At Africa's Expense?
Disaggregating the Employment Effects of Chinese Mining Operations in Sub-Saharan Africa

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Abstract

China's increasing investments in African countries have attracted considerable media attention and are the subject of scholarly controversies. However, the socio-economic impacts of China's presence in Africa remain poorly understood. While some case studies maintain that Chinese projects have an enclave character and have largely failed to promote economic spillovers and local employment, others claim that Chinese activities have in fact encouraged infrastructural development and local economic activity. Focusing on the labour market effects of foreign mining investments in Africa, this paper examines whether Chinese-controlled companies generate fewer local jobs compared to non-Chinese mining operations. Theoretically, we argue that – due to a competitive advantage in the employment of expatriate workers and a lower readiness to invest in local skill formation – Chinese firms are less likely to foster regional employment. Relying on novel data on the control-rights regimes of diamond, gold, and copper mines and geo-referenced information from Afrobarometer surveys, we test the effect of mining contractors' nationality on local employment rates. Our individual-level logistic models show that respondents living close to Chinese mining areas are more likely to report being unemployed compared to individuals living in the vicinity of non-Chinese mining operations. Times-series cross-sectional estimations employing district-level data from the Demographic Health Survey for 20 sub-Saharan countries over the period 1997-2014 corroborate these findings. Furthermore, we find evidence that negative perceptions of China among indigenous populations are largely driven by the belief that Chinese workers are crowding out local employment.

Keywords: Natural Resources; Sub-Saharan Africa; China; Mining; Unemployment

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1. Introduction

Over the past decade, Chinese companies have invested heavily in the resource sectors of many developing nations. According to recent estimates, around half of China's total outbound investments in the years from 2005 to 2016 went into the energy and mining sectors of foreign countries. Of these investments in the resource sector, sub-Saharan countries attracted approximately one-third of the funds (Scissors, 2017). Mining in metals and energy resources attracted the largest share of these outbound investments followed by the construction sector (e.g. Tang 2016, 111; Sow, 2018). Driven by its hunger for resources and new markets, China now operates mining facilities in several sub-Saharan countries including the Democratic Republic of the Congo, Namibia, South Africa, and Zambia. Some authors note that China even exclusively targets African economies with abundant natural resources when making investment decisions (Kolstad & Wiig, 2011).

While bringing much-needed capital and technology for the development of mining operations, Chinese activities often also cause discontent among local communities in host countries. African miners have protested against insufficient payment and poor working conditions at Chinese-operated mines in Chad, Namibia, Niger and Zambia (Ghosh, 2013; Jamasmie, 2013; Kabemba, 2012; Reuters, 2014; Shinn, 2016; D. Smith, 2011), contributing to a widespread bad reputation of Chinese-owned mines in many host regions (e.g., Armony & Velásquez, 2015; Geerts, Xinwa, & Rossouw, 2014).

Particularly the alleged loss of jobs to Chinese employees, who are ferried in project by project, seems to be a key driver of protests around different mining regions in countries such as Nigeria, Namibia, and Zambia (Knaup, 2010; Larmer, 2017; Magistad, 2011). As a consequence of protests and riots among coal and copper miners in Zambia, former president Michael Sata, for example, asked the Chinese government to observe limits on how many expatriate workers Chinese companies bring into the country (Magistad, 2011). According to some authors, Sata was elected largely on the basis of his

attacks on the employment of Chinese expatriate workers (e.g. Wood, Mazouz, Yin, & Cheah, 2014, p. 185).

The seemingly high employment of expatriate workers has been largely criticized by various authors who claim that Chinese mining operation have an enclave character and do not contribute to local socio-economic development (Gadzala, 2010; Lee, 2009). Whether Chinese companies in fact rely on more expatriate workers and create fewer local jobs compared to other firms is disputed. Some qualitative, fieldwork-based studies suggest that Chinese companies prefer to bring in their own work force and local hiring is confined to low-skill workers (Cooke, 2014; Cooke, Wood, & Horwitz, 2015; Rui, Zhang & Shipman, 2017; Smith, 2013; Zhao 2014). Other scholars maintain that the rate of local employment by Chinese companies is largely contingent on local skill availability and is highly sector-specific (c.f. Tang 2010). According to Mohan (2013), more empirical evidence is needed to prove conventional wisdom surrounding Sino-African relations, especially concerning China's impact on local labour markets.

Contradictory findings on the employment effects of Chinese operations in Africa are not particularly surprising given that previous qualitative work has mostly focused on certain regions and failed to fully account for country-specific variations and differences between economic sectors. Systematic studies relying on quantitative and fine-grained data that enable broader comparisons beyond specific cases seem particularly warranted (c.f. Ado & Su, 2016). Employing a comparative quantitative design and focusing on mining as a key sector for Chinese foreign direct investment in Africa, this paper is the first attempt to compare local labour market effects of Chinese vs. non-Chinese companies for a large sample of Sub-Saharan African countries at the disaggregated level of analysis. By doing so, our analysis contributes to a growing number of studies investigating the local socio-economic effects of mining in developing countries (Aragón & Rud, 2013; Kotsadam & Tolonen, 2016; Loayza & Rigolini, 2016; Mamo, Bhattacharyya, Moradi, & Arezki, 2017; Von der Goltz & Barnwal, 2018). In line with recent

contributions highlighting the importance of institutional contexts, regulatory frameworks and governance structures (c.f. Chuhan-Pole, Dabalen, Land, Lewin, Sanoh, Smith, & Tolonen, 2017; Diaz-Rioseco, 2016; Libman 2013; Spiegel 2012a), we show that natural resource control rights should be accounted for when addressing the local resource curse.

Theoretically, we argued that while large-scale mining is commonly linked to poor labour market outcomes (c.f. Gamu, Le Billon, & Spiegel, 2015), Chinese-controlled mining operations have a particular detrimental effect on local employment for two main reasons. First, Chinese companies have a competitive advantage in the use of expatriate labour and therefore import more foreign labour than Western companies when facing shortage of indigenous skilled labour. This advantage mainly rests on lower Chinese labour costs and the availability of a centralised and collective expatriation management system that provides a pool of disciplined and hardship tolerant workers. Second, the greater reliance on foreign labour by Chinese firms and language barriers go hand in hand with a lower necessity and readiness in upskilling and training local labour, thereby potentially limiting the potential for economic spillovers. Taken together, these characteristics of Chinese-led mining operations may partly explain anti-Chinese resentment often reported in the media.

Combining novel data on the control rights of copper, diamond and gold mines in Sub-Saharan Africa with survey data from two Afrobarometer rounds, we test the effect of respondents' proximity to Chinese and non-Chinese controlled mines on local employment rates and anti-Chinese resentments for the period 1997-2015. Our logistic regressions employing country and deposit fixed effects show that Chinese majority ownership of mines can be associated with higher levels of local unemployment. In contrast, domestic or international non-Chinese mining operations have either no significant or a weak negative impact on unemployment. Furthermore, we find that the presence of Chinese mining firms may instigate anti-Chinese resentment particularly because of a perceived lack of job

opportunities for the local population. To check the robustness of these findings, we perform linear two-way fixed effects estimations using district-level data from the Demographic Health Survey (DHS).

This paper is organized as follows: The next section discusses why Chinese mining firms are expected to have negative effects on local employment. Thereby, we elaborate on our core claim that Chinese-controlled mining operations rely less on the employment and training of locals, thus possibly hindering potential linkages with the local economy. This discussion is followed by the description of our research design and the presentation of the empirical findings. The conclusion points to further areas of research.

2. Chinese Mining Operations and the Limits of Local Employment: The Arguments

Existing studies discuss manifold reasons why internationally-controlled mining projects may lead to conflict within local communities (e.g., Calvano, 2008; Wegenast & Schneider, 2017). In addition to the negative impacts on the natural environment, extractive industries often have a detrimental effect on the social and economic order of local communities and destroy traditional ways of living (c.f. Brain 2017). Yet, mining operations may also promote local development through various channels, including fiscal transfers, employment effects, the development of economic activities outside the mining sector, and extractive industries' investments in public goods, either as a side effect of mining operations or out of social-responsibility-related considerations (Gamu, Le Billon, & Spiegel, 2015, pp. 167–170).

