



Mining and quality of public services: The role of local governance and decentralization



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ABSTRACT

This paper investigates the local effects of mining on the quality of public services and on people's optimism about their future living conditions in Africa. Most importantly, it assesses the moderating role of local institutions and local governments' taxing rights in shaping the proximity-to-mine effects. The empirical framework connects more than 130,000 respondents from the Afrobarometer survey data (2005–2015) to their closest mines based on the geolocation coordinates of the enumeration areas (EA) and data on the mines and their respective status from the SNL Metals & Mining by the S&P. The geo-referenced data are matched with new indicators on local governments' taxing rights across the African continent. Using a difference-in-differences strategy, the results indicate that citizens living near an active mine are less likely to approve government performance in key public goods and services – including health, job creation and improving living standards of the poor. On the moderating role of local governance and local taxing rights, the findings point to a negative impact of local corruption, yet a positive impact of local authorities' discretion over tax and revenues. However, the positive impact of local taxing powers tends to reduce in environments with poor quality of local governance, high incidence of bribe payment and low level of trust in local government officials. Residents of mining communities with low corruption and comparatively high-level of raising revenue ability have the highest rate of positive appraisal compared to the other scenarios.

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1. Introduction

The question of whether natural resources hinder or boost development has been extensively investigated in the literature, but it is only recently that the focus has shifted to disaggregated and subnational-level analyses (Cust & Poelhekke, 2015). The increasing availability of geo-referenced data on subnational entities provides a unique opportunity to link geographical features of local areas in resource-rich countries to administrative, households, and individual data. This new approach has also enabled scholars to overcome some of the common identification issues such as endogeneity, measurement errors, and misspecifications, that macro-level cross-country studies have encountered. As a result, recent publications set forth empirical estimates on the effects of mining on local development indicators such as health,

wealth, poverty, and inequality (Loayza & Rigolini, 2016; von der Goltz and Barnwal, 2019). In Africa, more particularly, recent contributions have also shed light on the local effects of mining on economic activity and public service delivery (Mamo et al., 2019), on socio-economic indicators (Kotsadam & Tolonen, 2016; Benschaul-Tolonen, 2019) and on local conflict and corruption (Lujala, 2010; Maystadt et al., 2013; Berman et al., 2017).

These studies rely on two opposing postulates. On the one hand, mining communities are prone to benefit from their exploitation primarily through rents which could be used to finance public goods and services, through the employment of the local labour force in mining industries and the emergence of local businesses. On the other hand, artisanal mining activities may increase child labour and thus decrease human capital in the long term while industrial mining activities may not contribute significantly to local employment because they often require highly skilled labour that may not be available in the mining communities. Furthermore, rent opportunities from the mining sector may create the wrong incentives for local government officials and deviate their attention

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from handling local needs to seeking personal gains, fuelling local corruption. Although several studies have also shown that institutional environments and regulations – or lack thereof – contribute to creating or amber resource curse symptoms (Jensen & Wantchekon, 2004; Bulte et al., 2005; Mehlum et al., 2006; Robinson et al., 2006, 2014; Broilo et al., 2013; Wiens, 2014), the role of local institutions in shaping the effects of local mining has been relatively neglected in the sub-national resource curse literature (Gilberthorpe & Papyrakis, 2015; Lawer et al., 2017).

The existing evidence regarding Africa so far considers institutional quality as an outcome (Berman et al., 2017; Knutsen et al., 2017) without exploring the possibility that local institutional quality may also be a moderator in the relationship between mining and local development indicators. This paper fills this gap by analyzing the relevance of local institutions and institutional arrangements in shaping the local proximity-to-mine effects. In this paper, we argue that the quality of local governance and the capability of local authorities to raise and capture revenues, either through the mining sector or other means, are likely to be key confounding factors of how mining could benefit or hinder local development.

The objectives of this paper are threefold. First, we investigate whether individuals living near a mining zone and those living afar have different perceptions of how *well* or *badly* their governments are handling the living standards of citizens and the delivery of public goods and services such as job creation, water, education and health. In addition, we investigate whether these different groups of individuals have different levels of optimism about their future living conditions. Second, we examine whether and how the local institutional environment in places such as incidence of bribe payment, (dis)trust in and perceived level of corruption among local government officials shape the relationship between mining and the assessment of government performance in resource-rich communities. Third, we explore whether the legal rights or the discretionary power of subnational governments over the tax and revenue system matters in the analysis of the effects of natural resources on the provision of local public goods and services. Although royalties from mining industries are mostly controlled by central government authorities, mining-related or induced business generate rents and revenue opportunities that can be exploited by local authorities.

To date, and to the best of our knowledge, there is little evidence on the role of institutions, local governance, and decentralization in shaping the relationship between natural resources and development at the local level. Most of the existing evidence on such confoundedness is provided in macro-level studies where it has been shown that the quality of institutions and governance are key explanatory factors of why natural resources might be a curse for some countries and a blessing for others (van der Ploeg, 2011). Our paper, then, makes a significant contribution to the growing literature on the local effects of mining in Africa.

For our analysis, we match the Afrobarometer survey georeferenced data with the SNL Metals and Mining by the S&P¹ that provide time-series information on industrial mines in countries in Africa. The SNL Metal and Mining data are provided annually, which facilitates the merging with multiple rounds of Afrobarometer surveys and the identification of residents who live within a certain distance to a mine, be it active or non-active at the time of the survey. We follow existing publications by considering a 50 km radius to a mine as the reference value.² We exploit the availability of a new dataset on decentralization – mainly the decision-making power of sub-national governments over tax and revenue instruments, which,

unlike existing works, covers a range of African countries as well as those that have been implementing decentralization since the early 2000s.

We employ a difference-in-differences strategy, similar to that used in recent studies (Knutsen et al., 2017; von der Goltz and Barnwal, 2019) to study the gap between the effects of living within a 50 km radius of an active mine versus a non-active mine, and the gap between each of these categories and living afar a mining zone.³ Furthermore, the use of multiple rounds of the Afrobarometer surveys allows us to control for both time (shocks) and country-level heterogeneity. The results show a negative effect of living near active mining areas on the perceived performance of government authorities and the assessment of how *well* or *badly* they handle living standards of the people and the delivery of public services. Proximity to a mine also decreases the expectations of better living conditions in the future.

More interesting is that the findings confirm that the quality of local governance matters. We find that the poor quality of local governance has a negative impact on the effects of mining on government performance. Notwithstanding, the results suggest that the marginal effects of mining on the performance assessment of governments are positive in countries that have a higher level of decentralization. Nevertheless, this positive impact tends to be reduced in environments with poor quality of local governance, high incidence of bribe payments, and high-level of distrust in local public officials. The empirical results on the interplay between local corruption and decentralization sustain our hypothesis that both the quality of local institutions and the inter-governmental fiscal arrangements regarding taxes and revenue collection matter for how mining activities translate into welfare improvement in local communities.

This paper is closely related to two strands of the literature. First, the paper contributes to the body of research on the local effects of mining on socio-economic and political indicators. Pioneers in evaluating the local impact of natural resources initially paid attention to the case of Latin America (Aragón & Rud, 2013; Caselli & Michaels, 2013; Loayza & Rigolini, 2016; Santos, 2018). The increasing availability of reliable disaggregated data for African countries has led to a growing interest in exploring how mining affects local residents in resources-rich communities in that part of the world. For instance, using a large sample that covers more than 3,600 districts across 42 African countries, Mamo et al. (2019) show that mining has a positive impact on local economic activity measured by night-lights density but mixed effects on living standards and public services provision. Chuhan-Pole et al. (2015) also confirm the positive impact of gold mining on economic activity in Ghana, and most notably on access to employment, cash earning and household expenditure.

In contrast, Zabsonré et al. (2018), in Burkina Faso, find that mining activities reduce school enrolment and increase child labour. Ahlerup et al. (2020) also show that the income earned by child workers from mining activities did not compensate for the long-term benefits of education. These later results thus reinforce the argument that, despite some short-term benefits in employment and earning, a slowdown in human capital accumulation may have adverse effects in the longer term. The existing evidence also shows that the scale of mining operations may contrast the short-term employment effects. For instance, Pokorny et al. (2019) and Bazillier & Girard (2020) show that artisanal mining can generate jobs, cash for local population and increase in household consumption, whereas industrial mining fails to yield such positive effects. This entanglement becomes even more relevant

¹ Standard & Poor's Global Market Intelligence

² See Knutsen et al. (2017).

³ The non-active mines also include the ones define as "yet to open", "under mitigation", "on care and maintenance", "under rehabilitation", and "on hold".

for the case of Africa where substantial mining activities are now operated by Chinese companies and workers, leaving few low skilled jobs suffering from poor working conditions for the African population.

Besides the direct impact on households' socio-economic conditions, previous contributions also indicate that mining activities can negatively affect local communities through an increase in the incidence of conflicts, corruption and bribery. Research by [Berman et al. \(2017\)](#) shows that higher financial capabilities of fighting groups, generated through resource extraction, tend to spread conflicts across territory and time. [Knutsen et al. \(2017\)](#) find that local corruption tends to increase after mine openings in Africa since local police and officials request more bribes with the anticipation that local residents can better afford to pay them. These empirical results, therefore, hint to the potential duality and opposing direction of the impact of mining in the short- and long-term and which calls for additional research.

Second, the paper contributes to the broad literature on the moderating role of institutions and institutional arrangements on the relationship between natural resources and socio-economic performance. To date, the role of 'institutions' remains predominant in the political economy branch of the literature on the effects of natural resources. Some of the existing literature argues that natural resources exercise a negative effect on economic performance through their negative impact on institutional quality ([Dauvin & Guerreiro, 2017](#); [Badeeb et al., 2017](#)). [Sala-i-Martin & Subramanian \(2003\)](#) empirically confirm this indirect causation in the case of Nigeria. Yet, [Bhattacharyya & Hodler \(2010\)](#) suggest that this effect might also be contrasted depending on the initial level of institutional quality. In the same vein, other literature advocates that the assumed exogenous quality of institution determines whether a country experiences a resource curse or blessing ([Dauvin & Guerreiro, 2017](#)).

[Mehlum et al. \(2006\)](#) distinguish between two types of institutions influencing the impact of natural resources. On the one hand, producer-friendly institutions promote rent-seeking and production as complementary activities, thereby promoting the allocation of investments into productive activities, and subsequently stimulating growth. On the other hand, grabber-friendly institutions endorse rent-seeking and production as competing activities, leading investments to be allocated into unproductive activities, hence, resulting in poor growth performance. This channel of causation has not only been empirically supported by the authors, but also by others using different measures of institutional quality and natural resources endowment ([Boschini et al., 2013](#)).

While institutional quality may either operate indirectly or interactively with resource wealth in influencing socio-economic outcomes, the role of local institutions has relatively been neglected in the resource curse debate. Since the wave of decentralization reform in Africa, local government institutions have borne increasing responsibilities both in terms of services provisions as well as raising revenue abilities. As advanced by [Mitton \(2016\)](#), the distinction between national and sub-national entities is essential to consider, as they may not operate the same way. Even though national policies may promote accountability and transparency of resource revenues, [Lawer et al. \(2017\)](#), in a qualitative analysis, denotes that decentralization and by extension local government institutions do not necessarily improve living standards in mining communities, but rather gives more rooms for rent-seeking behaviours when local institutions are weak in nature. Hence, the paper assesses the role of local governance and decentralization in shaping the relationship between natural resources endowment and local socio-economic outcomes. To date, and to the best of our knowledge, there is little existing evidence on such confoundedness at the local level, as most of the existing

contributions are bound to macro-level studies ([van der Ploeg, 2011](#)).

