

China's Aid and People's Perception of Inequality in South Africa

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Defense Date: April 2nd, 2024

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Thesis submitted in partial fulfillment of the requirements for the degree of Master of Arts in the Department of Political Science in The Graduate School of Duke University
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ABSTRACT

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Abstract

This paper is focusing on the relationship between China's aid to South Africa and people's perception of inequality in recipient areas, and its mechanism. South Africa is African's largest economy and second largest China's aid recipient. However, in the meantime, South Africa is a country with high inequality and a large amount of people are living under the poverty line. This paper is focusing on subjective inequality. This paper proposes that China's aid can reduce people's perception of inequality by promoting employment therefore increases people's prospect of upward mobility. AidData's China's aid dataset and South Africa Social Attitude Survey are used to test this theory. The result is that China's aid decreases perception of inequality in recipient areas, however, the result varies among ethnic groups. To avoid endogenous, this paper also uses China's steel production as an instrument variable. This paper also uses different measurement of aid, different methods, different attitudes, and different instruments to test the robustness. The result is robust. However, the effect of mechanism—employment is weak.

Key Words: Aid; China; South Africa; Perception of Inequality; Prospect of Upward Mobility

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1 Introduction

On January 10, 2010, the 2010 African Cup of Nations was opened at the Estádio 11 de Novembro in Luanda. This was the first international sports games to be held in Angola. Four fields were used for these games, all of them was built by China. From 2002 to 2012, this country maintained a very high GDP growth rate. In the meantime, many roads, schools, houses, hospitals were built. This showed that China's evidence in Africa is rapidly growing. Another evidence is the Ethiopia-Djibouti railway connects the capitals of two countries. This railway is designed, constructed, and operated by Chinese companies. In 2009, China overtook the US as Africa's largest trade partner and aid donor. Figure 1.1 shows the distribution of Chinese aid from 2000 to 2017. As Figure 1.1 shows, China's aid flows to almost all developing countries in the world, and SSA countries are the largest recipients. In addition, China has built more than 10,000 kilometers of railways and hundreds of schools in Africa over the past twenty years (Information Office of the State Council of the People's Republic of China, 2021). One-third of Africa's power grids and infrastructure are also financed and built by Chinese state-owned enterprises.

However, scholars disagree on the impact of China's aid on African countries. Some scholars believe that China's aid can provide better infrastructure and promote local development, and they also believe that because China's aid is unconditional, recipients can allocate the aid more independently (Huang, 2019; Xu et al., 2021; Dreher et al., 2021). For others, however, China's aid is always accompanied by corruption, pollution, lack of oversight, and even the promotion of authoritarian values (Chen et al., 2009;

Isaksson et al., 2018; Wegenast et al., 2019; Malik et al., 2021). Such scholars argue that one purpose of Chinese aid is to buy the support of African leaders. Therefore, this money is likely to end up in the pockets of African leaders (Tull, 2006; Dreher et al., 2019; Isaksson et al., 2020; Brazys et al., 2021).