Review articles provide mixed support for the existence of a local resource curse (c.f. Badeeb, Lean, & Clark, 2017; Cust & Poelhekke, 2015; Gamu, Le Billon, & Spiegel, 2015; Marchand & Weber, 2018; Ploeg & Poelhekke, 2017). Research on the connection between extractive industries and poverty, for

example, shows that industrial mining is more often linked with growing levels of poverty, whereas small-scale artisanal mining has an alleviating effect on poverty (Gamu, Le Billon, & Spiegel, 2015).[i] In fact, some quantitative studies exploring within-country evidence show that resource-producing regions are often characterised by poverty; underemployment; a neglect of public services such as health, education, security, or basic utilities; and reduced community well-being (see Deaton & Niman, 2012; Jensen, Yang, & Muñoz, 2012; Lawrie, Tonts, & Plummer, 2011; Slack & Jensen, 2004; Stedman, Parkins, & Beckley, 2004; Tonts, Plummer, & Lawrie, 2012). Regarding the effect of resource extraction on the demand for local jobs in the U.S., Slack and Jensen (2004) find that workers in extractive industries experience higher rates of underemployment compared to the employees of other major industrial sectors (see also Perdue & Pavela, 2012). It is often argued that extractive activities promote economic enclaves with no linkages to other regions or economic sectors. An enclave economy is associated with a lack of production, of consumption, and of fiscal backward or forward linkages (c.f. Hirschman, 1981).

Yet, other studies provide evidence of positive socio-economic effects of resource extraction via, for example, increases in local income and employment, households' asset wealth or the increased dynamism of small businesses and overall economic activity as measured by night-time lights (Cust & Poelhekke, 2015; Mamo, Bhattacharyya, Moradi, & Arezki, 2017; von der Goltz & Barnwal, 2018). For instance, Aragón and Rud (2013) conducted an econometric study of the Yanacocha gold mine in Peru and found positive income levels for the local population living within 100 km of the mine. The authors assume that the mine's demand for local inputs (the so-called backward-linkage channel) explains these welfare effects. In a similar vein, Lippert (2014) finds that Zambians have benefited from mining in the Copper Belt region through mines' backward linkages. Employing survey data and a constituency-level panel, the author shows that an increase in local copper output improves measures of living standards. Similar results are reported by Loayza and Rigolini et al. (2016), who use variation in mining across Peruvian districts. Studying how large-scale gold-mining affects local livelihoods and

communities in Ghana, Mali, and Tanzania, Chuhan-Pole et al. (2017, p. xviii) also find that besides well-known negative externalities such as environmental degradation, health risks, and social dislocations "mining communities experience positive yet limited welfare benefits."

According to the cited research, one important factor determining the kind of impact mining activities have on local economic welfare relate to the generation of direct and indirect employment opportunities in the mining district. Research also finds that the overall impact of resource extraction on local well-being seems largely contingent on sociopolitical institutions and linkages with the rest of the economy (Havranek, Horvath, & Zeynalov, 2016; Papyrakis, 2017). We contribute to these studies by underlying the importance of one particular contextual variable that might moderate the effect of mining on local employment and socio-economic development: the nationality of mining companies. We argue that Chinese companies perform differently than non-Chinese (and mainly Western) enterprises in terms of providing local employment opportunities and thus in their potential of bolstering communal economic wealth. While disaggregated quantitative studies have shown that mining companies may bring about new job opportunities for the local population (Kotsadam & Tolonen, 2016), we expect that employment effects are lower for Chinese mining operations compared to non-Chinese controlled projects for two main reasons: the relatively low degrees of workforce localization and the lower readiness in upskilling and training local labour.

A common narrative is that Chinese companies bring in their own work force rather than hiring locally. According to several authors, this practice is not limited to managerial positions and higher skilled jobs but also extends to semi-skilled and labour intensive tasks (Smith, 2013, pp. 178, 195; Zhao, 2014, p. 1044). Alden (2005) shows that the deployment of Chinese labor rather than the hiring of local workers in Chinese sponsored projects in Ethiopia, Sudan and Namibia has been criticized locally and, according to Adisu et al. (2010), African labor has not benefited from Chinese investment.

Providing jobs abroad for Chinese citizens is commonly regarded as one solution to China's own problem of domestic rural unemployment (Zhao, 2014, p. 1043). The availability of relatively cheap labour forces at home makes the use of expatriate labour - particularly during the starting phase of an operation – a sensible strategy for Chinese companies in many host countries where local labour costs are high, when facing shortage of indigenous skilled labour, and to overcome "regulatory, language and cultural constraints" (Cooke, Wood, Wang, & Veen, 2018, p. 12). As mentioned above, the exact extent of Chinese companies' workforce localization is a debated issue and the available data differs between countries and industry sectors. Overall, official Chinese data suggest that around 50% percent of the workforce employed by Chinese multinational enterprises abroad consist of locals while the other half are Chinese (Rui, Zhang, & Shipman, 2017, p. 1). This ratio has been supported by surveys conducted among a sample of Chinese multinational companies operating in different regions and sectors including transport and electricity infrastructure work, oil extraction, house construction and the telecommunication sector (e.g. Tang 2010). According to the research by Rui et al. (2017, p. 5) this result is driven by the use of large numbers of "operational expatriates" (e.g., skilled, semiskilled labour) in the infrastructure sector. For the African construction sector, similar numbers have been reported (Chen, Goldstein, & Orr, 2009).[ii] Besides these numbers, of particular importance in the context of this study is the observation that overall Chinese companies' human resource management practices differ from Western multinational companies operating in Africa (and South/Southeast Asia). While the latter companies traditionally assign only managerial and technical tasks to expatriate labour, Chinese enterprises more often deploy expatriate workers also for semiskilled and manual jobs (Cooke, 2014, pp. 890-891).

Compared to Western enterprises, Chinese firms have a comparative advantage of deploying expatriate workers at both the managerial and the operational level. In a given mining district, non-Chinese companies also face similar labour and skill shortage problems. Bringing its own labour, however, is arguably more often cost-efficient for Chinese firms than for firms originating from

industrialized countries with higher wage levels. While the average Chinese wage levels have been rising rapidly over past years, indicators of Chinese labour costs suggest that the country still has a rather large pool of relatively cheap labour (Plekhanov, 2017). Mines operated by resource companies from Canada, the United States, South Africa, and Great Britain, for instance, face approximately three to five times higher unit labour costs in their country of origin than Chinese companies, thus making the employment of expatriate labour far costlier (Ceglowski & Golub, 2012, p. 16). For these companies, workforce localization and, when facing local skill shortages, investments in the training of locals for semi-skilled and unskilled jobs might turn sooner into a cost-efficient strategy than for Chinese managers. Given lower labour costs, Chinese multinational companies have higher incentives to import expatriate labour. Also, when compared to many Sub-Saharan African countries, China's relative unit labour costs in the labour-intensive manufacturing sector are lower, suggesting that importing labour from China might be a reasonable strategy at least at the beginning of a new project (Golub, Ceglowski, Mbaye, & Prasad, 2018). Moreover, evidence exists that even in cases where Chinese employees earn more in their host countries than locals (e.g. in Angola), up to a certain point the deployment of expatriate workers might be more cost-efficient due to higher productivity levels (Tang, 2010, p. 355).