The rest of the paper is structured as follows. [Section 2](#) provides the rationales for considering the role of local institutions and institutional arrangements in the analysis of the local effects of mining. [Section 3](#) presents the data description, gathering, and merging process. [Section 4](#) details our empirical strategy. [Section 5](#) presents and discusses the main findings. Concluding remarks are found in [Section 6](#).

2. Sub-national resource curse and the role of local institutions

The so-called resource curse literature has theorized several channels through which natural resources impact on the socio-economic development of countries. These include economic channels such as Dutch disease symptoms – primarily marked by a distortion in prices and revenues and reallocation of productive factors ([Sachs & Warner, 1995, 2001](#); [Papyrakis & Gerlagh, 2004](#); [Frankel, 2010](#)), political economy channels that draw on institutions and the behavioural responses of different groups of stakeholders symptoms ([Jensen & Wantchekon, 2004](#); [Bulte et al., 2005](#); [Mehlum et al., 2006](#); [Robinson et al., 2006, 2014](#); [Brollo et al., 2013](#); [Wiens, 2014](#); [Gallego et al., 2020](#)), and conflicts-related transmissions as extractive activities tend to give rise to or prolong civil strife ([Ross, 2004](#); [Collier, 2004](#); [Humphreys, 2005](#)). Empirical enquiries testing the relevance of these different mechanisms have accrued throughout the years, although they remain inconclusive ([van der Ploeg, 2011](#); [Badeeb et al., 2017](#)).

While a growing body of scholarship has shifted the resource curse literature from the country to sub-national levels, the so far highlighted mechanisms leading to a potential sub-national resource curse do not differ much from the country-level literature. Economic, political-economic and conflict-related transmissions are similarly argued to explain the impact of resources boom on socio-economic outcomes in local communities ([Paler, 2011](#); [Cust & Viale, 2016](#)). The emergence of local mining activities contributes to distorting local prices, revenues, and the allocation of productive factors which ultimately impact on key sectors that are not directly linked to the extractive industry ([Caselli & Michaels, 2013](#); [Kotsadam & Tolonen, 2016](#)). Although revenues from extractive activities are predominantly collected and managed by higher-tier authorities, substantial top-down transfers from central to local authorities can create a revenue windfall which undermines political accountability, trigger corruption and deteriorate institutions ([Knutsen et al., 2017](#)) in line with the political-economic channels, and do not necessarily translate into welfare gains for local communities ([Caselli & Michaels, 2013](#)). On conflict-related transmissions, research in Colombia ([Dube & Vargas, 2013](#)), Peru ([Arellano-Yanguas, 2011](#)), Nigeria and Sierra Leone ([Maconachie, 2009](#); [Mähler, 2010](#); [Berman et al., 2017](#)) also points to rises in local social tensions and conflicts following an increase in mineral prices, extraction of oils and precious metals and mining-related fiscal transfers.

Nevertheless, and as argued above, the mitigating role of local institutions has been relatively neglected in the sub-national resource curse literature ([Gilberthorpe & Papyrakis, 2015](#); [Lawer et al., 2017](#)). Existing empirical enquiries, especially in Sub-Saharan Africa, either estimate the direct effects of mining activities on households' livelihoods or – unlike macro-level empirical works – regard institutional quality as an outcome rather than a mitigating factor ([Arezki & Gylfason, 2013](#); [Berman et al., 2017](#); [Knutsen et al., 2017](#)).

Still, variations in local institutional quality across resource-rich communities are bound to influence how strategies to limit externalities, and adequate level of local public services are imple-

mented. The administrative capacity of local governments and the salience of corruption across mining-based areas may thus yield different outcomes. Qualitative research by Lawer et al. (2017) already shows the relevance of local institutions in the sub-national resource curse debate in Ghana where the negative impact of the resource booms and the lack of socio-economic progress is argued to be deep-rooted in chieftaincy power, conflicts and unaccountable local traditional institutions.

Besides the relevance of local institutions, what differs a national (country-level) from a sub-national analysis is the potential influence of central-local government relationships in containing a potential resource-curse. As argued by Arellano-Yanguas (2011), inter-governmental institutions and regulations can be devised in a way that influences or limits the externalities of extractive activities. In resource-rich countries, more particularly, fiscal decentralization and fiscal arrangements are key to local governments' efforts to improve local welfare, as they complement national authorities in ensuring that these communities benefit from resource revenues. Extractive activities also create a pressure to decentralize public resources as local jurisdictions often feel entitled to a part of the resource-generated wealth as compensation for the environmental risks and the negative externalities associated with the industry (Brosio, 2003; Bahl & Tumennasan, 2004).

To date, however, the relevance of inter-governmental fiscal relations remains vaguely explored in the (sub-national) resource curse literature. The existing contributions predominantly focus on the allocation and redistribution of natural resources-based revenues to local governments which are argued to have important implications for the prospect of a local resource curse (Desai et al., 2005; Freinkman & Plekhanov, 2009; Paler, 2011; Arellano-Yanguas, 2011; NRG, UNDP, 2016; Cust & Viale, 2016; Ardanaz & Maldonado, 2016). Still, no attention has been paid to the design of institutions and regulations across tiers of governments, and most importantly, regarding taxes and revenues matters. In this paper, we argue that the way in which local governments navigate their fiscal relations with the centre, and with local firms and residents, would play a role in mitigating the externalities of extractive activities and for at least three important reasons.

First, besides fiscal transfers from the extractive sector, local government budgets are comprised of revenues and fees levied on residents and businesses. Some may be legally entitled to levy taxes within their respective jurisdictions as defined in each country's tax codes, decrees or regulations. In the event of a resource boom, the emergence of local business and employment grant local authorities a more extensive revenue base to tap onto. Therefore, their legal rights would impact on their ability to mobilize revenues from sources other than the extractive sector, and thereby their budgeting and public provision. Second, sub-national governments that manage abundant non-resources-based revenues may face similar institutional risks, such as an increase in corruption and rent-seeking behaviours. While they may have limited decision power over resources-based revenues, they may be involved in issuing permits, enforcing relevant regulation and in charge of local infrastructure. Third, the fiscal federalism literature suggests that effective fiscal decentralization requires a certain level of autonomy over taxes and revenues to reap the accountability benefits of the reform (Rodden, 2002, 2006; Lockwood, 2005; Martinez-Vazquez, 2015). As tax autonomy is argued to play a critical role in disciplining local budgeting, it is thus relevant to test whether substantial taxing rights granted to local governments in resource-rich communities translate into more efficient public policies.

Hence, to sum up, in our enquiry, we first investigate how the quality of local government mitigate the local mining effects using

different indicators that capture the salience of corruption and trust in local officials within resource-rich countries. Second, we investigate how the level of legal decision-making power over taxes and revenues influences the linkages between resources endowments and the quality of public services delivery in key areas. Lastly, we explore the interplay between these two institutional parameters and assess the influence of their independent and joint interaction with resources endowment in local communities in Africa.

3. Data description and sources

Our empirical analysis relies on geo-referenced Afrobarometer surveys data for the period of 2005 to 2014. The Afrobarometer constitutes a large pool of public opinion surveys and a reliable source of information on various political and socio-economic characteristics of residents and local communities in Africa. The surveys capture the availability and residents' appraisal of their perceived quality of public goods and services in local communities -- these latter identified by the enumeration areas (primary sampling unit). The geospatial coordinates of the enumeration areas facilitate the merging of the Afrobarometer surveys data with the records of the Raw Materials Database (RMD) of SNL Metals and Mining by S&P. Each enumeration area and their corresponding respondents in the surveys are matched with its closest mine based on a cut-off distance value (Picard, 2010).

3.1. Merging and matching process

The Raw Materials Database (RMD) of SNL Metals and Mining inform on the geolocation and the status of several mines in Africa. The database also informs on the year in which the most recent information was recorded. The two datasets are merged by first matching the spatial point coordinates (GPS) of the mines and primary sampling units (enumeration areas or districts or townville) in the survey data; and second, by matching the year of the survey data collection to the reference year for the latest information update on the mine. In cases where the year of the latest update does not correspond to the year of the Afrobarometer survey data collection, this latter is matched with the closest date in the SNL Metals and Mining data which in all accuracy corresponds to the previous or subsequent year. This consideration only applies to a few countries: Senegal (Round 3 and Round 4 of the Afrobarometer), Burundi (Round 5), Benin and E-Swatini (Round 6). In countries where the enumeration area is not coded in the Afrobarometer dataset, the districts or Townsville GPS coordinates are used to set the geographical boundaries.

From a cluster centre point, we measure the distance to a mine and create a binary variable 'Active' that equals to 1 if the sampling unit or district is located within 50 km radius from an active mine. For the remaining units, we create another binary variable 'Inactive' which points to all respondents that reside within 50-km radius from an inactive mine. 'Inactive' refers to any mine with one of the following statuses: inactive, care and maintenance, on hold, rehabilitation, and under litigation.⁴ The pseudo control group thus includes all enumeration areas located farther than 50 km radius from a mine (be it active or inactive). As the individual data are identified by their enumeration areas or districts or Townsville, it is feasible to relate their responses to their residential location at the time of the survey.

⁴ Table 2 A in appendices shows the distribution of the mine data into the different categories.

3.2. Dependent variables

The dependent variables are (a) the residents' appraisal of public goods and services, and (b) their self-reported optimism about the future. The first set is operationalized from the following survey question.

“How well or badly would you say the current government is handling the following matters, or haven't you heard enough to say? “

The different matters are: (i) improving living standards of the poor, (ii) creating jobs, (iii) improving basic health services, (iv) addressing educational needs, and (v) providing water and sanitation services. For each of these items, the possible answers are on a four-step Likert-scale and range from 'very badly' to 'very well'. We create a binary variable that takes the value of 1 if the individual responded 'fairly well' or 'very well' to the question and 0 for the responses 'bad' or 'very bad'. Other responses such as 'I don't know' or 'haven't heard about it', or any refusal to answer are coded as missing values. To capture the overall appraisal of each respondent, we also construct a composite indicator of public services delivery by aggregating each respondent's appraisal of all individual public services through polychoric correlation structure of the categorical responses (Lee et al., 1995; Holgado-Tello et al., 2008). The composite indicator is thus a reflection of how each respondent evaluates the range of public services provided by the state.⁵

Table 1 shows the distribution of the respondents for each of these policy matters. We can observe that less than one-third of the interviewees agreed with the statement that the government is handling very well or fairly well the living standards of the poor and creating jobs, although more than half appear to approve their respective government's performance in improving essential health services (57.92%) and addressing educational needs (60.15%) across the whole sample (four rounds of the Afrobarometer survey).

Self-reported optimism is derived from the survey question: “Looking ahead, do you expect the following to be better or worse: Your living conditions in twelve months' time?”. The responses range from 'much worse' to 'much better'. We create a binary variable that equals 1 if the reply of the respondent is 'better' or 'much better' and 0 otherwise. Natural resources discoveries and exploitations are expected to shift expectations of local residents

Table 1
Distribution of respondents in the category fairly well and well.

	Percentage	Observations
Creating jobs	26.90	130,277
Improving the living standards of the poor	29.86	109,019
Providing water and sanitation services	44.44	131,280
Improving basic health services	57.92	132,161
Addressing educational needs	60.15	131,661
Optimism (Expectation of living conditions in 12 months ahead)	78.59	91,200

⁵ This polychoric correlation method performs the principal component analysis on the resulting correlation matrix of ordinal and categorical variables. It provided composite indicators that capture the underlying correlation of such variables. This approach has been chosen under the premise that variables such as trust in different types of institutions (e.g. president, parliament etc.) or the deprivation of basic goods and services (water, food etc.) are highly correlated. As those variables are ordinal in the Afrobarometer survey data, this method appeared an optimal way to aggregate individual ordinal responses that capture more broadly the level of deprivation or access to public services, for instance.