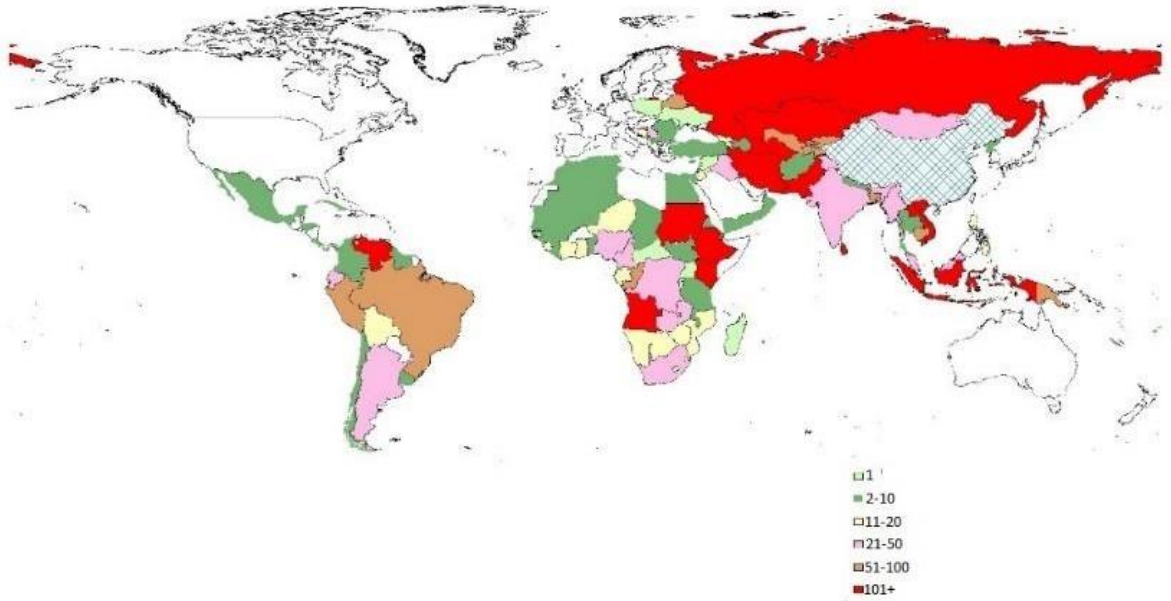


Figure 1.1 Allocation of China's aid¹

This paper tries to discuss the relationship between China's aid and local people's perception of inequality. Perception of inequality is different from objective inequality, since the later one is always measured by Gini index or Thail index. Scholars have long noticed the relationship between aid and inequality. These studies can be divided into two categories. One is the inequality caused by aid. By comparing GDP, night light intensity, income, quality and quantity of public goods, and people's living conditions, many

¹ See AidData's Global Chinese Development Finance Dataset, Version 2.0. <https://www.aiddata.org/data/aiddatas-global-chinese-development-finance-dataset-version-2-0>

scholars found that aid is increasing inequality (Bornschieer et al., 1978; Chong et al. 2009; Maqbool et al., 2020). Another is the unequal distribution of aid. Scholars realized that in Africa, foreign aid is more likely to flow to some "important places," such as the birthplaces of leaders, capitals, and resource-rich areas (Chen et al. 2009; Dreher et al. 2019; Huang 2021). This is because allocating aid to such areas is profitable for both donors and recipients (Chen et al. 2009). However, all these literatures are about real inequality (Higashijim et al., 2018; Hillesund, 2022). Studies on perceptions of inequality and aid are still lacking.

Perceptions of inequality matter. Scholars have noticed that misperceived inequality can change people's attitude toward redistribution and lead people to support biased redistributive policies, which may even increase the inequality. By conducting surveys in European countries, many scholars such as Cruces et al. (2013) and Cansunar (2021) found that rich people in Europe may underestimate their own wealth and overestimate the income of the rich. This misperception will lead them to support high-tax, high-redistribution policies. Moreover, not only perception but also valuation is important. Some scholars compared the US and EU countries and found that Americans are more "tolerant" of inequality than EU people, either because of a sense that "rich people should be rich" or simply because of patriotism (Shayo 2009; Caveille 2023).

Perceptions of inequality not only affect redistribution but can also influence social unrest, which is a very important issue in SSA countries. Scholars have found that inequality is associated with social unrest, civil war, or even interstate war (Acemoglu &

Robinson 2000; Svobik 2013). Moreover, the relationship between inequality and conflict is much more pronounced in African countries (Houle 2017). However, as Gurr (2015) reminds us, it is not actual inequality but rather grievances or "a sense of relative deprivation" that influences people's decisions to rebel. Evidence of the link between subjective inequality and conflict can also be found in African countries (Østby et al. 2009). Therefore, studying Chinese aid and subjective inequality will provide us with a broader picture of African politics.

This paper tries to trace the relationship between China's aid and perception of inequality in South Africa. The theory is that China's aid increases local people's perception of inequality by increasing local employment. A lot of scholars have found that the perception of inequality may come from the prospect of upward mobility, that is, if individuals are aware that they or their descendants may become rich in the future (upward social mobility), they might support lower income taxes and less redistribution, despite their current poverty. Being employed can raise people's expectations about the future, especially for those who are initially unemployed. The reasons are, first, from an economic perspective, employment implies a stable income in the long run. Secondly, from a social perspective, employment itself can also encourage social recognition. Finally, as work requires specific skills, employment also means an opportunity for education and training. All of these factors are closely linked to future upward mobility.

This paper focuses on South Africa. On the one hand, South Africa is the second largest economy in Africa with abundant mineral resources and a well-developed modern industrial and agricultural system. However, South Africa's economic development is

also weak and unbalanced. First, the country's unemployment rate is high. In 2015, less than 50% of the population was employed, significantly lower than in countries at a similar level of development. Second, there is a significant difference in income. In 2015, a quarter of the population still lived on less than \$2 a day. South Africa's Gini is high. According to World Bank statistics, this index reached 0.70 in 2010. Third, although South Africa's infrastructure is relatively developed compared to other African countries, it still has many shortcomings. For example, power shortages are not uncommon in this country.