According to several studies, another important motivation for Chinese managers to deploy expatriate workers is the facilitation of communication and overcoming cultural and regulatory constraints. Managers of Western companies with longer experiences of operating in African host economies and lower language barriers might find it easier to address such challenges. Researching Chinese construction projects in Angola, Corkin (2012, p. 480) reports evidence that Chinese managers often regard Chinese workers as more reliable and hard-working than local employees (see also Cooke, Wood, & Horwitz, 2015; Gadzala, 2010; Rui, Zhang, & Shipman, 2017). Due to cultural and linguistic similarities and the fact that expatriate labourers often live on compounds near the industry site, Chinese employees are also easier to manage than local employees commuting to the workplace. In

addition, Chinese managers regard co-ethnic workers as more willing to work long shifts, disciplined and adaptive to work conditions (Cooke, 2014, p. 885). Rui et al. (2017, 11) further argue that because Chinese expatriates working overseas for large multinational companies often do not bring their families and children, collective management is facilitated and a closer collaboration between managers and workers is encouraged, contributing to an overall higher work performance. Besides management and performance-related (instrumental) reasons for the use of co-ethnic workers, research on the employment practices of Chinese large state-owned and small and medium-sized enterprises in Zambia highlights the role of culture. According to Gadzala (2010, pp. 43, 50), "traditional Chinese notions of [interpersonal] trust and networking in overseas Chinese businesses" contribute to the "continued use of compatriots as a key source of labour, even where large numbers of indigenous workers […] exist."

The greater reliance on expatriate labour by Chinese firms goes hand in hand with a lower readiness in upskilling and training local labour, thereby possibly limiting the potential for economic spillovers and the ability to provide job opportunities for locals lacking the required skills (Jackson, 2014). In general, the reliance on expatriate labour due to reasons of cost-efficiency is expected to curb knowledge transfers in particular (Rui, Zhang, & Shipman, 2017). In host countries with lower wage levels, where local capacity building and skill formation is economically more viable, two factors may constrain Chinese managers willingness to train locals (Tang, 2016, p. 116): On the one hand, onsite training by Chinese technicians is hampered by language barriers. The low command of English, let alone of local languages, makes explanations of complex skills and work processes difficult. On the other hand, once local employees are trained by Chinese staff, they might seek employment with companies that offer better payment and working conditions. In some cases, this has reportedly lowered Chinese managers' willingness to engage in the costly training of local workers. While companies from other countries of origin may face similar challenges, "[t]hese problems may be more

obvious in Chinese companies because their investments are relatively new and some companies currently have strict control of wage level" (Tang, 2016, p. 117).

While evidence on wage levels payed by Chinese mining companies compared to other employers is rare and inconclusive (see, e.g., González-Vicente, 2013, pp. 53, 59–60; Sanborn & Chonn, 2015, pp. 18–19; Sautman & Yan, 2014, p. 1089), media and non-governmental organisations regularly point to widespread wage-related grievances among domestic employees of Chinese mining facilities in sub-Saharan Africa. Some studies argue that, in particular, Chinese state-owned enterprises favour cost-efficient short-term strategies, which might also have a dampening effect on paid wages (Haglund, 2009). Moreover, Chinese companies frequently face criticism related to racism in the workplace, poor working conditions, and the substandard safety records in extractive activities. This seems particularly applicable in Africa and Latin America, and has led to negative views of Chinese employers in various countries' resource sectors (Irwin & Gallagher, 2013; Lee, 2009; Sautman & Yan, 2016, p. 2152) reducing the overall attractiveness of Chinese companies as an employer.

The reliance on larger shares of expatriate labour in operational and managerial positions and a lower preparedness to upskill and train local labour is not only expected to reduce the direct labour effects of Chinese mines. It also bears the risk of increasing the alleged enclave character of Chinese (mining) operations in sub-Saharan Africa since the lack of direct job opportunities deprives the local communities from additional income and limits potential spillover effects. Large Chinese-run projects in developing countries are often viewed as "enclaves" with poor integration in the host regions' economies, which in turn limits the communal welfare effects (Gadzala, 2010; Lee, 2009; Mohan, 2013). In general, mining can provide financial assets for state and private actors, not only for investments in the non-extractive industries of host economies but also for the establishment of higher-value mining-related industries such as processing and refinement facilities at a national scale. More importantly in the context of our argument, industrial mining is also expected to generate

positive effects on non-mining economic activities in the producing communities, creating many indirect jobs related to the mining operations, particularly in the service sector through the spending of mine workers (e.g. Chuhan-Pole, Dabalen, Land, Lewin, Sanoh, Smith, & Tolonen, 2017; Kotsadam & Tolonen, 2016; Remy & MacMahon, 2002). The reality of Chinese activities in Africa, though, might be different, as illustrated by Mohan (2013, p. 1262) in the case of a Chinese dam project in Africa who finds that supplies for the construction sites ranging from heavy trucks to cooking oil and cigarettes for the workers are imported from China and that even vegetables are grown onsite.

Similar observations have also been made by other studies, and also regarding the mining sector, calling into question the idea of a straightforward economic linkage effect of Chinese extractive industries on host communities (e.g. G. Smith, 2013). For instance, in contrast to traditional mining companies from Western countries, Chinese copper mining enterprises in Zambia have not established the long-term relationships with local firms to a similar degree and have thus not supported the development of suppliers to the same extent (Fessehaie & Morris, 2013). As observed by Gadzala (2010, 45-46), the surroundings at the Chambishi mine in Zambia are populated by Chinese entrepreneurs and their "small-scale groceries, restaurants, and (Chinese) medical clinics, all of which cater to the needs of the Chinese workers employed in the mine." While these studies suggest that Chinese mines indeed operate like enclaves, more research and robust evidence is needed to gain a better understanding of the linkages between Chinese mines and local industries.

Taken together, we expect that the frequent reliance on expatriate labour, the lower preparedness to train local labour and the resulted limited spill over effects (i.e., backward linkages) hamper the overall impact of Chinese-run mining projects on local job creation and potential welfare gains in local communities in particular. The next section describes the chosen research design to test our hypothesis.

3. Empirical Strategy and Data

To test our arguments that Chinese mining operations generate less local employment opportunities compared to non-Chinese firms, we draw on a new dataset containing mine-level information on the ownership structure of companies operating copper, gold and diamond mines within 38 sub-Saharan countries between 1997 and 2015 (c.f. Wegenast & Schneider 2017).[iii] The locational details provided by this data allow us to geographically link each extraction site to individuals living in its proximity. In order to quantify the employment status of these nearby residents and their attitudes towards China, we employ rounds 5 and 6 of the Afrobarometer as well as panel data from the Demographic Health Survey (DHS).

3.1 Dependent Variables: Measuring the Socio-Economic Impact of Chinese Mining

The Afrobarometer surveys public attitudes and is one of the most comprehensive data sources on the socio-economic development of more than 30 African countries.[iv] The Afrobarometer's national samples comprise either 1,200 or 2,400 face-to-face interviews with randomly selected respondents older than 18 years. To guarantee representativeness, the Afrobarometer uses a stratified, multi-stage area probability design. Stratification is based on the main subnational unit of government (state, province, or region) and urban and rural location. The smallest geographic unit for which reliable population data is available constitutes the primary sample unit (PSU). In every PSU, eight survey respondents are combined into one cluster. To account for household size and over- or under-sampling of the data, some national surveys are additionally weighted.

Afrobarometer has recently provided subnational geocoded data for all rounds. We joined point coordinates from our mine-level dataset with the geo-location of Afrobarometer respondents through spatial proximity using the software QGIS. To this end, we first calculated 25, 40, and 50 km buffer zones around the centroids of the survey clusters following and expanding the procedure applied by

Knutsen et al. (2017) who argue that 50 km constitute a commutable distance in Africa. Information on the number and ownership of mines was added in a second step, which is outlined below.

In our empirical analysis, we chose rounds 5 and 6 of Afrobarometer for their temporal coverage and prompted information.[v] Given that Chinese investments in Africa's mining sector mainly started in the early part of this century and Chinese mines did not surpass the number of 30 before 2010 (see Figure A1 in the web appendix), it makes little theoretical sense to employ earlier rounds of Afrobarometer to measure our dependent variables. Both rounds also inquire the employment status of a comparable sample,[vi] asking if interviewees have a job that pays in cash.[vii] We code unemployment as a binary variable taking the value "1" when individuals report to be unemployed and either actively looking or not looking for a job and "0" otherwise. In addition, round 6 contains respondents' attitudes towards China, which is valuable for testing our hypotheses. Specifically, respondents were asked whether they have a rather negative view of China because they believe that China takes jobs, resources and/or land.[viii] Using this information, we generated three dichotomous variables measuring respondents' perceptions on China. These variables take the value "1" when respondents report that China has a negative image because it takes jobs from their countries, extracts resources from Africa or individual Chinese or their businesses grab land.