Table 2
Coding and scoring of the decentralization proxy.

	Scoring															
	Income			Property			Consumption			Others			Scores			
	Corporate Income Tax	Business Tax	Personal Income Tax	Payroll/Withholding	Property	Transfers of Property	Sales/VAT/ Turnover	Excise	Fuel	Industry and Trade	Vehicles	Gambling	Stamps	Natural Resources	Decision Score	Tax Assignment Index
C: Central I: Intermediate L: Local	C	C	C	C	C	C	C	C	C	C, I	C	C	C	C	0.04	0.22
Country Name	C	C	C	C	C	C, I	C	C	C	C, I	C	C	C	C	0.11	
Instrument	C	C	C	C	C	C, I	C	C	C	C, I	C	C	C	C	0.29	
Base Rate	C	C	C	C	C, I	C, I	C	C	C	C, I, L	C, I	C	C	C	0.46	
Administration	C	L	C	C, I	C, I	C, I	C	C	C	C, I, L	C, I	C, L	C, L	C		

Notes: Matrix design originally from the World Bank Qualitative Decentralisation Indicators. The Tax Assignment Index is used to proxy the level of decentralization in this paper.

and authorities. By choosing optimism as an outcome, we relate to the recent literature exploring the impact of natural resources on behaviours and expectations of economic agents (Arezki et al., 2017; Bazillier & Girard, 2020; Cust & Mensah, 2020) that is in line with the seminal idea of the “pre-resource curse” highlighted in Cust & Mihalyi (2017a, 2017b). According to this strand of research, when expectations overshoot the “felt” benefits of natural resources, countries can experience growing disappointment, and such disappointment can be exacerbated by low institutional quality.

As this question is not included in Round 6 of the Afrobarometer survey, the corresponding estimations thus incorporate data from Round 3 to Round 5. Table 1 shows that approximately 79% of the survey respondents expect an improvement in their living conditions in the twelve months following the survey data collection.

Fig. 1 displays, for each mining location (both active and inactive mine), the percentage of respondents with a positive assessment of government authorities’ performance in improving the living standards of the poor and job creation in Round 6 of the Afrobarometer survey. Such percentage is very low across the whole continent. The dissatisfaction is particularly striking in local communities near active mines, except for Botswana, where the average appraisal on government pro-poor policies tends to be positive on average (Fig. 2).

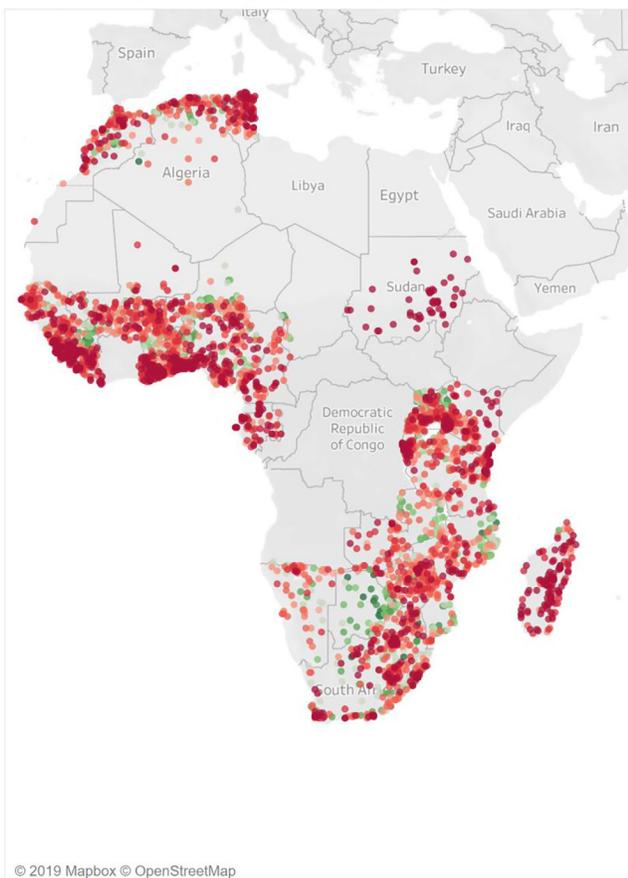
3.3. Measuring the quality of local governance and decentralization

The quality of local institutions and local governance is measured through various proxies. First, we constructed an objective measure of corruption based on the incidence of bribe payment in three steps. In the first step, we derived a binary indicator from answers to the question “How often, (if ever, have you had to pay a bribe, give a gift, or do a favour to government officials in order to: . . .”, to which the respondents indicate whether they have bribe government officials in order to obtain public services such as school placement, medical services, official documents, household services and police help. In the second step, the binary indicators are then aggregated using polychoric correlation to create an indicator of the tendency of bribe payment at the individual level. In the third step, the individual estimates are averaged at the regional level. Unlike the individual perception of corruption, the incidence of bribe payment points to an objective exchange between authorities and residents. Second, we measure the quality of local governance by averaging the individual distrust in local government councillors at the regional level. Lastly, we corroborate the results with a corruption perception indicator, which also takes the regional average number of residents that perceive their local governments as being corrupt.

As per our third contribution to the literature, we introduce a measure of decentralization based on the legal assignment of

Government Handling Living Standards of the Poor

Percentage of respondents with “fairly well” & “very well” by mine location



Government Handling Job Creation

Percentage of respondents with “fairly well” & “very well” by mine location

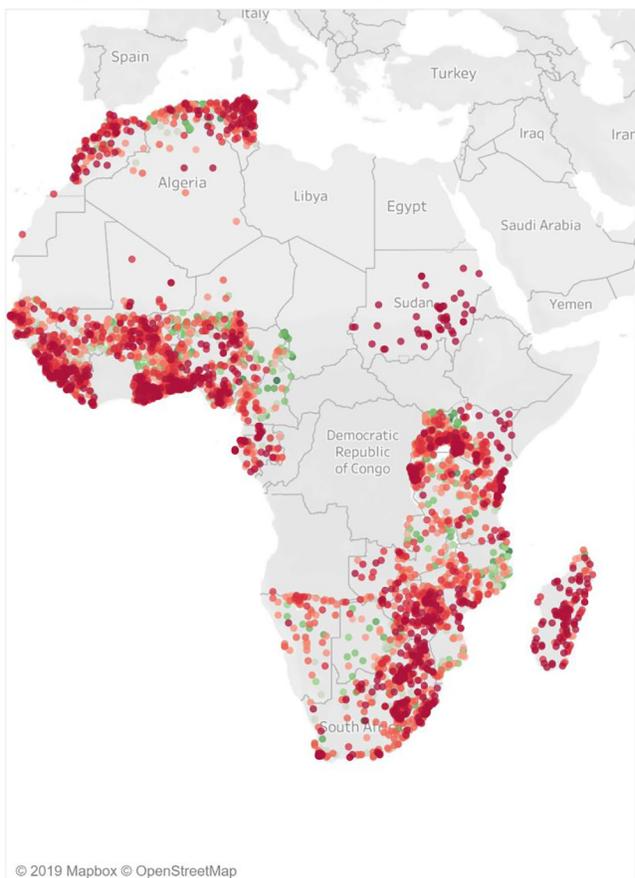


Fig. 1. Assessment of Government Performance by Mining Location (Active and Inactive Mines).

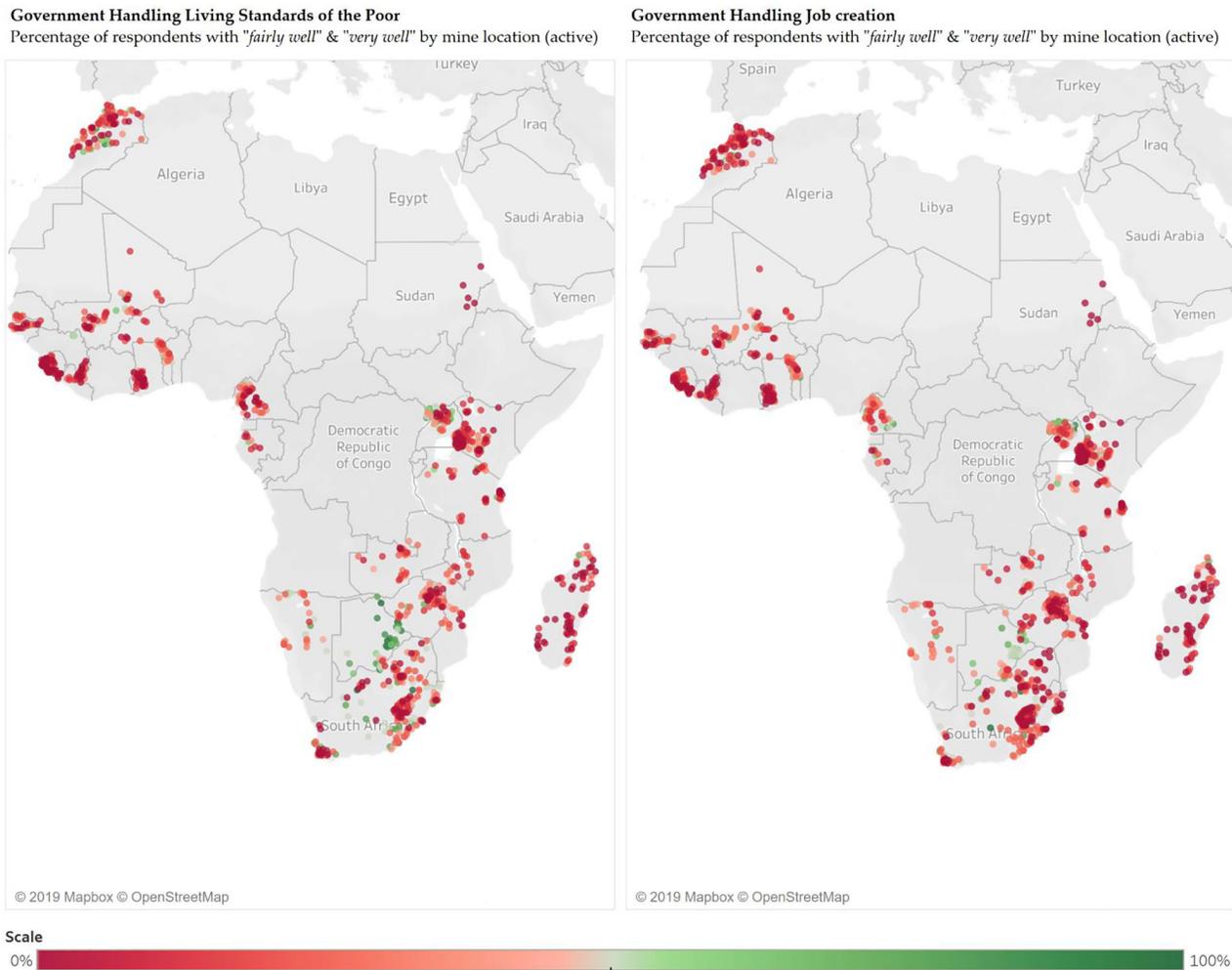


Fig. 2. Assessment of Government Performance by Mining Location (Active Mines Only) Living Standards and Job Creation.

tax-related decisions to local governments issued from a new dataset on the discretionary power of all governments tiers over tax revenue instruments and covering a large number of developing and emerging economies (Vincent, 2020).⁶ The dataset was constructed through in-depth reviews of legal (e.g. tax codes, local taxation acts, constitutions, public finance laws), policy documents (e.g. decentralization policy documents), grey and scientific literature and archives from the International Bureau of Fiscal Documentation (IBRD (Access: 2015-2017)) that define the governance of the tax system across tiers of government in each country.

