burkina Faso
Chile	Indonesia	Armenia[a,b]	Jordan[b]	Botswana[a,b]
Colombia	India	Azerbaijan[a]	Lebanon	Central African Republic
Costa Rica[b]	Cambodia[a]	Georgia[a]	Libya	Cote d'Ivoire
Dominican Republic	Kiribati	Croatia[a]	Morocco[b]	Cameroon
Ecuador	Laos[a]	Hungary[a]	Palestine	Democratic Republic of Congo
Guatemala	Sri Lanka	Kazakhstan[a]	Syria	Congo
Guyana	Maldives[b]	Kyrgyz Republic[a]	Tunisia[b]	Comoros
Honduras	Myanmar	Lithuania[a]		Cabo Verde[b]
Jamaica[b]	Mongolia[b]	Latvia[a]		Ethiopia
Mexico	Malaysia[b]	Moldova[a]		Gabon
Nicaragua	Nepal	North Macedonia[a,b]		Ghana
Panama[b]	Pakistan	Montenegro[a,b]		Guinea
Peru[b]	Philippines	Poland[a]		Gambia
Paraguay	Papua New Guinea	Romania[a]		Kenya
El Salvador	Solomon Islands	Russia[a]		Lesotho
Suriname	Thailand[b]	Slovak Republic[a]		Madagascar
Uruguay[b]	Timor	Tajikistan[a]		Mali
	Tonga	Turkey[b]		Mozambique
	Vanuatu[b]	Ukraine[a]		Mauritania
				Mauritius[b]
				Namibia[b]
				Niger
				Nigeria
				Rwanda
				Sudan
				Senegal
				Sierra Leone
				Eswatini[b]
				Seychelles[b]
				Togo
				Tanzania
				Uganda
				South Africa
				Zambia
				Zimbabwe

[a] Transition economies.
[b] Tax havens.

Table 6
Robustness checks: system GMM.

Dependent variable: ln(FDI/GDP)	(1) 4 lags	(2) 3 lags	(3) Endogenous
$\ln(FDI/GDP)_{-1}$	0.378***	0.395***	0.509***
	(0.099)	(0.098)	(0.088)
Control of corruption	0.801	0.902	0.616
	(0.944)	(1.343)	(1.036)
ln(Resources)	0.159	0.083	0.023
	(0.131)	(0.143)	(0.153)
Control of corruption × ln(Resources)	1.030**	1.204*	1.439**
	(0.481)	(0.666)	(0.554)
ln(GDP p.c.)	−0.174	−0.157	−0.067
	(0.161)	(0.156)	(0.149)
ln(GDP p.c.) × ln(GDP p.c.)	0.094	0.076	0.030
	(0.135)	(0.139)	(0.096)
ln(Trade openness)	0.785*	0.547	0.053
	(0.431)	(0.569)	(0.475)
$\ln(\lvert\Delta$ Inflation$\rvert)$	−0.115	−0.120	−0.086
	(0.086)	(0.093)	(0.214)
ln(Fixed capital)	0.663**	0.813***	0.453
	(0.298)	(0.303)	(0.382)
Constant	Yes	Yes	Yes
Time period FE	Yes	Yes	Yes
Number of observations	520	520	520
Number of instruments	46	37	32
Number of countries	117	117	117

(*continued on next page*)

Table 6 (*continued*).

P-value of Hansen J Statistic	0.167	0.097	0.386
P-value of AR(1) statistic	0.000	0.000	0.000
P-value of AR(2) statistic	0.141	0.161	0.124