To check the robustness of our results, we rely on socio-economic variables from 52 Democratic and Health Surveys (DHS) containing district-level data on national household surveys in 21 sub-Saharan countries during the period 1996–2014. In order to create a disaggregated dataset with a panel structure, we focused on countries that underwent at least two survey waves within this period of analysis and for which the geo-location of respondents was available and interpolated values for missing years linearly. Applying these benchmarks, we were able to include 21 sub-Saharan countries. Three survey rounds were available for a total of 10 countries,[ix] while two rounds were available for the remaining states.[x]

The district information was assigned to the coordinates of each survey cluster using GIS software and spatial data from the Global Administrative Unit Layers (GAUL).[xi] Following the strategy of Fjelde and Østby (2014), the coordinates from DHS survey clusters were matched with district information from GAUL polygons using the software QGIS. The district information was then assigned to surveyed households by merging both with a designated DHS cluster identifier variable. This enabled us to compute the percentage of respondents per district that is unemployed in a given year.

3.2 Independent Variables of Interest

The new dataset on mineral deposits uses information from Infomine (2013) and the U.S. Geological Survey (USGS). The first database provides details on the location, production and status of extraction facilities as well as the percentages controlled by participating companies. Data from the USGS and the relevant mining companies' websites was gathered to fill in missing information. Using these indications in combination with the firm reports provided, we were able to code the ownership structures of 328 gold mines, 125 diamond mines, and 85 copper mines. Yearly observations from 1997 to 2015 depict the shares held by private domestic, state-owned domestic, private international, and state-owned international natural resource companies.

The distribution of natural resource mines appears to be quite uneven among countries. South Africa hosts as many as 146 gold mines, followed by Zimbabwe with 62. Other countries have a maximum of 25 (Ghana) and a minimum of one (e.g. Zambia). South Africa is also the country with the most diamond mines (70), with other countries harbouring 14 at the most (Angola) or at least one at the least (e.g. Cameroon). When it comes to copper mines, the Democratic Republic of Congo ranks at the top with 39 and is followed by Zambia with 20. Other countries have as many as nine (Botswana) or only one (e.g. Angola). Figure 1 below shows the location of Chinese-controlled and non-Chinese-controlled

mines as well as the respondents of Afrobarometer's round 6. Our estimations exploit respondents' proximity to mines in order to estimate the effect of the Chinese presence on our different dependent variables.[xii]

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Figure 1 about here

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A look at the spatial distribution of Chinese mineral companies reveals a concentration in four host countries: Zambia, Zimbabwe, South Africa, and the Democratic Republic of Congo. The highest number of mineral mines with Chinese ownership can be found in South Africa, which hosts as many as 20. The Democratic Republic of Congo is home to 12 mines of this type and is closely followed by Zambia with 10. Figure A1 in the web appendix plots the temporal dynamic of Chinese resource extraction. It reveals that Chinese foreign investment in Africa's mining sector increased considerably after the year 2000. In 2015, a total of 46 mines were owned by Chinese companies.

Every mine is dummy coded as majority controlled by Chinese companies if Chinese firms hold at least 66 per cent of the shares. The idea behind this threshold value is that a company's effects should prevail where its influence on the decision-making of joint-venture boards could be decisive. The resulting variables summarise the number of mines that are predominantly controlled by Chinese investors. To isolate the specific influence of Chinese mineral extraction from that of other ownership structures, we furthermore distinguish between non-Chinese mines that are predominantly controlled by foreign firms and those that belong to domestic companies.

Making use of the latitude and longitude coordinates that were collected during the coding phase, we calculated the number of Chinese-controlled versus non-Chinese-controlled mines in 25, 40, and 50

km buffer zones around Afrobarometer respondents. Since rounds 5 and 6 of Afrobarometer were surveyed in 2011-2013 and 2014-2015, respectively, we calculated mean control shares for each active mine for the corresponding periods: 2009-–2013 and 2011–2015[xiii]. Figures A2 and A3 provide the respective number of individuals covered by Afrobarometer round 6 living within a distance of 25, 40 and 50 km from Chinese- and non-Chinese-controlled active mines over the 2011-2015 period. For our district-level analysis employing DHS data, we assigned each mine to its hosting district. As a result, we were able to obtain the number of mines controlled predominantly by Chinese or non-Chinese operators for each district-year.

In addition to considering contractors' ownership structure, we also control for the corresponding deposit type of each mine. Thereby, we apply the universal classification of host rocks that categorize the formation of ores into three main types: igneous, hydrothermal and surficial. We connect each mine to its closest deposit, using data on global major mineral deposits from the USGS.[xiv] Controlling for the deposit type is important since deposits largely differ in their degree of extraction difficulty and economic value. As surficial deposits are more easily extractable than igneous or hydrothermal formation, their exploitation is less skill- and capital-intensive. In addition, surficial deposits commonly stretch over vast areas, making their recovery less profitable for industrial mining companies (c.f. Robb 2013). For these reasons, gold, diamond and copper originated from igneous and hydrothermal deposits have a greater potential to promote backward economic linkages compared to minerals stemming from surficial deposits.

3.3 Control Variables

To minimise potential problems stemming from omitted variable bias, we selected control variables that might jointly influence a mine's control-rights structure and our dependent variables. When assessing how the proximity of Chinese-operated mines impacts respondents' employment status, we mainly control for individuals' socio-economic status, including whether they have attained at least secondary education (*Education*), regard themselves as economically better off compared to the rest of the country (*Living conditions*), or belong to an ethnic group that experiences discrimination (*Discrimination*). In addition, we include several neighbourhood characteristics and indicators of institutional quality in our models. *Crime* is a dummy variable indicating whether respondents feel unsafe walking in their neighbourhood, and *Urban* indicates whether respondents live in an urban area. *Democracy* measures the perceived level of democracy within the respondents' country.[xv] We also account for local state capacity by including a dummy variable in which respondents report that government manages the provision sanitation services sufficiently well (*State capacity*). Finally, we add the variable *Local corruption* that takes the value "1" when respondents indicate that most or all local government councillors are corrupt and "0" otherwise. We expect personal wealth, educational level, and local state capacity (proxied by access to sanitation) to be negatively linked to unemployment. In contrast, respondents living in unsafe and corrupt areas or belonging to groups that are discriminated against should have an increased risk of being unemployed. Whether democracies reduce unemployment levels is unclear (c.f. Fishman, 2010). The effect of an urban residence on unemployment is also not clear-cut. While cities might offer more job opportunities, respondents living in rural areas are likely to be self-employed in the agricultural sector.

When estimating the effect of mines' property rights on respondents' perception of China, we keep the control variables *Education* and *Urban* and add unemployment to the socio-economic control variables. The latter indicator is added to assure that negative views on China are independent of respondents' employment status. We expect more educated individuals to be better informed about

potential adverse effects of China's economic involvement in their country. Since urban populations are less exposed to possible land expropriation or mining, they may be less likely to report that China's negative view is based on Chinese grabbing land or natural resources. In contrast, we expect that individuals living in urban areas are more likely to report that Chinese workers are taking local jobs. Furthermore, we include two additional control variables measuring respondent's view on *Protectionism* and negative attitudes towards foreign neighbours (*Xenophobia)*. Thereby, we account for unfavourable perceptions of China stemming from individuals' general views on globalization and migration. Lastly, we capture the extent to which respondents consume news to ascertain that interviewees can more critically discern conventional wisdom propagated in the public discourse from actual socio-economic effects of Chinese investments.