Based on the legal and policy information and using a pre-defined matrix, it is coded the legal ability of local (identified as "L"), intermediate ("I") and central authorities ("C") to (i) introduce new instruments or altering existing ones, (ii) define the base, (iii) set the tax rates and (iv) collect and administer the revenues from major instruments. The dataset considers the latest information available for each country based on the publication or ratification date of the most recent legal provisions on local taxation or the general tax codes. As such, not all countries listed in Table 3A are included in the estimations with the decentralization variable. For instance, Benin is included in all rounds provided that the Afrobarometer was conducted as the primary law on local finance dates back to 1998 (e.g. Law No. 98-007). On the other hand, Madagas-

car's intergovernmental tax system is most recently defined by 2014 on local government finance and is therefore excluded from the analysis using the local government taxing rights variables.

The coding matrix is illustrated in Table 2. From this coding, it is derived a composite indicator the level of taxing rights of sub-national governments as follows. Let T be the number of identified tax instruments (e.g. corporate income tax, business tax, personal income tax), D_s a binary indicator for the involvement of lower-tier governments in the decision-making process, S the number of instruments upon which sub-central governments have a certain degree of decision-making power ($S \leq T$) and α a scoring weight which is equivalent to 0.5 for a joint decision and 1 for a single-handed decision. The discretionary power of sub-national authorities (intermediate and/or local) over each decision component (e.g. decision score on the setting of tax rates) is derived as follows:

$$A_d = \frac{\sum_{s=1}^S \alpha D_s}{\sum_{i=1}^T T_i} \text{ with, } \alpha = \begin{cases} 1/2 \text{ if decided by central AND sub-national authorities} \\ \text{(e.g. } \{C, L\} \text{ or } \{C, L, I\}) \\ 1 \text{ if decided by central or sub-national authorities} \\ \text{(e.g. } \{C\} \text{ or } \{L\} \text{ or } \{I, L\}) \end{cases}$$

The overall taxing rights of sub-national authorities is obtained by taking the averages of the decision scores on the four dimensions

⁶ See Appendix B for additional details.

$$\text{Tax Assignment Index (Decentralization Proxy)} = \frac{\sum_{d=1}^4 A_d}{4}$$

The so-labelled “tax assignment index” is used to proxy decentralization in this paper. It reflects the legal taxing powers granted to lower-tier authorities both across existing instruments and decision dimensions.

Given that natural resources extraction generates revenues for local authorities, either directly through extraction royalties or indirectly through booming local businesses, this indicator is used as a proxy for the level of decentralization or the extent to which sub-national governments are involved in raising revenues or deciding over parameters of the tax system. We thereby estimate whether the assessment of government performance of respondents living near a mining area varies according to the level of taxing rights granted to sub-national authorities in each country.⁷

Measuring the variables of interest respectively at the regional (local institutions) and national level (local government taxing rights) reduces the probability of a bi-directional relationship between these variables and individual assessment of public goods and services.

3.4. Additional covariates

The empirical estimations account for countries, regional and individual heterogeneity. At the individual level, we consider an array of demographic and socio-economic characteristics, including gender, age, education, employment status, residential area (urban or rural) which are likely to shape their views on public services. Since the Afrobarometer surveys do not include the income level of the respondents, we create a composite index of living standards by relying on questions such as “How often have you gone without food (or water, medicine, cooking fuel)?”. The question points to the level of deprivation of essential public goods and services, including food, water, medication, cooking fuel and cash. The answers are on a Likert-scale as follows: 0 = never, 1 = just once or twice, 2 = several times, 3 = many times, 4 = always. The categorical variables are aggregated using polychoric correlation to derive a single indicator which reflects the level of poverty and neediness of each respondent’s in basic necessities. In addition, the empirical models include local quality of institutions measured at the regional level (see above), and at the country level and in addition to the measurement of decentralization, the empirical models include proxies for the country corruption control with data from the World Governance Indicators and the share of natural resources rents as a percentage of GDP from the World Development Indicators.

4. Empirical strategy

Eq. (1) is our baseline model. We denote by y_{ilcs} the response of an individual i living in locality l of country c and which has been interviewed in survey round s . Depending on the specification, the variable y_{ilcs} indicates the assessment of how well or badly does the government handle public services or the expectation of an individual regarding his/her future living conditions. NR_active is a binary variable that takes the value of 1 if the respondent is located within a 50-km radius from an active mining zone, and 0 otherwise; and $NR_inactive$ is also a binary variable that equals 1 if the individual is located within a 50 km radius from an inactive mining zone and 0 otherwise. Our choice of 50-km as the cut-off distance is based on previous research by Knutsen et al. (2017). X_{ilcs} represent a vector of individual-level variables with their respective coefficients θ , W_{cs} a vector of country-level co-variables, c_c the country fixed effects and s_s the time (survey round) fixed effects.

$$y_{ilcs} = \beta_0 + \beta_1 NR_{active_{ilcs}} + \beta_2 NR_{inactive_{ilcs}} + \theta_{ilcs} + \phi_{cs} + c + s + \varepsilon_{ilcs} \quad (1)$$

Eq. (1) is estimated using a linear probability approach for the binary outcome variables and multi-variate OLS for the composite indicator on public services. Interpreting the coefficient for active mine solely assumes that the respondents’ residence nearby an active mine is uncorrelated with other individual, socio-demographic, or institutional characteristics such as access to new infrastructure (in active mining areas) or employment opportunities. This would indeed be a strong assumption, even though the baseline specification accounts for an array of control variables. By including inactive mine, the baseline model facilitates the comparison between responses of individuals in mining areas (both active and inactive) with those from non-mining areas. Non-mining areas consist of all individuals who live farther than a 50-km radius to a mine – thus a pseudo control group (Knutsen et al., 2017). The coefficient on ‘inactive mine’ can be interpreted in isolation and reflects the differences in the outcome variables between a non-mining area and an inactive mining area. While it is not the standard difference-in-differences approach, it results in a difference-in-differences estimate which accounts for the time-invariant characteristics that may influence an individual residential decision, and factors which may have contributed to shaping living conditions within the 50-km radius community and even prior to the discovery of a mine.

To assess whether the quality of local governance shapes the effect of mining on different variables of interest, Eq. (1) is extended to the following specification in which $localgovernance_{lc}$ refers to the quality of local governance at the regional level. In Eq. (2) an interaction term is added between the quality of local governance and the status of the mine (active or inactive) to test whether the variation in local institutions determines how mining affects the appraisal of public goods and services by residents in nearby areas. The interaction term facilitates the identification of how the institutional environment shapes the individual assessment of public goods through the quality of local governance. Depending on the specification, local governance is captured either through the incidence of bribe payment, the aggregate perception of corruption of local government councillors or the aggregate level of distrust in local authorities. It is worth noting that the different measures of governance considered may be endogenous and affected by omitted factors that we are not able to take into account in this paper because of lack of data and lack of good instrument for the local measures of governance. Therefore, we cautiously interpret our results on the interaction terms as correlations and not as causal effects.

$$y_{ilcs} = \beta_0 + \beta_1 NR_{active_{ilcs}} + \beta_2 NR_{inactive_{ilcs}} + \beta_3 localgovernance_{lc} + \beta_4 (NR_{active_{ilcs}} \times localgovernance_{lc}) + \beta_5 (NR_{inactive_{ilcs}} \times localgovernance_{lc}) + \theta_{ilcs} + \phi_{cs} + c + s + \varepsilon_{ilcs} \quad (2)$$

To investigate the relevance of decentralization, we substitute $localgovernance_{lc}$ by $decentralization_c$ in Eq. (2). The resulting model thus tests whether the responses vary according to the design of intergovernmental tax arrangements. Lastly, to test the interplay between the quality of local governance and institutions and decentralization, we introduce interaction terms between the proxy for decentralization, local governance and natural resources endowment (living nearby an active or inactive mine) as shown in Eq. (3).

$$y_{ilcs} = \beta_0 + \beta_1 NR_{active_{ilcs}} + \beta_2 NR_{inactive_{ilcs}} + \beta_3 localgovernance_{lc} + \beta_4 decentralization_c + \beta_5 (NR_{active_{ilcs}} \times decentralization_c) + \beta_6 (NR_{inactive_{ilcs}} \times decentralization_c) + \beta_7 (NR_{active_{ilcs}} \times decentralization_c \times localgovernance_{lc}) + \beta_8 (NR_{inactive_{ilcs}} \times decentralization_c \times localgovernance_{lc}) + \theta X_{ilcs} + \phi W_{cs} + s + \varepsilon_{ilcs} \quad (3)$$

5. Results and discussions

5.1. Mining and quality of public services

Table 3 presents the results of the baseline model using the individual assessment of how well or badly the government is handling the living standards of the poor. The coefficient estimates suggest that residents living within a 50 km radius of an active mine have a lower probability of a positive appraisal of government performance in that policy area. The probability is lower by 2% in specifications (3) and (4) with additional controls – this latter being estimated with clustered standard errors. The direction and significance level of that coefficient is also corroborated with two alternative probit specifications in columns (5) and (6). The difference-in-differences estimate points show a statistical difference between residents living near an active mine and those living near an inactive on how they evaluate the government performance in improving the living standards of the poor. Compared to individuals in communities located near an inactive mine, those living near an active mine are 2.3% less likely to report a positive appraisal of the government performance.

At the country level, it is noted that the higher the ratio of natural resources rents in GDP, the lower the likelihood of a positive appraisal by the respondents. The direction and significance of the coefficients on natural resources rents are consistent throughout all the estimations, indicating thereby an overall dissatisfaction with governments in countries where mining extraction is very significant. However, the results indicate that the control of corruption at the national level tends to have a positive effect on how residents perceive the government's performance in that area. At the individual level, interest in public affairs tends to have a positive effect on the outcome. In contrast, the poverty level of the respondents (measured by the proxy on how often they are deprived of necessities such as food, water, medicine, and cooking fuel) appears to impact their views negatively.

In Table 4, we consider all other policy areas (water and sanitation, jobs creation, health, education), respondents' optimism about future living conditions (their expected living standards in twelve months' time) and the composite indicator on access to public goods and services. We found a negative and significant

impact of living nearby a 50 km radius of an active mine on the perception of government performance in all individual policy areas as well as the aggregated public services measure.

Those living near an active mine are also rather pessimistic about the future. Residents near active mines are 2.3% less likely to positively appraise the government's performance in improving water and sanitation services, 2.9% less likely to approve their performance in job creation, 1.8% less likely to approve health services provision, and 4.2% more pessimistic about the future. Residents near inactive mines are 1.1% less likely to be satisfied with water and sanitation services, and by 2.6% less likely to be optimistic about the future.

The differences-in-differences point estimates suggest a statistically significant gap between the local effects of active and non-active mines on individual assessment of government delivery in the listed policy areas. The comparison (difference-in-differences) between active and non-active mining shows that living near an active mine reduces the probability of positively assessing the performance of the government in water and sanitation by 1.2% points, in job creation by 2.6% points, in health services by 1.2% points, in education by 1.1% points and in public services as a whole by 1.9% points. In addition, the active status of a nearby mine also decreases optimism about the future by 1.7% points compared to living nearby an active mine. The direction and significance of the coefficients on individual interest in public affairs, individual poverty level, country-level natural resources rents (% of GDP), and control of corruption are consistent with the results of Table 3.

Overall, our findings corroborate with existing studies in the literature that have shown that local mining activities may have negative impacts on local development outcomes (e.g. Zabsonré et al., 2018; Ahlerup et al., 2020). These findings could be explained by the wrong incentives for local government officials who may deviate their attention from being responsive to their local people to rent-seeking activities in the mining sector for their gain. Furthermore, our findings could also be explained by the resource enclave theory (Ferguson, 2005) which argues that in many developing countries with bad quality of institutions, mining and oil extraction investment has been concentrated in secured enclaves that benefit primarily foreign capitalist with little/no alignment with the needs

Table 3
Mining and assessment of public services: baseline models.