The dependent variable is FDI as a percentage of GDP. Standard errors are two-step Windmeijer corrected. In columns 1 and 2, control of corruption and natural resources are treated as endogenous while all other regressors are treated as predetermined. In column 3, all regressors are treated as endogenous. In column 1, lags 2 to 4 of the dependent variable and the endogenous variables and lags 1 to 4 of the predetermined variables are used to construct the instrument sets in the first difference equation. In column 2, lags 2 and 3 of the dependent variable and the endogenous variables and lags 1 to 3 of the predetermined variables are used to construct the instrument set in the first difference equation. In column 3, lags 2 and 3 of all variables are used to construct the instrument set in the differences equation, and lagged first differences of all variables are used to construct the instrument set in the levels equation. All variables other than Control of corruption are constructed in logarithmic form in accordance with the transformation given in Eq. (2). All variables which appear in interaction terms are centered around their respective means so that the estimates on the non-interacted variables are the estimates at the respective means. *, **, and *** denote significance at 10-, 5-, and 1 per cent level, respectively.

Table 7
Robustness checks: system GMM (Marginal effects).

Percentile	(1) 4 lags	(2) 3 lags	(3) Endogenous
10th	−1.480	−1.763	−2.571
	(1.549)	(2.450)	(1.942)
25th	−0.241	−0.315	−0.840
	(1.140)	(1.784)	(1.390)
Mean	0.801	0.902	0.616
	(0.944)	(1.343)	(1.036)
50th	0.916	1.036	0.776
	(0.935)	(1.307)	(1.008)
75th	2.083**	2.401**	2.401**
	(1.019)	(1.164)	(0.936)
90th	2.746**	3.176**	3.334***
	(1.182)	(1.289)	(1.072)

The dependent variable is FDI as a percentage of GDP. Reported are the estimates on control of corruption at different values of the natural resource variable. The estimates of the marginal effect in column 1 correspond to the regression specified in column 1 of Table 6. The estimates of the marginal effect in column 2 correspond to the regression specified in column 2 of Table 6. The estimates of the marginal effect in column 3 correspond to the regression specified in column 3 of Table 6. Standard errors are two-step Windmeijer corrected. *, **, and *** denote significance at 10-, 5-, and 1 per cent level, respectively.

This implies that countries with high natural resource endowment can reap the benefits of more FDI if they improve their institutions.

CRediT authorship contribution statement

Jonathan Bothner: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

I thank Martin Leschke, Tim Baule, Tim Röthel, Felix Schlieszus, Thomas Grebel, Sophia Friedrich, Gabriel Wölfel, the participants of the University of Bayreuth Graduate Seminar, and the participants of the Radein Seminar 2023 for helpful discussions, commentary, and feedback.

Appendix A

See Tables 5–20.

Data availability

Data will be made available on request.

Table 8
Robustness checks: controls.

Dependent variable: ln(FDI/GDP)	(1) Interactions	(2) Fuel	(3) Ores	(4) V-dem
$\ln(FDI/GDP)_{-1}$	0.443***	0.423***	0.251***	0.355***
	(0.095)	(0.093)	(0.095)	(0.099)
Control of corruption	0.655	0.708	0.366	
	(0.623)	(0.792)	(1.444)	
Political corruption				−0.011
				(0.491)
ln(Resources)	−1.537	−0.071	0.524***	0.096
	(1.175)	(0.108)	(0.161)	(0.164)
Control of corruption × ln(Resources)	0.587	0.651	0.985	
	(0.459)	(0.559)	(0.598)	

(*continued on next page*)

Table 8 (*continued*).