As previously noted, we check the robustness of our results by using alternative district-level survey data. Unfortunately, not all control variables described above are available from the Demographic Health Survey. When estimating the effect of Chinese-operated mines on unemployment levels with DHS information, we rely on the following control variables: the regional equivalent of gross domestic product (in USD) based on the Geographical-based Economic Data (G-Econ) v4.0 (c.f. Nordhaus et al., 2006) to proxy for local economic activity, the share of individuals that have not completed primary education, the percentage of the population with access to electricity (as a proxy for local state capacity), districts' population density, and the average number of acts of one-sided violence perpetuated by government or rebels against civilians with at least 25 casualties from the UCDP-GED database.[xvi]

4. Estimation Technique and Empirical Findings

As previously noted, we construct buffer zones with different sizes around each respondent and calculate the location and average ownership structure of all active mines for the previous five years of each Afrobarometer survey round (i.e. 2009-2013 for round 5, and 2011-2015 for round 6). This way, we are able to estimate individual's risk of being unemployed among respondents living close to Chinese- or non-Chinese-controlled mines. Given that our dependent variable – unemployment – has a binary outcome, we employ logistic regression models. To account for country-specific effects and heteroscedasticity, we include country fixed effects and standard errors clustered around countries.

Figure 2 illustrates the research design employed. Drawing on round 6 from Afrobarometer, it shows the location of mines predominantly operated by Chinese or non-Chinese companies and the location of respondents aggregated into enumeration areas[xvii] (with their corresponding 50 km buffer zone) for South Africa. In addition, the map depicts the share of respondents within each enumeration area reporting to be unemployed. The results from the cross-sectional logistic estimations described below reveal that there is a systematic variation in respondents' employment status that can be explained by mining companies' nationalities across African countries.

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Figure 2 about here

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Table 1 below reports the effect of the mean number of active mines predominantly controlled by Chinese or non-Chinese mines for the period 2009-2013 (Afrobarometer round five, models 1-3) and 2011-2015 (Afrobarometer round 6, models 4-6). As described in the last section, the exploitation of igneous or hydrothermal mineral deposits is more capital- and skill-intensive compared to igneous formations and thus more likely to generate economic spillovers. For this reason, we exclude the latter

from our sample. Throughout all models, respondents living in the vicinity of Chinese-controlled mines seem to face a higher risk of being unemployed. Moreover, the models show that the closer respondents live to Chinese mining operations, the higher their risk of being unemployed. Expressed in odds ratios, an additional one Chinese-controlled mine within 25km of a respondent, increases his/her risk of reporting to be unemployed by approximately 8% (model 1) and 19% (model 4). Individuals living within 50km of Chinese mining operations have a respective risk of 7% and 8%. In contrast, proximity to non-Chinese mining operation – either domestically- or internationally-controlled, show no statistical significantly effect on interviewees' risk of reporting unemployment.

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Table 1 here

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The effect of the control variables is largely in line with our expectations: respondents who enjoy better economic conditions compared to the rest of the country, who have completed at least secondary education or live in urban areas show a reduced risked of being unemployed through all models. Respondents living in regions with higher state capacity (as proxied by access to sanitation) also reduce the unemployment risk when only the results of Afrobarometer round 5 (models 1-3) are considered. Surprisingly, higher levels of local corruption also seem to reduce unemployment among respondents, but only when round 5 is considered. The remaining variables have no robust effect across models.

To assess the consistency of our findings, we perform several robustness checks. First, we use alternative time frames (4 and 6 years) when calculating the average control rights structure of active mines in order to regress them on the unemployment status of respondents from both Afrobarometer rounds (see Tables A5 and A6). We also employ a different threshold (51% instead of 66%) when defining a mine as predominantly Chinese or non-Chinese-controlled (Table A7). Finally, instead of

limiting our sample to igneous and hydrothermal mineral formations, we include the three outlined deposit types as dummy variables within our models (Table A8). As can be noted, our results are robust to these modifications.

To increase the reliability of our findings, we also employ an alternative research design making use of alternative data. For this purpose, we compile a district-level, time-series cross-sectional dataset using georeferenced information from the Demographic Health Survey as described in the previous section. In order to assess the impact of Chinese and non-Chinese mining operations on districts' unemployment rates, we use a linear estimator with country as well as year fixed effects and standard errors around countries. For the reasons explained above, we limit our sample to hydrothermal and igneous deposit types.

Table 2 below largely corroborates our previous findings. The two-way fixed, fixed-effects linear models show that while Chinese-controlled mines increase the level of unemployment within districts, non-Chinese mining projects have either no significant or even a negative effect. The effect magnitude is considerable: an additional one Chinese-controlled mine increases districts' average unemployment rates by around 2% (models 2 and 4). Concerning the control variables, the estimations suggest that districts with higher economic activity exhibit lower levels of unemployment, while districts hosting a large share of individuals without formal education are more affected by unemployment. The finding that higher levels of access to electricity is equally associated with more unemployment appears counterintuitive at first glance. This may be explained by the lower electricity coverage in rural areas in which the population are subsistence farmers and not formally employed.

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Table 2 here

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The results discussed above provide consistent evidence that Chinese mining operations may indeed generate less local employment opportunities compared to mines controlled by non-Chinese companies. As has been noted in previous sections of this paper, this may promote anti-Chinese resentment within affected mining communities (c.f. Kopiński & Polen, 2011, pp. 187-188). In order to explore whether the lack of local job creation constitutes a key motive for negative views on China, we rely on detailed information from round 6 of Afrobarometer. Relying on logit estimations summarized in Table 3 below, we investigate whether respondents living close to Chinese mining operations are more likely to report to have a negative image of China because of Chinese investors taking their jobs (models 1-3), and their resources (models 4-6). In Table 4 we examine the effect on Chinese resource extraction on the likelihood that interviewees perceive China negatively because they feel deprived of their land (models 1-3).

Tables 3 and 4 evidence that Chinese-controlled mines in the vicinity is in fact a good predictor of anti-Chinese resentment due to respondents' perceptions that China's presence leads to less local jobs and more natural resources and land grabbing. Note that – among the three motives for anti-Chinese sentiment – the perception that China is taking local jobs has the strongest effect. Having an additional Chinese-run mine within a distance of 25km increases respondents' likeliness to report that China's presence is crowding out local employment by 38%, while it increases perceptions that China is grabbing resources and land by 6% and 26% respectively. Furthermore, results remain qualitatively robust when applying the same robustness checks reported for previous models using unemployment as a dependent variable (see Tables A9-A16).

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Table 3 and 4 here

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One potential concern of the findings presented above is a possible self-selection of Chinese-operated mines in areas exhibiting weaker regulatory capacity and worse political institutions.[xviii] Although we control for local state capacity in our models, our findings may be driven by the assumption that Chinese investments in Africa's extractive industries may be biased towards institutionally weaker regions. Contrary to the view that Chinese firms are mostly present in countries from which Western governments have shied away, recent empirical findings suggest that China's engagement is not limited to countries with bad economic and political institutions. Chen, Dollar, & Tang (2015), for example, show that Chinese investment is not concentrated in countries with poor rule of law and the biggest recipient is South Africa. Cheung, de Haan, Qian, & Yu (2014) also find that host-country characteristics such as corruption or political instability are hardly related to the number of Chinese engineering projects in the country (see also Asongu & Ssozi, 2016, pp. 38–39).

To analyse whether our results may suffer from endogeneity issues, we explore the temporal dynamics within our dataset by comparing the levels of legal inequality and local governments' capacity of creating jobs[xix] before the opening of mines controlled by either Chinese or non-Chinese companies. For this purpose, we assess all mine openings between 2009-2016 and employ data from Afrobarometer round 4 (surveyed in 2008) in order to assess potential differences in regional legal equality and state capacity.[xx] Our analysis shows that while an average of 37% of people living in areas that will experience the opening of a mine controlled by a non-Chinese company believe that people are never treated equally under the law, this number is slightly higher (39%) for citizens inhabiting regions that will receive a Chinese-controlled mine. Similar small differences are found for state capacity: while an average of 26% of the interviewees living close to future mines that will be operated by non-Chinese firms are satisfied with local governments' performance of creating jobs, 23% of individuals that will experience a Chinese mining investment share this belief. T-tests show that these

differences are not statistically significant. Figures A4 and A5 show box plots summarizing the reported descriptive statistics that do not suggest that our results may be biased due to self-selection.