Dependent Variables: Government improving living standards of the poor	(1-LPM)	(2-LPM)	(3-LPM)	(4-LPM)	(5-Probit)	(6-Probit)
Active 50 km	-0.018*** (0.006)	-0.018*** (0.007)	-0.020*** (0.007)	-0.020* (0.010)	-0.063*** (0.021)	-0.063* (0.032)
Inactive 50 km	0.005 (0.004)	0.002 (0.004)	0.004 (0.004)	0.004 (0.006)	0.011 (0.011)	0.011 (0.017)
Natural Resources Rents (ln)			-0.035*** (0.007)	-0.035*** (0.010)	-0.112*** (0.021)	-0.112*** (0.030)
Control of Corruption			0.155*** (0.014)	0.155*** (0.022)	0.534*** (0.044)	0.534*** (0.071)
Constant	0.341*** (0.010)	1.301*** (0.118)	1.460*** (0.119)	1.460*** (0.125)	3.016*** (0.358)	3.016*** (0.375)
Difference in Differences	-0.024	-0.021	-0.023	-0.023		
F-test: active-inactive = 0	11.7	8.8	10.9	4.5		
P-value of F-test	0.00	0.00	0.00	0.03		
R-squared	0.05	0.07	0.07	0.07		
Pseudo R-squared					0.06	0.06
Observations	112,825	109,282	109,282	109,282	109,282	109,282
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Round FE	Yes	Yes	Yes	Yes	Yes	Yes
Robust/Cluster std	Robust	Robust	Robust	Cluster	Robust	Cluster
Additional individual controls	No	Yes	Yes	Yes	Yes	Yes

Notes

1 Significance level: * p < 0.10, ** p < 0.05, ***p < 0.01. Robust or clustered (at the geo-localization of the mine) standard errors in parenthesis.
2: The additional controls are age (ln), the square of the logarithm of age (ln), gender, education, residential area (urban), employment status.

Table 4
Mining and assessment of public services: baseline models (2).

Dependent Variables	(1-LPM) Water & Sanitation	(2-LPM) Jobs	(3-LPM) Health	(4-LPM) Education	(5-LPM) Public Services	(6-LPM) Optimism
Active 50 km	-0.023*** (0.006)	-0.029*** (0.005)	-0.018*** (0.006)	-0.010* (0.006)	-0.019*** (0.006)	-0.042*** (0.007)
Inactive 50 km	-0.011*** (0.003)	-0.002 (0.003)	-0.006 (0.003)	0.001 (0.003)	-0.001 (0.003)	-0.026*** (0.004)
Natural Resources Rents (ln)	-0.114*** (0.006)	-0.062*** (0.005)	-0.168*** (0.006)	-0.173*** (0.006)	-0.123*** (0.006)	-0.026*** (0.007)
Control of Corruption	0.138*** (0.011)	0.189*** (0.010)	0.229*** (0.011)	0.239*** (0.011)	0.202*** (0.012)	0.293*** (0.012)
Constant	1.838*** (0.115)	1.707*** (0.107)	1.981*** (0.113)	1.768*** (0.112)	2.065*** (0.102)	1.832*** (0.120)
Difference in Differences	-0.012	-0.026	-0.012	-0.011	-0.019	-0.017
F-test: active-inactive = 0	3.9	23.7	4.3	3.5	9.4	5.7
P-value of F-test	0.05	0.00	0.04	0.06	0.00	0.02
R-squared	0.09	0.05	0.09	0.10	0.11	0.12
Observations	131,659	130,751	132,511	132,001	105,199	80,553
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Round FE	Yes	Yes	Yes	Yes	Yes	Yes
Additional individual Controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes

1: Significance level: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors in parenthesis.

2: Specifications (1) to (4) refers to the respondents' view of how the government is handling water & sanitation services to the households, job creation, health, and education. The dependent variable in specification (5) is a composite indicator constructed through polychoric correlation and which combines all the respondents' views on various types of public services and policies, including those in specifications (1) to (4). The sample size is reduced due to inconsistent missing patterns across the different assessment variables. The dependent variable in specification (6) refers to the expected living standards of the respondent in 12 months after the survey collection. Individual-level control variables are added in all specifications: age (ln), the square of the logarithm of age (ln), gender, education, residential area (urban), employment status.

of local people living near the places where the mining activities take place. Indeed, in the case of Africa, [Campbell \(2004\)](#) highlighted that most of the legal and regulatory reforms implemented in the mining sector in the 80 s and 90 s had rather favoured the investment environment for external investors at the expense of improving the living conditions of the people in the countries endowed in natural resources. The empirical results are also in line with the seminal idea of the "presource curse" highlighted in [Cust & Mihalyi \(2017b, 2017a\)](#). According to this strand of research, when expectations overshoot the "felt" benefits of natural resources, countries can experience growing disappointment, and such disappointment can be exacerbated by low institutional quality.

5.2. The moderating role of local governance

As stated in the introduction and [Section 2](#), our contribution also explores whether the quality of institutions at the local level determines the relationship between natural resources endowment and individual assessment of public goods and services. We do so in two different ways. First, we adopt an objective measure of corruption based on the incidence of bribe payment of the respondents, averaged at the regional level. This measure points to the prevalence of corrupt attitudes in the immediate environment surrounding the mining locations. Second, we test the robustness of the results by also considering the distrust in local government councillors and the perception of corruption of local officials. These two are also derived by averaging individual responses on whether local authorities are corrupt or untrustworthy.

With the incidence of bribe payment as a proxy for effective corruption, the results in [Table 5](#) (columns 1–3) show that the incidence of bribe payments has a negative role on how the distance to an active mine affects the perceived performance of the government – as depicted by the coefficient of the interaction terms. The higher the incidence of bribe payment in a community within 50-km distance from an active mine, the higher the likelihood of citizens being dissatisfied with government performance in

improving their living standards and in public services delivery. The incidence of bribe payment also renders the respondents even more pessimistic about the future, be they located nearby an active or an inactive mine. Similar outcomes are observed when the quality of local governance is measured by the level of distrust in local government councillors (columns 4–6). The higher the local distrust in local community leaders, the more negative is the local effects of mining (both active and inactive) on individual assessment with government policies, and their optimism about their future living conditions.

[Table 6](#) reports the coefficient estimates using the average perception of corruption of local government officials as an indicator of the quality of local institutions. In line with [Table 5](#), it is suggested that a high level of perceived corruption of local officials has a negative role on the relationship between mining and assessment of government performance in improving living standards of the poor, improving essential health and education services, and handling public services. The corruption perception indicator also exacerbates the adverse effects of living near an inactive mine on all the outcome variables as suggested by the interaction terms.

To sum up, the findings of [Tables 5 and 6](#) suggest that when the incidence of bribe payment or the level of distrust or the perception of corruption of local officials is zero, mining has a positive effect on residents' satisfaction with poverty sensitive-related policies (how government improve living standards of the poor). These findings are particularly insightful in this (African) context where poverty reduction policies are crucial to the households and local communities, especially in resource-rich areas. They indicate that there might be some local benefits to living nearby an active mine, but that those benefits are carried away by poor governance and high-level of corruption, which corroborates the above hypothesis that the quality of local governance matters in how mining impact on socio-economic outcomes.

5.3. The moderating role of decentralization

In [Table 7](#), we investigate whether and how decentralization – measured by the subnational discretionary power over tax and rev-

Table 5

Mining and Assessment of Public Services: the role of corruption (bribe payment) and trust in local governments.

Dependent Variables	(1-LPM) Living standards	(2-LPM) Living standards	(3-LPM) Public Services	(4-LPM) Optimism	(5-LPM) Living standards	(6-LPM) Public Services	(7-LPM) Optimism
Active 50 km	0.021*** (0.009)	0.024** (0.010)	0.028*** (0.009)	-0.022* (0.012)	0.054** (0.023)	0.024 (0.020)	0.035* (0.018)
Inactive 50 km	0.007 (0.006)	0.004 (0.006)	-0.003 (0.005)	0.015** (0.007)	0.048*** (0.010)	0.035*** (0.008)	0.042*** (0.010)
Bribe	-0.021 (0.015)	0.007 (0.015)	-0.003 (0.013)	-0.085*** (0.016)			
Active 50 km * Bribe	-0.229*** (0.039)	-0.246*** (0.039)	-0.265*** (0.034)	-0.090* (0.049)			
Inactive 50 km * Bribe	-0.002 (0.022)	-0.006 (0.023)	0.012 (0.019)	-0.180*** (0.026)			
Local Government Distrust					-0.392*** (0.012)	-0.415*** (0.010)	-0.177*** (0.013)
Active 50 km * Local Government Distrust					-0.122*** (0.039)	-0.065* (0.035)	-0.162*** (0.037)
Inactive 50 km * Local Government Distrust					-0.089*** (0.020)	-0.071*** (0.017)	-0.144*** (0.020)
Natural Resources Rents (ln)	-0.039*** (0.007)	-0.033*** (0.007)	-0.121*** (0.006)	-0.022*** (0.007)	-0.013* (0.007)	-0.100*** (0.006)	-0.011* (0.007)
Control of Corruption	0.169*** (0.014)	0.156*** (0.014)	0.203*** (0.012)	0.292*** (0.012)	0.080*** (0.014)	0.124*** (0.012)	0.012 (0.012)
Constant	0.532*** (0.023)	1.455*** (0.119)	2.061*** (0.102)	1.836*** (0.119)	1.599*** (0.119)	2.209*** (0.101)	1.885*** (0.120)
R-squared	0.055	0.07	0.11	0.12	0.08	0.13	0.12
Observations	112,825	109,282	105,199	80,553	109,282	105,199	80,553
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Round FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional individual controls	No	Yes	Yes	Yes	Yes	Yes	Yes

Notes

1: Significance level: * p < 0.10, ** p < 0.05, ***p < 0.01. Robust standard errors are in parenthesis.

2: Specifications (1) and (4) refers to the respondents' view of how the government is improving the living conditions of the poor. The dependent variable in specification (2) and (5) is a composite indicator constructed through polychoric correlation and which combines all the respondents' views on various types of public services and policies. The dependent variable in specification (3) and (6) refers to the expected living standards of the respondent in 12 months after the survey collection. The additional individual-level control variables are: age (ln), the square of the logarithm of age (ln), gender, education, residential area (urban), employment status, interest in public affairs and deprivation (poverty level).

Table 6

Mining and Assessment of Public Services: the role of local corruption.

Dependent Variables:	(1-LPM) Living standards	(2-LPM) Water & Sanitation	(3-LPM) Jobs	(4-LPM) Health	(5-LPM) Education	(6-OLS) Public Services	(7-LPM) Optimism
Active 50 km	0.106* (0.055)	0.011 (0.034)	-0.068** (0.029)	0.074** (0.033)	0.046 (0.030)	0.130 (0.095)	-0.075** (0.038)
Inactive 50 km	0.127*** (0.026)	0.033 (0.022)	0.066*** (0.021)	0.064*** (0.021)	0.080*** (0.020)	0.186*** (0.040)	0.010 (0.021)
Local Corruption	-0.317*** (0.017)	-0.109*** (0.017)	-0.216*** (0.015)	-0.200*** (0.017)	-0.227*** (0.017)	-0.389*** (0.028)	-0.119*** (0.016)
Active 50 km * Local Corruption	-0.141** (0.061)	-0.039 (0.039)	0.046 (0.034)	-0.109*** (0.038)	-0.066* (0.036)	-0.174* (0.106)	0.039 (0.046)
Inactive 50 km * Local Corruption	-0.144*** (0.029)	-0.052** (0.026)	-0.081*** (0.024)	-0.081*** (0.025)	-0.093*** (0.024)	-0.219*** (0.046)	-0.043* (0.025)
Natural Resources Rents (ln)	-0.033*** (0.007)	-0.112*** (0.006)	-0.056*** (0.005)	-0.160*** (0.006)	-0.165*** (0.006)	-0.281*** (0.011)	-0.024*** (0.007)
Control of Corruption	0.136*** (0.014)	0.153*** (0.011)	0.208*** (0.010)	0.242*** (0.011)	0.258*** (0.011)	0.336*** (0.024)	0.306*** (0.012)
Constant	1.675*** (0.121)	1.921*** (0.116)	1.860*** (0.108)	2.097*** (0.115)	1.895*** (0.114)	2.700*** (0.197)	1.935*** (0.120)
R-squared	0.08	0.09	0.05	0.09	0.10	0.12	0.12
Observations	106,968	129,349	128,481	130,201	129,706	102,970	80,553
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Round FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes

1: Significance level: * p < 0.10, ** p < 0.05, ***p < 0.01. Robust standard errors are in parenthesis.