Dependent variable: ln(FDI/GDP)	(1) Interactions	(2) Fuel	(3) Ores	(4) V-dem
Political corruption × ln(Resources)				−0.830
				(0.589)
ln(GDP p.c.)	−0.154	−0.141	0.039	−0.122
	(0.137)	(0.176)	(0.202)	(0.128)
ln(GDP p.c.) × ln(GDP p.c.)	0.027	0.066	−0.010	0.125
	(0.114)	(0.157)	(0.169)	(0.148)
ln(GDP p.c.) × ln(Resources)	−0.124			
	(0.114)			
ln(Trade openness)	0.374	0.722*	0.497	0.775*
	(0.329)	(0.382)	(0.468)	(0.409)
ln(Trade openness) × ln(Resources)	0.190			
	(0.154)			
ln(|Δ Inflation|)	−0.173*	−0.218**	−0.030	−0.120
	(0.088)	(0.087)	(0.094)	(0.103)
ln(|Δ Inflation|) × ln(Resources)	0.127*			
	(0.076)			
ln(Fixed capital)	0.510	0.728***	0.727**	0.735***
	(0.311)	(0.255)	(0.340)	(0.262)
ln(Fixed capital) × ln(Resources)	0.114			
	(0.233)			
Constant	Yes	Yes	Yes	Yes
Time period FE	Yes	Yes	Yes	Yes
Number of observations	520	521	526	509
Number of instruments	75	55	55	55
Number of countries	117	117	117	114
P-value of Hansen J Statistic	0.680	0.099	0.245	0.292
P-value of AR(1) statistic	0.000	0.000	0.000	0.001
P-value of AR(2) statistic	0.140	0.173	0.116	0.101

The dependent variable is FDI as a percentage of GDP. Standard errors are two-step Windmeijer corrected. In column 2, fuel exports as a percentage of exports are used as the measure of natural resource endowment. In column 3, ores and metals exports as a percentage of total exports are used as the measure of natural resource endowment. In column 4, corruption is measured by the Political corruption index from the V-Dem dataset. The corruption and natural resources measures are treated as endogenous while all other regressors are treated as predetermined. All variables other than the corruption measures are constructed in logarithmic form in accordance with the transformation given in Eq. (2). All variables which appear in interaction terms are centered around their respective means so that the estimates on the non-interacted variables are the estimates at the respective means. *, **, and *** denote significance at 10-, 5-, and 1 per cent level, respectively.

Table 9
Robustness checks: controls (Marginal effects).

Percentile	(1) Interactions	(2) Fuel	(3) Ores	(4) V-dem
10th	−0.644	−0.622	−1.366	1.827
	(1.427)	(1.483)	(1.743)	(1.615)
25th	0.061	−0.331	−0.871	0.829
	(0.941)	(1.277)	(1.594)	(0.950)
Mean	0.655	0.598	0.189	−0.011
	(0.623)	(0.811)	(1.443)	(0.491)
50th	0.720	0.708	0.366	−0.103
	(0.600)	(0.792)	(1.444)	(0.461)
75th	1.385**	1.545	1.380	−1.044*
	(0.607)	(0.989)	(1.598)	(0.634)
90th	1.763**	2.397	2.579	−1.579*
	(0.784)	(1.549)	(2.020)	(0.953)

The dependent variable is FDI as a percentage of GDP. Reported are the estimates on control of corruption at different values of the natural resource variable. The estimates of the marginal effect in column 1 correspond to the regression specified in column 1 of Table 8. The estimates of the marginal effect in column 2 correspond to the regression specified in column 2 of Table 8. The estimates of the marginal effect in column 3 correspond to the regression specified in column 3 of Table 8. Standard errors are two-step Windmeijer corrected. *, **, and *** denote significance at 10-, 5-, and 1 per cent level, respectively.

Table 10
Different infrastructure variables.