Conclusion

The empirical evidence on the local socio-economic effects of extractive industries is inconclusive. The conditions under which mineral or oil extraction may benefit local communities remain poorly-understood. Contributing to recent research underlying the importance of institutional contexts, regulatory frameworks and governance structures when analysing the local resource curse (c.f. Chuhan-Pole, Dabalen, Land, Lewin, Sanoh, Smith, & Tolonen, 2017; Diaz-Rioseco, 2016; Libman 2013; Spiegel 2012a), this paper explored the role of mining contractors' nationality in shaping local employment opportunities in sub-Saharan Africa. In particular, we investigated the assertion commonly expressed in media reports and qualitative case studies that Chinese mining companies fail to promote local employment and instigate grievances within African countries.

Our empirical analysis represents an initial attempt to examine this claim in a quantitative and comparative way. In a nutshell, we have argued that – compared to other mining companies – Chinese firms create fewer local jobs for two main reasons. First, due to the comparatively low Chinese labour costs and the availability of a centralised expatriation management system that provides a steady pool of disciplined workers, Chinese investors can more easily import labour (e.g. when facing skill shortage or higher labour costs within African countries). Potential language barriers and cultural differences may be further reasons driving China to rely more on expatriate workers. Second, this competitive advantage in the use of foreign labour may decrease incentives to invest in local skill formation. Consequently, Chinese mining companies are less likely to hire locally and possibly also less likely to encourage backward linkages.

Our regression analyses find consistent evidence for the expected negative effect of Chinese-controlled mineral extraction on the local employment level. Relying on two rounds of Afrobarometer, our logistic estimations show that individuals living close to a Chinese-operated mine have a higher risk of being unemployed compared to respondents living in the vicinity of non-Chinese mining operations. Linear estimation of time-series, cross-sectional data using country, year and deposit fixed effects substantiate these findings: districts hosting Chinese-controlled mineral production show higher unemployment rates. Furthermore, we find that respondents living close to Chinese-run mining projects are more likely to have a negative image of China based on the belief that Chinese investors are taking local jobs.

Our findings raise several questions that warrant further investigation. While our analysis shows that Chinese mining operations are associated with more local unemployment, the precise mechanisms behind this association remain unclear. In order to better understand the channels linking contractor's nationality to local employment opportunities, future research should collect more comprehensive data on companies' employment of expatriate workers and their readiness to invest in local skill formation. Also, more quantitative and qualitative evidence on whether Chinese investors are in fact less able to promote backward economic linkages within host countries is needed. Given that the local welfare effects of resource extraction are largely contingent on mines' demand for local inputs (c.f. Aragón and Rud, 2013; Lippert 2014), we need to advance our understanding of what type of natural resource governance encourages economic spillovers.

Another important issue that warrants further investigation concerns the operation time of Chinese mining companies in Africa. The limited overall impact of Chinese mining companies on local job markets due to low degrees of workforce localization or training may be partly explained by the relatively new operational presence of Chinese enterprises within African states. Authors show that,

for various reasons, Chinese companies often have strong incentives to import their own labour instead of hiring locally particularly during the first years of a new project in Africa (Tang 2016, p. 110). Survey data for the operation of Chinese companies within different industrial sectors of the DRC, for example, show that while one third of total employees is composed by Chinese citizens in the first five years of operation, this number is reduced by half thereafter (Tang, 2010, pp. 361-362). Therefore, it seems possible that the detrimental labour market effects of Chinese mining companies wear off or are even reversed when longer operation cycles are considered. Given the relatively new presence of Chinese mining firms in Africa (see Figure A1), we need longer time horizons to better investigate this alternative hypothesis.

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Figures

FIGURE 1: Location of Chinese- and non-Chinese controlled mines and respondents of Afrobarometer data (round 6)

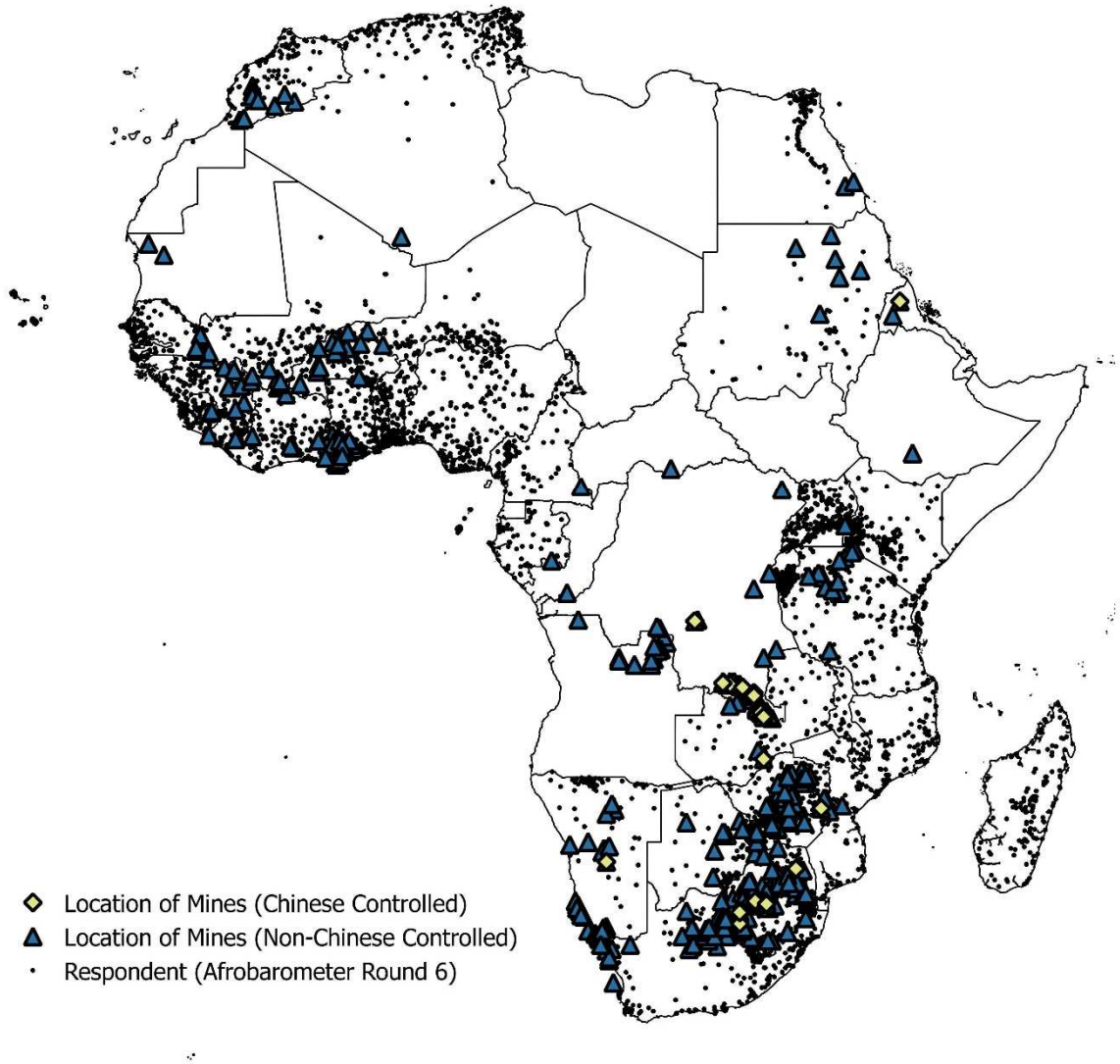
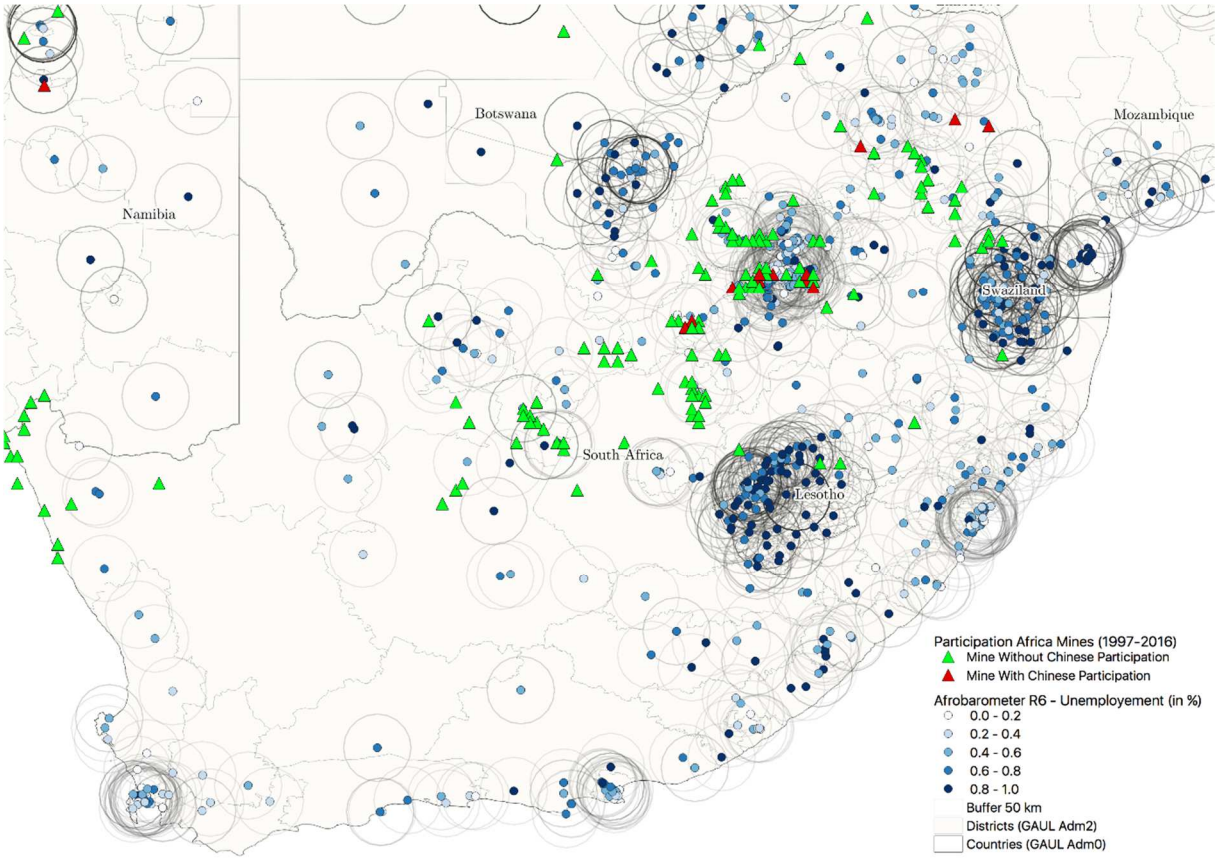