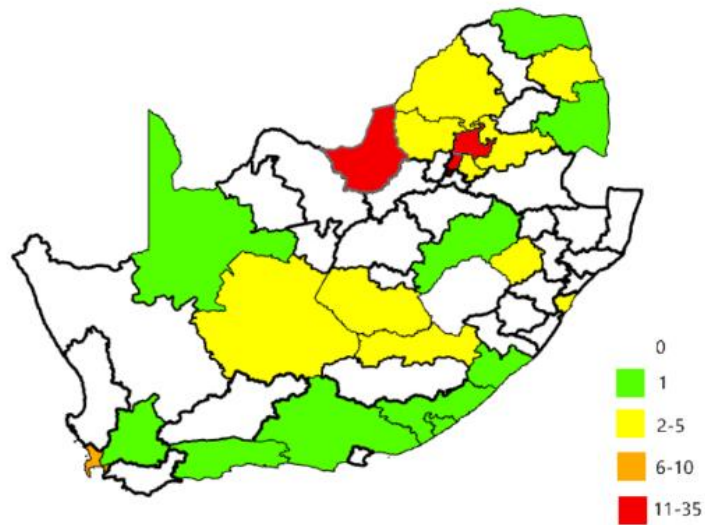


Figure 1.2 China's aid to South Africa²

On the other hand, the relationship between China and South Africa is also important. Due to South Africa's long-standing policy of apartheid, China did not establish high-level political contacts with South Africa until 1990. After the abolition of the apartheid

² Data from AidData, by total amount, ADM2, from 2008 to 2018

system, the relationship between China and South Africa quickly warmed up. South Africa has become China's largest trading partner in Africa since 2006. According to statistics from the Ministry of Commerce, bilateral trade between China and South Africa reached \$55 billion in 2022. South Africa is also a major recipient of Chinese aid projects and foreign direct investment. According to the Chinese Embassy in South Africa, as of 2023, Chinese investment in South Africa has exceeded \$25 billion, creating nearly 400,000 job opportunities. The distribution of China's aid to South Africa is shown in Figure 1.2. From a political perspective, the relationship between China and South Africa has been growing rapidly. South Africa joined the BRICS in 2011. Given this social-economical background, this study is important.

The remainder of this paper is organized as follows. In the second part, I will review previous scholars' work on the perception of inequality and propose my theory. In the third part, I will present my research design. The fourth and fifth part is the result of baseline empirical studies and robustness tests. The sixth part is the concluding remarks.

2 Theory

2.1 Literature Review

A large body of evidence has shown that, in many situations, people tend to misplace their income level and thereby misperceive the real inequality (Engelhardt and Wagener 2014; Bublitz 2016; Gimpelson & Treisman 2018; Kuhn 2020). Moreover, even when people are able to correctly perceive the actual level of inequality, they may evaluate this inequality differently (Shayo 2009). This misperception and misevaluation will strongly affect the support and the outcome of distributional policies (Alesina & Glaeser 2004; Luttig 2013; McCall 2013; Cansunar 2021). Some scholars argued that part of this problem is due to a problematic survey design, which cannot accurately capture the nature and characteristics of perceived inequality (Bavetta et al. 2019; Jachimowicz et al 2022). However, most scholars believe that this misperception is caused by some socioeconomic, political, or even some psychological factors. Typically, scholars have explained misperceived inequality through three main mechanisms. The first mechanism is naïve comparison, which argues that people only compare income with others around them, and this may bias their evaluation. The second mechanism focuses on values, according to this theory, political ideologies, social norms, historical legacies, and religious values make people more or less tolerant of inequality. The third mechanism considers the interaction between socio-economic conditions and perceptions. They argue that the previous level of inequality, real income, and opportunities for upward mobility shape people's perceptions

of inequality. The basic argument of this mechanism is that people may be more tolerant of inequality if they believe they can still be promoted in the future.