Dependent variable: ln(FDI/GDP)	(1) Phones	(2) Broadband	(3) Phones & Broadband	(4) Fixed capital & Phones	(5) Fixed capital & Broadband	(6) Fixed capital, Phones & Broadband
$\ln(FDI/GDP)_{-1}$	0.464***	0.452***	0.433***	0.379***	0.350***	0.332***
	(0.090)	(0.092)	(0.082)	(0.092)	(0.068)	(0.074)
Control of corruption	2.010*	0.803	1.707*	1.241	0.050	0.830
	(1.107)	(0.840)	(0.909)	(1.090)	(0.737)	(0.798)
ln(Resources)	0.186	0.059	0.059	0.213	0.041	0.096
	(0.140)	(0.144)	(0.136)	(0.130)	(0.116)	(0.134)
Control of corruption × ln(Resources)	0.364	1.354**	0.473	0.482	1.246*	0.537
	(0.520)	(0.654)	(0.521)	(0.504)	(0.692)	(0.568)
ln(GDP p.c.)	−0.765***	0.021	−0.614***	−0.562**	0.107	−0.346
	(0.258)	(0.216)	(0.211)	(0.262)	(0.170)	(0.244)
ln(GDP p.c.) × ln(GDP p.c.)	0.128	0.031	0.117	0.133	−0.002	0.051
	(0.137)	(0.111)	(0.126)	(0.135)	(0.109)	(0.105)
ln(Trade openness)	0.931**	0.644	0.916**	0.906**	0.761**	0.845**
	(0.458)	(0.444)	(0.409)	(0.413)	(0.366)	(0.391)
ln(|Δ Inflation|)	−0.111	−0.186**	−0.114	−0.085	−0.188**	−0.142*
	(0.088)	(0.079)	(0.086)	(0.086)	(0.079)	(0.081)
ln(Telephone subscriptions)	0.320**		0.392***	0.230*		0.222
	(0.139)		(0.134)	(0.127)		(0.155)
ln(Broadband subscriptions)		−0.106	−0.137*		−0.135	−0.109
		(0.111)	(0.080)		(0.093)	(0.073)
ln(Fixed capital)				0.415	0.832***	0.785***
				(0.293)	(0.246)	(0.267)
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Time period FE	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	526	473	473	520	468	468
Number of instruments	55	55	61	61	61	67
Number of countries	117	115	115	117	115	115
P-value of Hansen J Statistic	0.405	0.512	0.676	0.446	0.674	0.573
P-value of AR(1) statistic	0.000	0.000	0.000	0.000	0.000	0.000
P-value of AR(2) statistic	0.119	0.289	0.401	0.157	0.501	0.807

The dependent variable is FDI as a percentage of GDP. Standard errors are two-step Windmeijer corrected. In column 1, fixed telephone subscriptions per 100 people are used as a measure of infrastructure development. In column 2, fixed broadband subscriptions per 100 people are used as a measure of infrastructure development. In column 3, both, fixed telephone subscriptions per 100 people and fixed broadband subscriptions per 100 people are controlled for. In columns 4 to 6, fixed capital accumulation as a percentage of GDP is additionally controlled for. Control of corruption and natural resources are treated as endogenous while all other regressors are treated as predetermined. All variables other than control of corruption are constructed in logarithmic form in accordance with the transformation given in Eq. (2). All variables which appear in interaction terms are centered around their respective means so that the estimates on the non-interacted variables are the estimates at the respective means. *, **, and *** denote significance at 10-, 5-, and 1 per cent level, respectively.

Table 11
Robustness checks: Different infrastructure variables (Marginal effects).

Percentile	(1) Phones	(2) Broadband	(3) Phones & Broadband	(4) Fixed capital & Phones	(5) Fixed capital & Broadband	(6) Fixed capital, Phones & Broadband
10th	1.203	−2.193	0.660	0.173	−2.708	−0.359
	(1.822)	(1.920)	(1.740)	(1.727)	(2.072)	(1.889)
25th	1.641	−0.566	1.228	0.753	−1.210	0.287
	(1.361)	(1.244)	(1.226)	(1.304)	(1.294)	(1.258)
Mean	2.010*	0.803	1.707*	1.241	0.050	0.830
	(1.107)	(0.840)	(0.909)	(1.090)	(0.737)	(0.798)
50th	2.050*	0.954	1.759**	1.295	0.188	0.890
	(1.091)	(0.817)	(0.886)	(1.079)	(0.692)	(0.757)
75th	2.463**	2.488***	2.295***	1.842	1.600**	1.499**
	(1.101)	(0.933)	(0.869)	(1.129)	(0.706)	(0.616)
90th	2.698**	3.360***	2.599**	2.152*	2.402**	1.844**
	(1.239)	(1.214)	(1.024)	(1.276)	(1.029)	(0.800)

The dependent variable is FDI as a percentage of GDP. Reported are the estimates on control of corruption at different values of the natural resource variable. The estimates of the marginal effect in columns 1 through 7 correspond to the regressions specified in the respective columns of Table 10. Standard errors are two-step Windmeijer corrected. *, **, and *** denote significance at 10-, 5-, and 1 per cent level, respectively.