FIGURE 2: Location of Chinese- and non-Chinese controlled mines mean unemployment of respondents living within 50km buffer zones



Tables

TABLE 1: Effect of Chinese versus Non-Chinese mines on respondents' employment status using Afrobarometer data and different buffer sizes.

VARIABLES	Unemployment in Afrobarometer Round 5 (2011-2013)			Unemployment in Afrobarometer Round 6 (2014-2015)		
	(1)	(2)	(3)	(4)	(5)	(6)
	(25 km Buffers)	(40 km Buffers)	(50 km Buffers)	(25 km Buffers)	(40 km Buffers)	(50 km Buffers)
Chinese mines	0.0771***	0.0517***	0.0573***	0.177***	0.0779***	0.0762***
	(0.0211)	(0.0134)	(0.0145)	(0.0135)	(0.0139)	(0.0160)
Domestic mines	-0.106	-0.129*	-0.0908	0.0183	0.0135	0.0370
	(0.0789)	(0.0661)	(0.0562)	(0.0923)	(0.0894)	(0.102)
International mines	0.0140	0.00939	-0.0124	-0.0192	-0.0186	-0.0213
	(0.0219)	(0.0160)	(0.0143)	(0.0491)	(0.0368)	(0.0292)
Living Conditions	-0.189***	-0.189***	-0.188***	-0.234***	-0.234***	-0.234***
	(0.0675)	(0.0673)	(0.0672)	(0.0524)	(0.0526)	(0.0525)
Education	-0.824***	-0.824***	-0.824***	-0.580***	-0.579***	-0.578***
	(0.0856)	(0.0856)	(0.0856)	(0.116)	(0.116)	(0.115)
Urban	-0.285***	-0.286***	-0.286***	-0.258***	-0.258***	-0.259***
	(0.0487)	(0.0487)	(0.0485)	(0.0825)	(0.0826)	(0.0827)
Crime	0.0552*	0.0554*	0.0560*	-0.0739	-0.0735	-0.0727
	(0.0320)	(0.0320)	(0.0321)	(0.0531)	(0.0531)	(0.0531)
Democracy	-0.00316	-0.00301	-0.00291	0.0290	0.0295	0.0294
	(0.00897)	(0.00896)	(0.00900)	(0.0535)	(0.0535)	(0.0536)
Discrimination	0.00733	0.00822	0.00884	0.106*	0.106*	0.106*
	(0.0908)	(0.0909)	(0.0910)	(0.0636)	(0.0633)	(0.0632)
State capacity	-0.111**	-0.110**	-0.111**	-0.0106	-0.0107	-0.0107
	(0.0442)	(0.0442)	(0.0441)	(0.0561)	(0.0560)	(0.0560)
Local corruption	-0.0905**	-0.0912**	-0.0905**	-0.00597	-0.00593	-0.00530
	(0.0386)	(0.0386)	(0.0386)	(0.0385)	(0.0386)	(0.0386)
Constant	1.920***	1.919***	1.918***	0.887***	0.887***	0.887***
	(0.0842)	(0.0840)	(0.0838)	(0.104)	(0.103)	(0.103)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	37,194	37,194	37,194	32,913	32,913	32,913

Note: Logistic regressions with unemployment as dependent variable and mean number of active mines during the last five years with igneous or hydrothermal deposits as independent variable. Clustered standard errors in parentheses

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

TABLE 2. Effect of majority-controlled Chinese versus non-Chinese mines within district on unemployment (DHS Data).

	Majority ownership 66%		Majority ownership of mine 51%	
	(1)	(2)	(3)	(4)
VARIABLES	Unemployment	Unemployment	Unemployment	Unemployment
Chinese mines	0.0312***	0.0208**	0.0312***	0.0208**
	(0.00762)	(0.00975)	(0.00762)	(0.00976)
Domestic mines	-0.0166	-0.0178	-0.0167	-0.0178
	(0.0146)	(0.0134)	(0.0146)	(0.0134)
International mines	-0.0110*	-0.0118**	-0.0109*	-0.0116**
	(0.00567)	(0.00545)	(0.00563)	(0.00542)
Regional gross product		-0.0350***		-0.0350***
		(0.0119)		(0.0119)
No education		0.118**		0.118**
		(0.0468)		(0.0468)
State capacity electricity		0.103**		0.103**
		(0.0462)		(0.0462)
One-sided violence		0.00410		0.00410
		(0.0139)		(0.0139)
Population density		2.95e-05		2.95e-05
		(2.59e-05)		(2.59e-05)
Constant	0.220***	0.129***	0.220***	0.129***
	(0.0186)	(0.0368)	(0.0186)	(0.0367)
Year dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
Observations	26,155	26,137	26,155	26,137
R-squared	0.419	0.441	0.419	0.441

Note: Two-way fixed-effects models with mean levels of unemployment within districts as dependent variable and number of active mines with igneous or hydrothermal deposits as independent variable.

Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

TABLE 3: Effect of Chinese versus Non-Chinese mines on respondents' perception of China taking jobs and resources using Afrobarometer 6 data and different buffer sizes.