In this section, I will discuss these four mechanisms and show how they relate to the literature on aid. The first mechanism is naïve comparison, according to this mechanism, the reason why people misperceive inequality is because they make a within-group convenience inference, in other words, they assume that the observed inequality is the real inequality. Through surveys and experiments, scholars have found much evidence for this mechanism. People may tend to make comparisons with their friends and co-workers. However, typically a person's inner circle always shares similar economic conditions, so they may underestimate the real inequality level (Knell & Stix 2020). On the other hand, if a person lives or works in a place with great diversity, or if the person can frequently interact with different people, their perception of inequality will be close to the real inequality (Cruces et al. 2013). Thus, it is the reference groups that people use for comparison that bias their perceptions (Hvidberg et al. 2023). In other words, people misperceive their wealth simply because they rely on false information. Therefore, if people are correctly informed the level of inequality, their behavior and attitudes will be different. For example, by conducting an experiment in a university, Card et al. (2012) observed that if a faculty member who earns less than the median income is exposed to a website that discloses the real income of her colleagues, she will be dissatisfied and more likely to change a job compared to people who have similar income but cannot visit the website. Perez-Truglia (2020) also found that in Norway, the more transparent tax records are, the greater the gap in happiness between rich and poor people will be. However,

scholars have also found that in some surveys, even when people are informed about the actual level of inequality, their preferences for distributional policies do not change or may even be biased (Karadja et al. 2017; Trump 2018). This evidence reminds us that people may not just “thinking something wrong”.

The second mechanism is values, which may include political ideologies, religious, tradition norms and so on. In most of scholars works, whether a person will misperceive inequality and whether a person will justify inequality depends on a belief of meritocracy, which means that rich people deserved because they worked hard. According to Alesina & Angeleto (2005), if society believes that income is determined by effort rather than some random factors such as birth and luck, it will be more supportive of low tax and low distribution policies. This logic is widely used when comparing redistribution policies between the US and EU countries (Shayo 2009; Blanchet et al. 2022; Cavaille 2023). Moreover, we can observe a strong Robin Hood paradox, i.e. the higher the inequality, the lower the demand for redistribution. Psychologically, this is because people believe that meritocracy is a "just world" (Benabou & Tirole 2006). Jost et al. (2004) argued that people may have a strong incentive to justify the status quo, and this effect is even stronger among people who have suffered most from the status quo. Therefore, the higher the level of inequality in a society, the more likely citizens are to believe in and justify meritocracy, and therefore the less likely they are to support redistributive policies (Trump 2018; Mijs 2021). In addition, other values, such as religious and political values, can also influence perceptions and evaluations. For example, Kraus et al. (2019) found in a survey that Americans tend to underestimate racial income inequality,

and they argued that this is due to a nationwide belief in the "racial-progress narrative," which assumes that racial equality in this country has "largely already been achieved." Therefore, to understand misperceived inequality, we should pay more attention to people's minds.

The final mechanism is upward mobility, which argues that people, especially the poor, misperceive or justify inequality because they believe they will become rich in the foreseeable future. Benabou & Ok (2001) summarize this as the "prospect of upward mobility" (POUM) hypothesis. According to POUM, even if people are poor throughout their lives, they may still support low redistribution because they believe that their children will be rich. Scholars have found much evidence for this. Using GSS data, Alesina & La Ferrara (2005) found that when people believe that effort is more important than love, and when people believe in upward mobility, they tend to support high tax policies. Alesina & Fuchs-Schuendeln (2007) also found that future income is negatively related to people's preference for insurance. Bjørnskov et al. (2013) found that in reality, people's perceived inequality will be lower if a society has a higher level of upward mobility. Cojocaru observed that in European countries, if people are risk averse, they are more likely to believe in POUM. Akbaş et al. (2019) also found that perceived inequality increases with equality of opportunity. However, some very famous works argued that POUM will be problematic in some cases. Hirschman & Rothschild (1973) proposed that due to the tunnel effect, if people cannot move up, their satisfaction will decrease in the long run. Corak (2013) found that the possibility of upward mobility is negatively related to income equality, which is the famous "Great Gatsby Curve". Piketty (1995) also notes

that although the experience of upward mobility may lead people to support less redistribution in the short term, this effect is likely to be diluted in the long term. However, these works cannot falsify the POUM. The reason is that most studies only find that fewer people believe they are upwardly mobile, or that upward mobility is less likely. We can still believe that if people have equal and clear opportunities, if people believe that they will be richer, they are likely to believe that inequality is acceptable.