2: Specifications (1-5) refer to the respondents' view on how the government is handling the improvement of living standards of the poor, water and sanitation services, job creation, health, and education. The dependent variables in specification (6) is a composite indicator constructed through polychoric correlation and which combines all the respondents' view on various types of public services and policies, including those in specifications (1-5). The dependent variable in specification (7) refers to the expected living standards of the respondent in the near future (12 months after the survey collection). Individual-level control variables are added in all specifications: age (ln), the square of the logarithm of age (ln), gender, education, residential area (urban), employment status, interest in public affairs and poverty.

Table 7
Mining and Assessment of Public Services: the role of decentralization.

Dependent Variables:	(1-LPM) Living standards	(2-LPM) Living standards	(3-LPM) Water & Sanitation	(4-LPM) Jobs	(5-LPM) Health	(6-LPM) Education	(7-OLS) Public Services	(8-LPM) Optimism
Active 50 km	-0.043*** (0.009)	-0.038*** (0.009)	-0.038*** (0.009)	-0.047*** (0.008)	0.001 (0.010)	0.005 (0.010)	-0.036*** (0.009)	-0.064*** (0.011)
Inactive 50 km	-0.014** (0.005)	-0.013** (0.005)	-0.043*** (0.005)	-0.011** (0.005)	-0.023*** (0.005)	-0.028*** (0.005)	-0.037*** (0.005)	-0.032*** (0.006)
Decentralization	-0.024 (0.015)	-0.057*** (0.016)	-0.056*** (0.017)	-0.230*** (0.015)	-0.267*** (0.018)	-0.297*** (0.017)	-0.223*** (0.015)	-0.019 (0.018)
Active 50 km * Decentralization	0.275*** (0.067)	0.267*** (0.069)	0.205*** (0.064)	0.205*** (0.056)	0.081 (0.067)	0.192*** (0.068)	0.306*** (0.066)	0.082 (0.069)
Inactive 50 km * Decentralization	0.305*** (0.036)	0.298*** (0.037)	0.366*** (0.036)	0.073** (0.032)	0.382*** (0.036)	0.516*** (0.036)	0.492*** (0.032)	-0.033 (0.037)
Natural Resources Rents (ln)	-0.006*** (0.002)	-0.005** (0.002)	-0.030*** (0.002)	0.008*** (0.002)	-0.036*** (0.002)	-0.053*** (0.002)	-0.026*** (0.002)	0.068*** (0.002)
Control of Corruption	0.089*** (0.003)	0.078*** (0.003)	0.067*** (0.003)	0.039*** (0.003)	0.024*** (0.003)	0.015*** (0.003)	0.035*** (0.003)	0.092*** (0.003)
Constant	0.439*** (0.007)	1.479*** (0.124)	1.354*** (0.120)	1.402*** (0.112)	1.497*** (0.121)	1.280*** (0.120)	1.710*** (0.107)	1.540*** (0.131)
R-squared	0.021	0.035	0.064	0.022	0.038	0.042	0.057	0.057
Observations	104,646	101,349	118,081	117,455	118,786	118,392	97,765	68,527
Round FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional individual controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes

1: Significance level: * p < 0.10, ** p < 0.05, ***p < 0.01. Robust standard errors are in parenthesis.
 2: Specifications (1–5) refer to the respondents' view on how the government is handling the improvement of living standards of the poor, water and sanitation services, job creation, health, and education. The dependent variables in specification (6) is a composite indicator constructed through polychoric correlation and which combines all the respondents' view on various types of public services and policies, including those in specifications (1–5). The dependent variable in specification (7) refers to the expected living standards of the respondent in the near future (12 months after the survey collection). Decentralization is measured by the discretionary power of sub-central governments to decide over the fiscal space. The additional individual-level control variables are: age (ln), the square of the logarithm of age (ln), gender, education, residential area (urban), employment status, interest in public affairs and poverty.

Table 8
Mining and assessment of public services: the interplay of decentralization and corruption.

Dependent Variables ¹ :	(1-LPM) Living standards	(2-LPM) Living standards	(3-LPM) Water & Sanitation	(4-LPM) Jobs	(5-LPM) Health	(6-LPM) Education	(7-OLS) Public Services	(8-LPM) Optimism
Active 50 km	-0.037*** (0.009)	-0.033*** (0.009)	-0.039*** (0.009)	-0.047*** (0.008)	0.000 (0.009)	0.003 (0.009)	-0.032*** (0.008)	-0.064*** (0.011)
Inactive 50 km	-0.017*** (0.005)	-0.016*** (0.005)	-0.043*** (0.005)	-0.012** (0.005)	-0.023*** (0.005)	-0.028*** (0.005)	-0.036*** (0.005)	-0.032*** (0.006)
Bribe	-0.109*** (0.011)	-0.089*** (0.012)	-0.014 (0.012)	-0.027** (0.011)	-0.001 (0.012)	-0.040*** (0.012)	-0.051*** (0.010)	0.003 (0.014)
Decentralization ⁴	-0.032*** (0.016)	-0.065*** (0.016)	-0.068*** (0.017)	-0.232*** (0.016)	-0.279*** (0.018)	-0.317*** (0.018)	-0.234*** (0.015)	-0.024 (0.018)
Active 50 km * Decentralization	0.581*** (0.089)	0.600*** (0.090)	0.384*** (0.081)	0.298*** (0.073)	0.466*** (0.082)	0.646*** (0.081)	0.717*** (0.075)	0.180* (0.093)
Inactive 50 km * Decentralization	0.151*** (0.043)	0.168*** (0.044)	0.525*** (0.044)	0.053 (0.040)	0.511*** (0.045)	0.751*** (0.044)	0.503*** (0.038)	0.050 (0.050)
Active 50 km * Decentralization * Bribe	-2.556*** (0.356)	-2.817*** (0.364)	-1.130*** (0.331)	-0.678** (0.294)	-2.553*** (0.333)	-2.972*** (0.331)	-3.244*** (0.324)	-0.487 (0.373)
Inactive 50 km * Decentralization * Bribe	1.017*** (0.170)	0.870*** (0.172)	-0.895*** (0.150)	0.123 (0.128)	-0.702*** (0.151)	-1.298*** (0.148)	-0.087 (0.139)	-0.362** (0.161)
Natural Resources Rents (ln)	-0.007*** (0.002)	-0.006** (0.002)	-0.030*** (0.002)	0.008*** (0.002)	-0.036*** (0.002)	-0.052*** (0.002)	-0.027*** (0.002)	0.068*** (0.002)
Control of Corruption	0.075*** (0.004)	0.066*** (0.004)	0.059*** (0.003)	0.036*** (0.003)	0.017*** (0.003)	-0.000 (0.003)	0.024*** (0.003)	0.089*** (0.004)
Constant	0.464*** (0.007)	1.482*** (0.124)	1.361*** (0.120)	1.402*** (0.112)	1.504*** (0.121)	1.294*** (0.120)	1.711*** (0.107)	1.542*** (0.131)
R-squared	0.023	0.04	0.06	0.02	0.04	0.04	0.06	0.06
Observations	104,646	101,349	118,081	117,455	118,786	118,392	97,765	68,527
Round FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes:

1: Significance level: * p < 0.10, ** p < 0.05, ***p < 0.01. Robust standard errors are in parenthesis.
 2: Specifications (1) to (5) refer to the respondents' view on how the government is handling the improvement of living standards of the poor and other public services such as in health, water and sanitation. The dependent variable in specification (6) is a composite indicator constructed through polychoric correlation and which combines all the respondents' views on various types of public services and policies. The sample size is reduced due to inconsistent missing patterns across the different assessment variables. The outcome variable in specification (7) refers to the expected living standards of the respondent in the near future (12 months after the survey collection). Decentralization is measured by the discretionary power of sub-central governments to decide over the fiscal space. The additional individual-level control variables are: age (ln), the square of the logarithm of age, gender, education, residential area (urban), employment status, interest in public affairs and deprivation (poverty level).

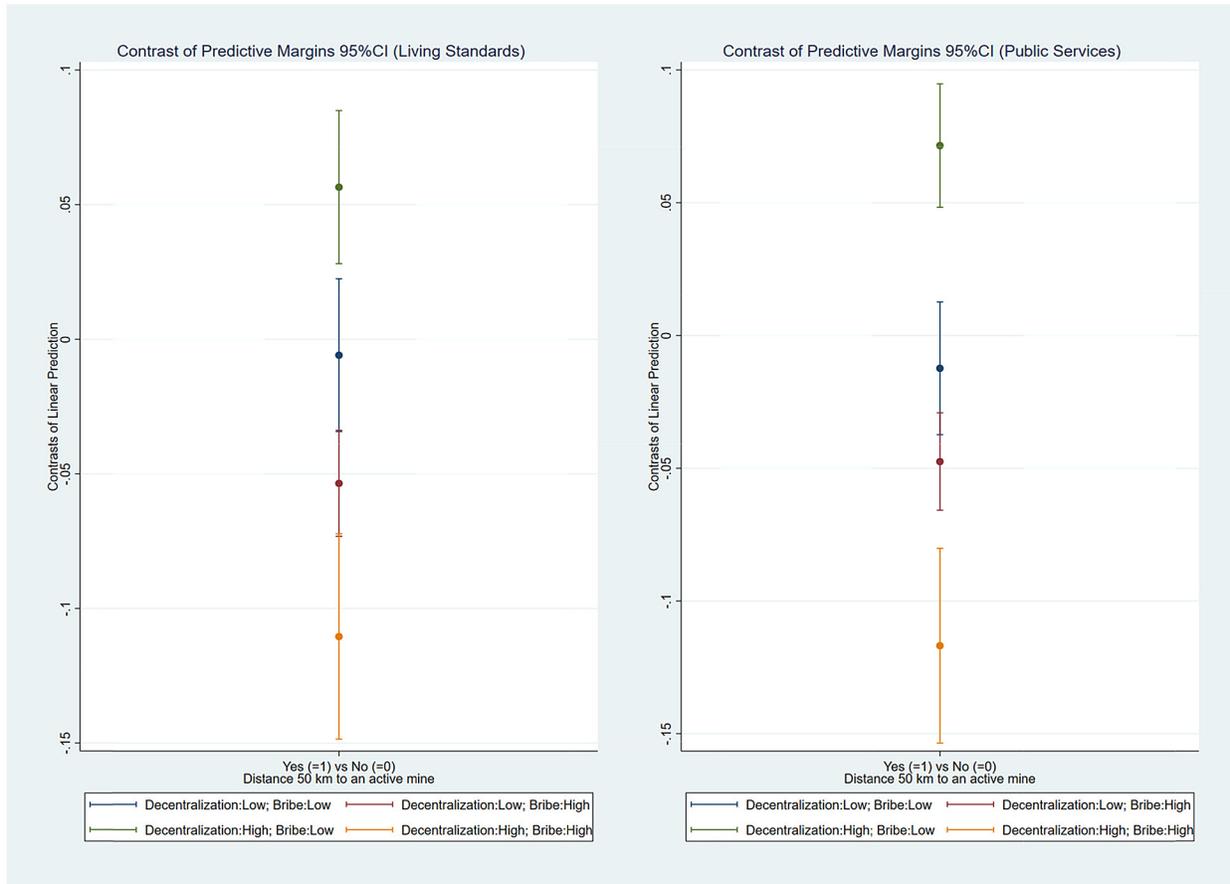


Fig. 3. Government improving living standards and public services: the interplay of decentralization and effective corruption.