Table 12
Different inflation variables.

Dependent variable: ln(FDI/GDP)	(1) Absolute inflation	(2) Absolute squared	(3) Difference squared
$\ln(FDI/GDP)_{-1}$	0.320***	0.383***	0.375***
	(0.096)	(0.090)	(0.081)
Control of corruption	1.675	2.149*	1.191
	(1.082)	(1.147)	(0.925)
ln(Resources)	0.247*	0.039	0.096
	(0.132)	(0.094)	(0.105)
Control of corruption × ln(Resources)	0.605	0.691	0.748
	(0.418)	(0.543)	(0.470)
ln(GDP p.c.)	−0.207	−0.221	−0.280
	(0.166)	(0.182)	(0.173)
ln(GDP p.c.) × ln(GDP p.c.)	0.074	0.081	0.076
	(0.116)	(0.122)	(0.140)
ln(Trade openness)	0.535*	0.354	0.765*
	(0.316)	(0.336)	(0.397)
ln(Inflation)	0.181	0.012	−0.500**
	(0.116)	(0.342)	(0.224)
ln(Inflation) × ln(Inflation)		0.005	0.088
		(0.066)	(0.053)
ln(Fixed capital)	0.809***	0.907***	0.719**
	(0.280)	(0.339)	(0.278)
Constant	Yes	Yes	Yes
Time Period FE	Yes	Yes	Yes
Number of observations	520	520	520
Number of instruments	55	61	61
Number of countries	117	117	117
P-value of Hansen J Statistic	0.438	0.221	0.313
P-value of AR(1) statistic	0.000	0.000	0.000
P-value of AR(2) statistic	0.306	0.267	0.152

The dependent variable is FDI as a percentage of GDP. Standard errors are two-step Windmeijer corrected. Control of corruption and natural resources are treated as endogenous while all other regressors are treated as predetermined. All variables other than control of corruption are constructed in logarithmic form in accordance with the transformation given in Eq. (2). All variables which appear in interaction terms are centered around their respective means so that the estimates on the non-interacted variables are the estimates at the respective means. *, **, and *** denote significance at 10-, 5-, and 1 per cent level, respectively.

Table 13
Marginal effects — Different inflation variables.

Percentile	(1) Absolute inflation	(2) Absolute squared	(3) Difference squared
10th	0.336	0.619	−0.466
	(1.479)	(1.723)	(1.485)
25th	1.063	1.450	0.434
	(1.192)	(1.309)	(1.097)
Mean	1.675	2.149*	1.191
	(1.082)	(1.147)	(0.925)
50th	1.742	2.226*	1.274
	(1.079)	(1.144)	(0.920)
75th	2.427**	3.010**	2.122**
	(1.162)	(1.287)	(1.024)
90th	2.817**	3.455**	2.604**
	(1.288)	(1.480)	(1.190)

The dependent variable is FDI as a percentage of GDP. Reported are the estimates on control of corruption at different values of the natural resource variable. The estimates of the marginal effect in columns 1 to 3 correspond to the regressions specified in the respective columns of Table 12. Standard errors are two-step Windmeijer corrected. *, **, and *** denote significance at 10-, 5-, and 1 per cent level, respectively.

Table 14
Controlling for Democracy.