VARIABLES	China is taking jobs			China is taking resources		
	(1)	(2)	(3)	(4)	(5)	(6)
	(25 km Buffers)	(40 km Buffers)	(50 km Buffers)	(25 km Buffers)	(40 km Buffers)	(50 km Buffers)
Chinese mines	0.325***	0.179***	0.174***	0.0549***	0.0304***	0.0160**
	(0.0128)	(0.00818)	(0.0126)	(0.00773)	(0.00837)	(0.00726)
Domestic mines	0.148*	0.153*	0.125	0.0857	-0.00505	-0.00453
	(0.0838)	(0.0796)	(0.0852)	(0.105)	(0.0972)	(0.0731)
International mines	-0.0999**	-0.0778***	-0.0660**	-0.0276	-0.00968	0.0145
	(0.0480)	(0.0256)	(0.0309)	(0.0231)	(0.0205)	(0.0155)
Unemployed	0.00669	0.00652	0.00590	-0.00799	-0.00787	-0.00684
	(0.0440)	(0.0440)	(0.0442)	(0.0814)	(0.0815)	(0.0815)
Education	0.0810	0.0835	0.0848*	0.106	0.106	0.105
	(0.0517)	(0.0515)	(0.0509)	(0.0720)	(0.0721)	(0.0715)
Urban	0.214***	0.213***	0.213***	-0.0898	-0.0906	-0.0897
	(0.0652)	(0.0652)	(0.0653)	(0.122)	(0.122)	(0.123)
Protectionism	0.141**	0.139**	0.138**	-0.0403	-0.0408	-0.0400
	(0.0637)	(0.0641)	(0.0640)	(0.0572)	(0.0570)	(0.0568)
News consumption	0.156**	0.156**	0.157**	0.113	0.112	0.111
	(0.0661)	(0.0664)	(0.0664)	(0.0846)	(0.0848)	(0.0840)
Xenophobia	0.0677	0.0683	0.0690	0.113	0.112	0.111
	(0.0550)	(0.0550)	(0.0548)	(0.0902)	(0.0904)	(0.0907)
Constant	-1.706***	-1.706***	-1.706***	-1.645***	-1.644***	-1.644***
	(0.0687)	(0.0689)	(0.0686)	(0.117)	(0.117)	(0.116)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	38,035	38,035	38,035	38,035	38,035	38,035

Note: Logistic regressions with China taking jobs and resources contributing to a negative image of China as dependent variables. The mean number of active mines during the last five years with igneous or hydrothermal deposits is the independent variable.

Clustered standard errors in parentheses

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

TABLE 4: Effect of Chinese versus Non-Chinese mines on respondents' perception of China taking land using Afrobarometer 6 data and different buffer sizes.

VARIABLES	China is taking land		
	(1)	(2)	(3)
	(25 km Buffers)	(40 km Buffers)	(50 km Buffers)
Chinese mines	0.229***	0.122***	0.126***
	(0.00825)	(0.00786)	(0.00604)
Domestic mines	0.00625	0.0106	0.0156
	(0.112)	(0.121)	(0.0921)
International mines	0.102***	0.0660***	0.0538***
	(0.0252)	(0.0217)	(0.0142)
Unemployed	-0.00659	-0.00596	-0.00529
	(0.0639)	(0.0640)	(0.0639)
Education	0.0154	0.0121	0.0118
	(0.0651)	(0.0651)	(0.0655)
Urban	-0.221*	-0.219*	-0.218*
	(0.117)	(0.117)	(0.117)
Protectionism	0.0151	0.0164	0.0167
	(0.0756)	(0.0751)	(0.0750)
News consumption	-0.132*	-0.134*	-0.134*
	(0.0797)	(0.0798)	(0.0799)
Xenophobia	0.0406	0.0427	0.0419
	(0.0688)	(0.0690)	(0.0687)
Constant	-2.183***	-2.182***	-2.184***
	(0.107)	(0.107)	(0.108)
Country dummies	Yes	Yes	Yes
Observations	38,035	38,035	38,035

Note: Logistic regressions with China taking land contributing to a negative image of China as dependent variable. The mean number of active mines during the last five years with igneous or hydrothermal deposits is the independent variable.
Clustered standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Endnotes

[i] Particularly for poorer and low-skilled rural households, studies find that artisanal mining provides a more accessible alternative livelihood activity (Hilson, Amankwah, & Ofori-Sarpong, 2013; Spiegel, 2012b). Large-scale industrial mining, in contrast, often has a smaller employment effect due to the lack of relevant skills among the local population. Nevertheless, a general effect is also evident in the latter case (Gamu, Le Billon, & Spiegel, 2015, p. 168).

[ii] According to Chen et al. (2009, p. 83), approximately 50% percent of the labor forces of the surveyed construction firms in Africa are Chinese. At the managerial level, the share rises to approximately 90 percent. In Sino-Angolan enterprises the percent share of local employment ranges between approximately 38% in the telecommunication sector, around 60% in the construction sector and 81% in agriculture. In the DR Congo where labour costs are lower, the ratio is on average much higher than in Angola with an average of 76% of local workers in Sino-Congolese enterprises (Tang, 2010, pp. 354, 361).

[iii] We decided to concentrate o these three minerals for two main reasons. First, in contrast to other natural resources such as Chromium or Cobalt that are concentrated within few African states, deposits of copper, diamonds and gold are widely spread across sub-Sahara Africa (c.f. Markwitz, Kim & Miller, 2016). Second, China has disproportionately invested in the extraction of these particular resources (c.f. Sharaky 2011). We exclude oil from our analysis as its extraction is less labour-intensive and therefore has an even lower capacity to generate direct jobs compared to most minerals.

[iv] Afrobarometer data can be retrieved from: http://www. afrobarometer.org (accessed March 22, 2017).

[v] Round 5 of the Afrobarometer consists of 34 national surveys conducted between 2011 and 2013 and round 6 covers 36 countries during the years 2014–2015. A list of countries covered by each round is provided in Table A1 in the Web Appendix. As can be noted, South Africa (a country hosting many Chinese mining investments) is excluded from our time-series, cross-sectional regressions as it does not have sufficient geo-referenced DHS survey rounds over our period of analysis. The DRC, a country also hosting considerable Chinese mining investments is not covered by Afrobarometer round 5 and therefore cannot be included in some of our models. Note, however, that this country is included in the estimations that are based on round 6 of Afrobarometer. Except for these two cases, all countries hosting major Chinese copper, diamond and gold operations are included in our estimations. We do not expect that the partial exclusion of these two countries from some of our models biases our results.

[vi] Round 5 covers 50,405 individuals and round 6 contains 53,935 respondents.

[vii] For a complete list of variable definition, coding rules and data sources see Table A2 in the web appendix. For descriptive statistics of all variables, please refer to Tables A3 and A4.

[viii] Items Q81B and Q81D, respectively.

[ix] Countries with three survey rounds include Burkina Faso, Ghana, Guinea, Kenya, Namibia, Nigeria, Rwanda, Senegal, Uganda and Zimbabwe.

[x] The countries covered by the two survey rounds are: Benin, Cameroon, Democratic Republic of Congo, Ethiopia, Ivory Coast, Liberia, Madagascar, Sierra Leone, Tanzania, Togo and Zambia.

[xi] GAUL features global geographic polygon layers with all districts in all countries of the world (EC-FAO Food Security Programme, 2008).

[xii] Note that mining locations overlap and therefore not all Chinese-controlled mines are visible.

[xiii] We also test the robustness of our results when employing average ownership shares of active mines using 4- and 6-year periods (instead of the reported 5-year periods), and obtain substantively unchanged results. The corresponding Tables A5 and A6 are relegated to the web appendix.

[xiv] The data can be retrieved from: https://mrdata.usgs.gov/major-deposits/ (accessed September 2, 2018).

[xv] See Table A2 for more detailed coding information of all variables.

[xvi] See Table A2 for further details of all control variables.

[xvii] Most enumeration areas comprise around 9 respondents.

[xviii] Scholars such as Irwin & Gallagher (2013) or Tan-Mullins & Mohan (2013) show that the national and local socio-economic impact of mining investments by Chinese or non-Chinese mining activities are largely driven by the host country's regulatory framework and implementation.

[xix] Legal inequality is proxied by the question of whether respondents think that people in their region are never treated equally under the law. Local governments' capacity of creating jobs is proxied by the question of whether individual believe that local governments' performance in generating jobs is either good or very good.

[xx] There is a total of 41 Chinese-controlled mine openings for the given period.