Table 9

Government improving living standards: the interplay of decentralization and effective corruption airwise comparison of average marginal effects (with Bonferroni correction).

	Decentralization	Bribe				
Case 1	High	High				
Case 2	High	Low				
Case 3	Low	High				
Case 4	Low	Low				
At	Contrast dy/dx	Std. Error	t	P> t	95% Conf Interval	
Case 2 vs 1	0.057	0.023	2.510	0.072	-0.003	0.117
Case 3 vs 1	0.167	0.026	6.380	0.000	0.098	0.236
Case 4 vs 1	0.104	0.022	4.710	0.000	0.046	0.163
Case 3 vs 2	0.110	0.017	6.400	0.000	0.065	0.155
Case 4 vs 2	0.048	0.017	2.830	0.028	0.003	0.092
Case 4 vs 3	-0.062	0.023	-2.670	0.045	-0.124	-0.001

Notes: dy/dx for factor levels is the discrete change from the base level. We control for individual- and country-level covariates, as well as time and country fixed-effects. Estimations are performed with robust standards errors.

enue instruments – shapes the relationship between natural resources endowments and socio-economic outcomes. More precisely, we test whether the variation in individual assessments of government performance in delivering all the ranges of public services depends on the level of decentralization.

The results indicate that the level of taxing rights of sub-national governments have a positive impact on how residents in both active and inactive mining area assess the delivery of public services by the state, be it in the areas of improving living standards, job creation, health and education services and the combination of all these public services. Decentralization does however

not seem to impact on pessimism, as the distance to the mines appears to predominantly be a driver of a negative outlook on life.

The coefficient estimates on the distance and decentralization variables clearly point to the fact that a higher level of decentralization could, to some extent, alleviate the negative local effects of natural resources on socio-economic outcomes. However, as suggested in the literature (Enikolopov & Zhuravskaya, 2007; Lawer et al., 2017), there is also an inherent link between decentralization and the quality of local governance. Hence, in the following sub-section, we explore, empirically, whether the level of local governance has an adverse effect on the potential benefits

Table 10
Government delivering public services: the interplay of decentralization and effective corruption Pairwise comparison of average marginal effects (with Bonferroni correction).

	Decentralization	Bribe				
Case 1	High	High				
Case 2	High	Low				
Case 3	Low	High				
Case 4	Low	Low				
At	Contrast dy/dx	Std. Error	t	P > t	95% Conf Interval	
Case 2 vs 1	0.188	0.023	8.060	0.000	0.127	0.250
Case 3 vs 1	0.069	0.022	3.140	0.010	0.011	0.128
Case 4 vs 1	0.104	0.021	4.990	0.000	0.049	0.160
Case 3 vs 2	-0.119	0.015	-8.070	0.000	-0.158	-0.080
Case 4 vs 2	-0.084	0.020	-4.250	0.000	-0.136	-0.032
Case 4 vs 3	0.035	0.015	2.370	0.108	-0.004	0.074

Notes: dy/dx for factor levels is the discrete change from the base level. We control for individual- and country-level covariates, as well as time and country fixed-effects. Estimations are performed with robust standards errors.

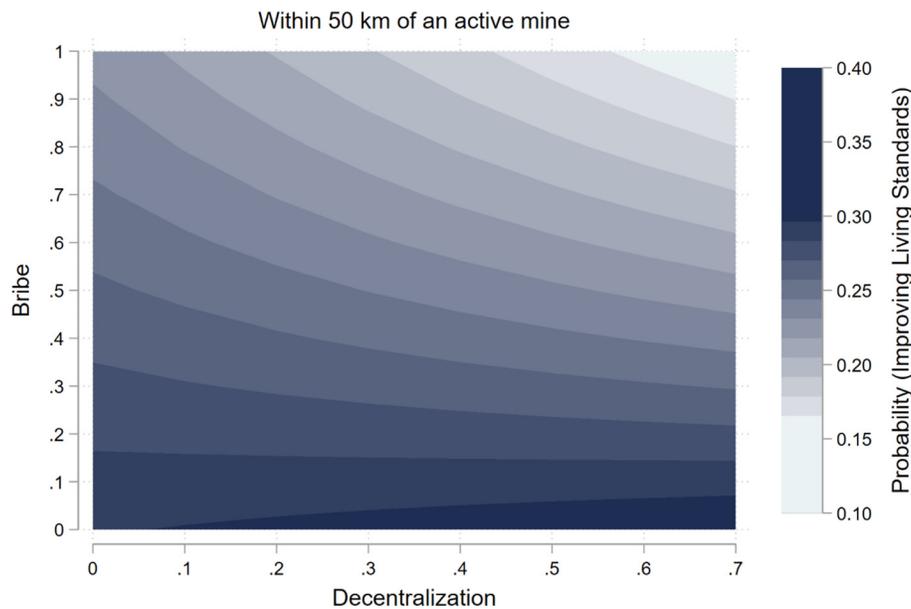


Fig. 4. Interplay of Decentralization and Effective Corruption in Resource-Rich Communities.

that decentralization entails for residents in resource-rich communities.

5.4. The interplay of decentralization and local governance

In Table 8, we report the coefficient estimates on the interplay between decentralization and corruption, and their confoundedness in explaining how natural resources endowment affects citizens' perception of the state's delivery of public goods and services. More precisely, we analyze how the negative role of the incidence of bribe payment

Table 6) and the positive role of Decentralization (Table 7) comes into play in the relationship between natural resources endowment and citizens' perception of government performance as well as their outlook on the future.

For residents living near active mines, the results indicate that the positive impact of decentralization is reduced by the incidence of corruption on the perception of government performance on improving living standards, improving water & sanitation, job creation, health and education, and public services as a whole. The incidence of bribe payment statistically and significantly reduces the positive impact of decentralization.

Figure 3 illustrates the local effects of active mining and the interplay of decentralization and the incidence of bribe payment.

We illustrate these effects and the interplay for the individual assessment of government performance in improving living standards and public services delivery. We do so by following the methods prone by Dawson & Richter (2006). We first compute the slope of the dependent variable (improving living standards or public services delivery) on the independent variable (active 50 km) when the moderators (decentralization and bribe) are held constant at different combinations of high and low values. In addition, we test the differences among all pairs of slopes by using the 'pwcompare(effects)' option of the 'margins' command in Stata 16 (StataCorp., 2019).

The results of the pairwise comparisons are reported in Tables 9 and 10. For both outcome variables, we found that, regardless of the level of decentralization (high or low), a high incidence of bribe payment leads to the worse impact of natural resources on individual perception of government performance. On the other hand, when corruption is low, a higher level of decentralization is preferable. By extension, when decentralization is low, a lower incidence of bribe payment is preferable. The pairwise comparison of these slopes is confirmed by the graphical analyses.

Poverty alleviation is the prime focus of the policy agenda in most African countries. Natural resources and the extractive industries have the potential of providing significant revenues for the government to implement pro-welfare policies, especially within resource-

rich communities. Fig. 4 further illustrates the interplay of local institutions and local taxing rights for both active and inactive mining areas. The probability of a positive appraisal of government performance in resource-rich communities more generally is the highest when the level of local taxing rights is high, and the incidence of bribe payment low. Like in Tables 9 and 10 the worst scenario is the case where both the incidence of corruption and the ability of sub-national governments to decide over the tax system are high. The interplay between the incidence of bribe payments and the legal attribution of taxing powers to sub-national authorities contributes to empirically sustain the hypothesis that the quality of local institutions and the inter-governmental fiscal arrangements regarding taxes and revenue collection matter for how mining activities translate into welfare improvement for the nearby local communities.

It is worth noting that the status of mines may change over time and that these dynamics are important to be tested. However, because the Afrobarometer data are cross-sectional at the individual level, we cannot observe the outcomes of the respondents when the status of their closest mines changes. We propose to re-run our estimations, restricting our sample to active mines. We then compare the outcome of the people residing within 50 km from active mine with the outcome of the people residing more than 50 km away from an active mine. The results are reported in Table A5 in Appendices A. The results are consistent with our main findings, but we should highlight that the number of observations decreases significantly.

6. Concluding remarks

In this paper, we investigated the effects of mining on the quality of local public services as reported by citizens, and on people's expectations of their future living conditions in more than 30 countries in Africa. The contributions of the paper were twofold. First, we contributed to the growing literature on the micro-impact of natural resources endowment and exploitation on local communities and local socio-economic outcomes. Second, we provided empirical evidence of the confoundedness of local quality of institutions and decentralization, which, to be best of our knowledge, has been so far missing in the literature.

Our empirical analysis relied on a rich combination of datasets. Owing to the geospatial information in the Afrobarometer surveys, we were able to match individuals in small communities in many African countries to their nearest mine with information on mining industries provided by the SNL Metals and Mining Dataset by the S&P. To this, we added a new measure of decentralization issued from a dataset on tax and revenue assignment, which covers developing and emerging economies. The measure of decentralization captures the legal assignment of decision-making power to sub-national governments and their legal ability to raise revenues from different instruments in a country (Vincent, 2020).

With these combined datasets, we estimated how individuals living within a 50 km radius from an active or an inactive mine assess government performance in several public policy areas, including improving living standards, job creation, health and education services, as well as a composite indicator of public services as a whole. We also investigated how the geographical closeness to a mine affects the individual expectation of their living standards in the future (referred to as optimism).

The results from the baseline suggested that residents living within a 50 km radius to an active mine are less likely to approve government performance in improving living standards, jobs cre-

ation, health services, and public services delivery. In addition, they are also less likely to be optimistic about their future living standards. While the results are more mitigated for the distance to an inactive mine, they point to the dissatisfaction of nearby with the government handling water and sanitation and a decrease in optimism about the future. In comparison to non-active mine, active mining statistically reduces the probability of approving government performance in the afore-mentioned policy areas and public services as a whole. In addition, the 'active' status of a nearby mine also decreases the optimism of the respondents in the Afrobarometer surveys.

We then moved onto exploring the role of local governance. The results confirm our hypothesis on the confoundedness of the quality of local institutions. We found that effective corruption, measured by the incidence of bribe payment at the local level and the sentiment of distrust in local government councillors, amplifies the negative effects of the geographical closeness to an active mine. The higher the incidence of bribe payment or level of distrust in local governments in a community located within a 50 km radius from an active mine, the higher the likelihood of citizens being dissatisfied with government performance. Both variables also render the respondents even more pessimistic about the future.

Finally, we examined the interplay between decentralization and effective corruption in how they jointly influence the local effects of mining. The results indicate that a higher level of decentralization could, to some extent, alleviate the adverse local effects of natural resources on socio-economic outcomes. However, this positive moderating role of decentralization considerably diminishes in the presence of corruption. Exploring the interplay of Decentralization and local government, we found that, regardless of the level of decentralization (high or low), a high incidence of bribe payment leads to the worse impact of natural resources on individual perception of government performance. On the other hand, when corruption is low, a higher level of decentralization is preferable.