Dependent variable: ln(FDI/GDP)	(1) Freedom	(2) Polity	(3) V-Dem	(4) Freedom	(5) Polity	(6) V-Dem
$\ln(FDI/GDP)_{-1}$	0.418***	0.350***	0.351***	0.383***	0.339***	0.339***
	(0.083)	(0.104)	(0.085)	(0.087)	(0.100)	(0.080)
Control of corruption	1.529	1.985*	1.706*	2.014**	2.450*	1.849*
	(1.090)	(1.148)	(1.026)	(0.985)	(1.277)	(1.083)
ln(Resources)	0.085	0.088	0.175	0.099	0.102	0.211
	(0.108)	(0.159)	(0.143)	(0.110)	(0.167)	(0.138)
Control of corruption × ln(Resources)	0.816	0.229	0.729	−0.008	−0.082	0.242
	(0.514)	(0.378)	(0.493)	(0.634)	(0.461)	(0.684)
Democracy	0.097	−0.290	−1.004	0.165**	−0.641	−1.186*
	(0.091)	(0.577)	(0.742)	(0.073)	(0.567)	(0.637)
Democracy × ln(Resources)				−0.094**	0.313	0.514
				(0.040)	(0.467)	(0.359)
ln(GDP p.c.)	−0.243	−0.317*	−0.204	−0.179	−0.343*	−0.235
	(0.173)	(0.178)	(0.170)	(0.174)	(0.188)	(0.160)
ln(GDP p.c.) × ln(GDP p.c.)	0.089	0.056	0.093	0.093	0.030	0.099
	(0.131)	(0.139)	(0.141)	(0.131)	(0.137)	(0.113)
ln(Trade openness)	0.922**	0.667*	0.805**	0.817**	0.767*	0.895**
	(0.377)	(0.371)	(0.367)	(0.412)	(0.392)	(0.355)
ln(|Δ Inflation|)	−0.118	−0.118	−0.113	−0.138*	−0.092	−0.119
	(0.085)	(0.092)	(0.088)	(0.081)	(0.095)	(0.086)
ln(Fixed capital)	0.553**	0.687***	0.530*	0.623**	0.706***	0.554**
	(0.246)	(0.249)	(0.273)	(0.249)	(0.267)	(0.276)
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Time Period FE	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	515	488	509	515	488	509
Number of instruments	60	60	60	65	65	65
Number of countries	116	109	114	116	109	114
P-value of Hansen J Statistic	0.397	0.353	0.338	0.612	0.396	0.462
P-value of AR(1) statistic	0.000	0.001	0.000	0.000	0.001	0.000
P-value of AR(2) statistic	0.178	0.098	0.086	0.205	0.095	0.081

The dependent variable is FDI as a percentage of GDP. The standard errors are two-step Windmeijer corrected. Democracy is measured by the Political rights index by Freedom House in columns 1 and 4, by the Polity index in columns 2 and 5, and by the electoral democracy index from the V-Dem dataset in columns 3 and 6. Control of corruption, the respective democracy indices, and resources are treated as endogenous while all other regressors are treated as predetermined. All variables other than Control of corruption and the democracy indices are constructed in logarithmic form in accordance with the transformation given in Eq. (2). All variables which appear in interaction terms are centered around their respective means so that the estimates on the non-interacted variables are the estimates at the respective means. *, **, and *** denote significance at 10-, 5-, and 1 per cent level, respectively.

Table 15
Controlling for democracy (Marginal effects).

Percentile	(1) Freedom	(2) Polity	(3) V-Dem	(4) Freedom	(5) Polity	(6) V-Dem
10th	−0.277	1.477	0.092	2.032	2.631	1.314
	(1.859)	(1.564)	(1.720)	(2.056)	(1.928)	(2.212)
25th	0.704	1.753	0.969	2.022	2.533*	1.604
	(1.380)	(1.288)	(1.276)	(1.404)	(1.525)	(1.517)
Mean	1.529	1.985*	1.706*	2.014**	2.450*	1.849*
	(1.090)	(1.148)	(1.026)	(0.985)	(1.277)	(1.083)
50th	1.620	2.011*	1.787*	2.013**	2.441*	1.876*
	(1.069)	(1.139)	(1.010)	(0.954)	(1.257)	(1.053)
75th	2.545**	2.271**	2.613***	2.003**	2.348**	2.150**
	(1.024)	(1.139)	(1.014)	(0.930)	(1.172)	(1.049)
90th	3.071***	2.419**	3.083***	1.998*	2.295*	2.306*
	(1.139)	(1.209)	(1.146)	(1.140)	(1.224)	(1.277)