As governments everywhere in Africa are delved into natural resources extraction, our paper contributes to the growing evidence that the quality of local institutions matters for how mining activities could translate into local welfare for nearby communities. In addition, we demonstrate that inter-governmental fiscal arrangements regarding taxes and revenues are of utmost importance in the way that natural resources may affect local socio-economic outcomes. More specifically, for communities within 50-km to an active mine, the results indicate that a high level of corruption alongside a high level of decentralization constitutes the worst-case scenario. On the other hand, when the incidence of bribe payment is very low, the higher level of decentralization translates into the more positive appraisal of welfare policies.

Declaration of Competing Interest

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Appendix A

Tables A1–A5.

Table A1
Summary statistics and description.

Variables	Definition	N	Mean	SD	Min	Max	Primary Data Source
Living Standards	Government Handling of: Improving living standards of the poor	109,019	0.30	0.46	0	1	Afrobarometer - Round 4, 5, 6
Water & Sanitation	Government Handling of: Water and sanitation to households	131,280	0.44	0.50	0	1	Afrobarometer - Round 3, 4, 5, 6
Jobs	Government Handling of: Job creation	130,277	0.27	0.44	0	1	Afrobarometer - Round 3, 4, 5, 6
Health	Government Handling of: Improving educational needs	132,161	0.58	0.49	0	1	Afrobarometer - Round 3, 4, 5, 6
Education	Government Handling of: Basic health services	131,661	0.60	0.49	0	1	Afrobarometer - Round 3, 4, 5, 6
Public Services	Composite measure of how government is handling public services listed	104,699	0.50	0.39	0	1.14	Afrobarometer - Round 3, 4, 5, 6
Optimism	Expected living standards in 12-month time	79,300	0.79	0.41	0	1	Afrobarometer - Round 3, 4, 5, 6
Active 50 km	Distance 50 km or less to an active mine	136,727	0.07	0.25	0	1	SNL Metal & Mining by S&P
Inactive 50 km	Distance 50 km or less to an inactive mine	136,727	0.22	0.42	0	1	SNL Metal & Mining by S&P
Local corruption	Average perception of corruption at the local level	134,327	0.85	0.13	0.12	1	Afrobarometer - Round 3, 4, 5, 6
Bribe	Incidence of bribe payment - averaged at the local level	136,727	0.21	0.15	0	0.94	Afrobarometer - Round 3, 4, 5, 6
Distrust in local governments	Average distrust level in local government councilors	136,727	0.48	0.19	0	1	Afrobarometer - Round 3, 4, 5, 6
Decentralization	Measure of the discretionary power of subnational governments over tax and revenue instruments	123,539	0.13	0.11	0	0.61	Vincent (2020)
Age (ln)	Age (natural logarithm)	135,473	3.53	0.38	2.89	4.87	Afrobarometer - Round 3, 4, 5, 6
Age ²	Age squared	135,473	12.63	2.70	8.35	23.69	Afrobarometer - Round 3, 4, 5, 6
Gender	Gender of the respondent	136,727	1.50	0.50	1	2	Afrobarometer - Round 3, 4, 5, 6
Education	Education (primary and above)	136,350	0.80	0.40	0	1	Afrobarometer - Round 3, 4, 5, 6
Urban	Urban area	136,727	0.39	0.49	0	1	Afrobarometer - Round 3, 4, 5, 6
Employed	Employed at the time of the survey	136,161	0.36	0.48	0	1	Afrobarometer - Round 3, 4, 5, 6
Interest in Public Affairs	Interest in public affairs	135,361	0.61	0.49	0	1	Afrobarometer - Round 3, 4, 5, 7
Deprived	Respondents lack basic necessities - higher/worse	134,991	1.45	1.09	0	4.59	Afrobarometer - Round 3, 4, 5, 8
Natural Resources Rents (ln)	Natural resources rents (%GDP) (natural logarithm)	136,727	2.21	0.71	0.89	3.92	World Development Indicators
Natural Resources Rents	Natural resources rents (%GDP)	136,727	11.62	8.81	2.43	50.25	World Development Indicators
Control of Corruption	World Governance Indicator - Control of Corruption Estimate	136,727	-0.55	0.56	-1.49	1.16	World Governance Indicators
Number of countries		34					
Number of survey rounds		4					
Observations		136,727					

Table A2
Mines status.

Mine status	# Observations	Percent
Active	357	25.89
Inactive	967	70.12
Care and Maintenance	14	1.02
On hold awaiting financing	3	0.22
On hold awaiting higher Prices	5	0.36
Rehabilitation	7	0.51
Temporarily on Hold	19	1.38
Under litigation	7	0.51
Total	1,379	100

Table A3
Afrobarometer country sample.

Survey Rounds Countries	Round3 2005–2006	Round4 2008–2009	Round5 2001–2013	Round6 2014–2015
Algeria	No	No	Yes	Yes
Benin	Yes	Yes	Yes	Yes
Botswana	Yes	Yes	Yes	Yes
Burkina Faso	No	Yes	Yes	Yes
Burundi	No	No	Yes	Yes
Cameroon	No	No	Yes	Yes
Cape Verde	Yes	Yes	Yes	No
Egypt	No	No	Yes	No
Gabon	No	No	No	Yes
Ghana	Yes	Yes	Yes	Yes
Guinea	No	No	Yes	Yes
Kenya	Yes	Yes	Yes	Yes
Lesotho	Yes	Yes	Yes	Yes
Liberia	No	Yes	Yes	Yes
Madagascar	Yes	Yes	Yes	Yes
Malawi	Yes	Yes	Yes	Yes
Mali	Yes	Yes	Yes	Yes
Mauritius	No	No	Yes	No
Morocco	No	No	Yes	Yes
Mozambique	Yes	Yes	Yes	Yes
Namibia	Yes	Yes	Yes	Yes
Niger	No	No	Yes	Yes
Nigeria	Yes	Yes	Yes	Yes
Senegal	Yes	Yes	Yes	Yes
Sierra Leone	No	No	Yes	Yes
South Africa	Yes	Yes	Yes	Yes
Sudan	No	No	Yes	Yes
Swaziland	No	No	Yes	No
Tanzania	Yes	Yes	Yes	Yes
Togo	No	No	Yes	Yes
Tunisia	No	No	Yes	Yes
Uganda	Yes	Yes	Yes	Yes
Zambia	Yes	Yes	Yes	Yes
Zimbabwe	Yes	Yes	Yes	Yes

Table A4
The impact of proximity to mines on local corruption and distrust.

	Bribe payments				Distrust	
	(1) Police	(2) School services	(3) medical services	(4) Official documents	(5) Police	(6) Local councilors
Active 50 km	0.00792** (0.00344)	0.00585* (0.00305)	0.00842** (0.00364)	0.00287 (0.00361)	0.0166*** (0.00486)	0.0205*** (0.00501)
Inactive 50 km	0.00416* (0.00214)	−0.000399 (0.00212)	0.00261 (0.00250)	0.00402* (0.00226)	−0.000318 (0.00286)	0.0170*** (0.00288)
Constant	0.0896*** (0.00542)	0.0299*** (0.00361)	0.0944*** (0.00541)	0.0898*** (0.00586)	0.0504*** (0.00661)	0.252*** (0.00974)
Difference in Differences	0.004	0.006	0.006	−0.001	0.017	0.003
F-test: active-inactive = 0	1.06	3.66	2.24	0.09	11.01	0.44
P-value of F-test	0.3029	0.0556	0.1347	0.7633	0.0009	0.5061
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Round FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	140,634	116,563	116,516	140,531	138,358	131,712
R-squared	0.065	0.049	0.082	0.056	0.069	0.044

Notes: Significance level: * p < 0.10, ** p < 0.05, ***p < 0.01. Robust standard errors in parenthesis.

Table A5
Estimations for active mines sample.

Dependent variable	(1) Living standards	(2) Public Services	(3) Living standards	(4) Public Services	(5) Water & Sanitation	(6) Jobs	(7) Health	(8) Education	(9) Optimism
Active 50 km (base: greater than 50 km from active mine)	0.0351*** (0.0118)	0.0445*** (0.0101)	-0.0288*** (0.0101)	-0.0668*** (0.00946)	-0.107*** (0.0107)	-0.0400*** (0.00929)	-0.0548*** (0.0109)	-0.0620*** (0.0107)	-0.0940*** (0.0135)
Active 50 km * Bribe	-0.250*** (0.0482)	-0.346*** (0.0420)							
Active 50 km * Decentralization			0.784*** (0.0999)	1.068*** (0.0843)	1.243*** (0.0919)	0.392*** (0.0810)	0.937*** (0.0918)	0.989*** (0.0902)	0.193* (0.114)
Active 50 km * Decentralization * Bribe			-2.988*** (0.390)	-3.808*** (0.346)	-3.322*** (0.362)	-1.182*** (0.314)	-3.748*** (0.355)	-3.868*** (0.350)	0.517 (0.435)
Bribe	-0.0608 (0.0397)	0.00588 (0.0347)	-0.235*** (0.0237)	-0.109*** (0.0204)	-0.145*** (0.0255)	-0.0874*** (0.0224)	-0.0144 (0.0254)	-0.0663*** (0.0254)	-0.458*** (0.0407)
Decentralization			-0.0766** (0.0319)	-0.241*** (0.0320)	-0.243*** (0.0377)	-0.192*** (0.0322)	-0.317*** (0.0390)	-0.300*** (0.0392)	-0.181*** (0.0423)
Constant	0.271*** (0.0365)	0.591*** (0.0304)	0.347*** (0.0339)	0.545*** (0.0272)	0.603*** (0.0113)	0.304*** (0.00989)	0.705*** (0.0110)	0.770*** (0.0106)	0.876*** (0.0124)
Country FE	Yes	Yes	No	No	No	No	No	No	No
Round FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	20,951	20,107	20,482	19,728	24,741	24,723	24,951	24,888	10,402
R-squared	0.069	0.089	0.016	0.015	0.021	0.005	0.017	0.025	0.035

Notes: Significance level: * p < 0.10, ** p < 0.05, ***p < 0.01. Robust standard errors are in parenthesis. The estimations reported in this table are obtained with the sample of active mines.

Appendix B

Decentralization indicator

Table B1.

Table B1
Sources of information – A summary.

Types	Sources
Legal Provision	Tax Codes, Local Government Acts, Laws and Decrees on Local Public Finance and Taxation, Constitutions Tax Codes, Local Government Acts, Laws and Decrees on Local Public Finance and Taxation, Constitutions
Archives and Policy Documents	Archives from the International Bureau of Fiscal Documentation (IBRD, Access: 2015–2017), Decentralisation Policy Document, Territorial and Public Administration Reforms documents, Development Strategies, Public Financial Reports, Regional and Local Council Reports
Scientific and Grey Literature	Peer-reviewed publications, edited volumes, working papers and multilateral organization reports (IMF, World Bank, UCLG, UN, ...)
Existing Databases	OECD Tax Autonomy, Regional Authority Index, Local Public Finance Datasets (when available); IMF Government Finance Statistics Manuals (Institutional Structure of Government)

The three most common layers of governments are identified as “C” for the central government, “I” for an intermediate level of authorities, and “L” for local government. A full discretion by one government layer is identified as such by a single letter referring to that layer, whereas a joint decision carried out by more than one layer is identified as such through a combination of letters.

Using the matrix in Table 2, the discretionary power of each layer of government is coded for each identified tax and revenue source, and across four types of decisions: instrument, base, rates and administration.

- Instrument* refers to the ability of each government tier to establish or alter an existing instrument.
- Base* refers to the discretionary power of each government tier over defining the taxable base.

c. *Rate* refers to the discretionary power over the setting of the rates. In cases where central authorities define an interval for the tax rates, and sub-central authorities set the appropriate rate for their respective jurisdictions, the coding reflects a joint decision.

d. *Administration* refers to the involvement of subnational authorities in tax and revenue administration.

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