The dependent variable is FDI as a percentage of GDP. Reported are the estimates on control of corruption at different values of the natural resource variable. The estimates of the marginal effect in columns 1 to 6 correspond to the regressions specified in the respective columns of Table 14. Standard errors are two-step Windmeijer corrected. *, **, and *** denote significance at 10-, 5-, and 1 per cent level, respectively.

Table 16
Controlling for polcon.

Dependent variable: ln(FDI/GDP)	(1) Polcon	(2) Polcon
$\ln(FDI/GDP)_{-1}$	0.362***	0.368***
	(0.102)	(0.102)
Control of corruption	1.483*	1.378*
	(0.810)	(0.772)
ln(Resources)	0.099	0.097
	(0.148)	(0.146)
Control of corruption × ln(Resources)	0.781*	0.826*
	(0.414)	(0.436)
Polcon	0.223	0.167
	(0.503)	(0.450)
Polcon × ln(Resources)		0.027
		(0.325)
ln(GDP p.c.)	−0.308*	−0.302**
	(0.160)	(0.152)
ln(GDP p.c.) × ln(GDP p.c.)	0.080	0.097
	(0.134)	(0.131)
ln(Trade openness)	0.844**	0.925**
	(0.405)	(0.391)
ln(|Δ Inflation|)	−0.137	−0.137*
	(0.086)	(0.079)
ln(Fixed capital)	0.535*	0.458
	(0.309)	(0.296)
Constant	Yes	Yes
Time Period FE	Yes	Yes
Number of observations	510	510
Number of instruments	59	64
Number of countries	114	114
P-value of Hansen J Statistic	0.426	0.530
P-value of AR(1) statistic	0.000	0.000
P-value of AR(2) statistic	0.125	0.113

The dependent variable is FDI as a percentage of GDP. The standard errors are two-step Windmeijer corrected. The institutional variables (Control of corruption and the political constraints index) and resources are treated as endogenous while all other regressors are treated as predetermined. All variables other than the institutional variables are constructed in logarithmic form in accordance with the transformation given in Eq. (2). All variables which appear in interaction terms are centered around their respective means so that the estimates on the non-interacted variables are the estimates at the respective means. *, **, and *** denote significance at 10-, 5-, and 1 per cent level, respectively.

Table 17
Marginal effects — Controlling for polcon.

Percentile	(1) Polcon	(2) Polcon
10th	−0.247	−0.450
	(1.190)	(1.267)
25th	0.693	0.543
	(0.891)	(0.909)
Mean	1.483*	1.378*
	(0.810)	(0.772)
50th	1.570*	1.470*
	(0.814)	(0.771)
75th	2.456**	2.405***
	(0.983)	(0.919)
90th	2.959**	2.937***
	(1.156)	(1.097)

The dependent variable is FDI as a percentage of GDP. Reported are the estimates on control of corruption at different values of the natural resource variable. The estimates of the marginal effect in columns 1 and 2 correspond to the regressions specified in the respective columns of Table 16. Standard errors are two-step Windmeijer corrected. *, **, and *** denote significance at 10-, 5-, and 1 per cent level, respectively.

Table 18
Reduced sample.

Dependent variable: ln(FDI/GDP)	(1) No Transition	(2) No Tax havens
$\ln(FDI/GDP)_{-1}$	0.284***	0.356***
	(0.099)	(0.098)
Control of corruption	1.527	1.655
	(1.140)	(1.091)
ln(Resources)	0.237	0.159
	(0.183)	(0.130)
Control of corruption × ln(Resources)	1.346*	0.294
	(0.695)	(0.540)
ln(GDP p.c.)	−0.237	−0.359*
	(0.209)	(0.204)
ln(GDP p.c.) × ln(GDP p.c.)	0.240	0.055
	(0.171)	(0.129)
ln(Trade openness)	0.977*	0.743*
	(0.499)	(0.381)
ln(|Δ Inflation|)	−0.198*	−0.149
	(0.113)	(0.109)
ln(Fixed capital)	0.265	0.541
	(0.399)	(0.370)
Constant	Yes	Yes
Time period FE	Yes	Yes
Number of observations	397	401
Number of instruments	55	55
Number of countries	91	91
P-value of Hansen J Statistic	0.423	0.357
P-value of AR(1) statistic	0.001	0.000
P-value of AR(2) statistic	0.155	0.144

The dependent variable is FDI as a percentage of GDP. In column 1, all transition economies are excluded from the sample. In column 2, all tax havens are excluded from the sample. The standard errors are two-step Windmeijer corrected. Control of corruption and resources are treated as endogenous, while all other regressors are treated as predetermined. All variables other than Control of corruption are constructed in logarithmic form in accordance with the transformation given in Eq. (2). All variables which appear in interaction terms are centered around their respective means so that the estimates on the non-interacted variables are the estimates at the respective means. *, **, and *** denote significance at 10-, 5-, and 1 per cent level, respectively.

Table 19
Marginal effects — Reduced sample.

Percentile	(1) No Transition	(2) No Tax havens
10th	−1.628	0.994
	(2.298)	(1.960)
25th	−0.183	1.352
	(1.673)	(1.429)
Mean	1.527	1.655
	(1.140)	(1.091)
50th	1.691	1.688
	(1.113)	(1.066)
75th	3.381***	2.016**
	(1.198)	(0.991)
90th	4.224***	2.190**
	(1.450)	(1.092)

The dependent variable is FDI as a percentage of GDP. Reported are the estimates on control of corruption at different values of the natural resource variable. The estimates of the marginal effect in columns 1 and 2 correspond to the regressions specified in the respective columns of Table 18. Standard errors are two-step Windmeijer corrected. *, **, and *** denote significance at 10-, 5-, and 1 per cent level, respectively.

Table 20
Robustness check — Sample split.

Dependent variable: ln(FDI/GDP)	(1) Low resource endowment	(2) High resource endowment
$\ln(FDI/GDP)_{-1}$	0.339***	0.517***
	(0.089)	(0.140)
Control of corruption	−1.478	2.114**
	(1.273)	(1.004)
ln(Resources)	0.018	0.218
	(0.144)	(0.334)
ln(GDP p.c.)	0.240	−0.335
	(0.204)	(0.229)
ln(GDP p.c.) × ln(GDP p.c.)	−0.108	0.425**
	(0.142)	(0.206)
Trade openness	0.397	0.537
	(0.404)	(0.566)
|Δ Inflation|	−0.222**	−0.165
	(0.098)	(0.132)
Fixed capital	0.477	0.538
	(0.365)	(0.465)
Constant	Yes	Yes
Time period FE	Yes	Yes
Number of observations	264	256
Number of instruments	50	50
Number of countries	58	59
P-value of Hansen J Statistic	0.458	0.236
P-value of AR(1) statistic	0.002	0.003
P-value of AR(2) statistic	0.327	0.381

The dependent variable is FDI as a percentage of GDP. In column 1, only countries with natural resource endowment below the sample median are included in the sample. In column 2, only countries with natural resource endowment above the sample median are included in the sample. The standard errors are two-step Windmeijer corrected. Control of corruption and resources are treated as endogenous, while all other regressors are treated as predetermined. All variables other than Control of corruption are constructed in logarithmic form in accordance with the transformation given in Eq. (2). All variables which appear in interaction terms are centered around their respective means so that the estimates on the non-interacted variables are the estimates at the respective means. *, **, and *** denote significance at 10-, 5-, and 1 per cent level, respectively.

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