2.2 China's Aid and Perceptions of Inequality

Although both aid and inequality are important topics in Political Economic, few works have discussed the relationship between aid and inequality theoretically or tested it empirically. Only some evidence can be found. For example, using a dynamic panel data technique, Chong et al. (2009) find support that aid may reduce inequality, but the robustness of this evidence is weak. Castells-quintana et al. (2015) also mentioned that, in Latin American countries, increasing 1% of foreign aid will reducing Gini coefficient by 0.4%. Dreher (2016) argued that China's aid is different from traditional OECD countries' aid, since the former focus more on infrastructure. Infrastructure can benefit recipient countries through spillover effects, by creating jobs, or by reducing the gap between rich and poor, remote and central areas. However, some scholars argued that aid can increase inequality. There are two main reasons for this. One is misallocation and biased distribution. Alesina & Weder (2002) found that some corrupt countries may receive a large amount of aid just like their "clean" counterparts. Shafiullah (2011) noticed that foreign aid can increase inequality through the channel of education. Since education is

only affordable for a small proportion of people in these countries, foreign aid may increase inequality. Dreher (2019) also observed that China's aid projects are more likely to flow to the birthplaces of African leaders. This evidence shows that aid may be vulnerable to political capture. Another reason is focusing on infrastructure, which is an important characteristic of China's aid. Infrastructure aid can also backfire. For example, a new road may increase inequality since only some people can afford a car, so a newly built road will only benefit people who have a car, thereby increasing inequality (Bajar et al. 2015; Makmuri 2017). Another example is that infrastructure construction requires skilled workers, but in these countries almost only the elite and their children can get higher education, so they tend to earn more, increasing inequality (Pi & Zhou 2012).

Compared to the impact of Chinese aid on objective inequality, there is even less research on the relationship between Chinese aid and subjective inequality in recipient countries. Research on the impact of Chinese aid on recipient country attitudes is also rare, even though changing recipient country attitudes may be one of the most fundamental concerns of donors. Some scholars started to notice this. For example, Dietrich & Winters (2018) found that in Bangladesh, receiving aid could increase people's support for their government. However, Baldwin & Winters (2020) found that in Uganda, only aid provided by NGOs could increase people's participation in public affairs, while aid provided by the government could not. Blair et al. (2021) analyzed attitudes toward donors in recipient countries and found that receiving aid from China did not increase people's positive will toward China. Instead, it increased their support for traditional colonizers such as the United Kingdom and the United States. Isaksson & Kotsadam

(2018) found that receiving China's aid significantly increased people's tolerance for corruption. However, there is little research on how China's aid affects subjective inequality in recipient countries. Therefore, this article will try to discuss this issue.

As mentioned above, perception of inequality is determined by three factors: naïve comparison, value, and POUM. Aid also impacts subjective inequality through these three channels. On one hand, aid may not affect the perception of inequality through the channel of naïve comparison. Naïve comparison comes from intra-group (mis) comparison and information asymmetry. Typically, Chinese aid, especially infrastructure aid, serves as a public good, which all residents of the recipient area can benefit, and its spillover can benefit even more people faraway. Therefore, aid contributes little to relative deprivation. Secondly, aid does not create new information, since infrastructure aid projects are mostly public. On the other hand, chance for aid to impact the perception of inequality through changing values is limited. Firstly, changing attitudes is a difficult and long-term task³. Secondly, the mainstream attitude towards redistribution in South Africa leans left, which perceives a higher level of inequality and supporting more redistribution (Nqwane et al. 2021). China's mainstream attitude towards inequality redistribution is similarly to South Africa. Kim et al. (2018) found that perceived inequality and expectations for redistribution are the highest in China among four Northeastern Asian countries. Jiang et al. (2015) found that perceived inequality

³ See Searing et al. (1976)

increases the sense of unhappiness among Chinese people⁴. Therefore, it is less likely that China's aid affects people's perception through value.

Given other mechanisms are blocked, POUM is the only possible channel between China's aid and local perception of inequality. To understand the role of POUM in aid, we should first understand why POUM can reduce perceived inequality. There are four reasons. First, from an economic perspective, if we view redistribution as a form of insurance, expectations of upward mobility imply lower expected future risks, leading to support for lower taxation. Second, from a societal perspective, POUM increases individuals' belief in the upward mobility structure of society. In other words, individuals believe that opportunities in this society are equal, which means that they can increase their well-being by increasing effort. Finally, from a psychological perspective, POUM implies that individuals believe that they or their descendants will have a better economic status in the future. In such expectations, current inequality becomes acceptable and is seen as a "challenge" rather than a "suffering".

⁴ Also, some negative evidence. See Whyte (2010), which argued that Chinese people may not perceive inequality or even if they perceive, their attitude and behavior do not change.

The reasons for increased POUM due to employment can also be explained by the above theories. First, employment increases an individual's income, and stable employment increases expectations of future income growth. Intuitively, such expectations contribute to an increase in people's probability of upward mobility (POUM), especially for those who have not worked or have had low wages. Second, employment changes individuals' perceptions of society; getting a job leads individuals to believe that their skills match societal needs and fosters a belief in equal opportunity within society. Finally, job performance requires specific skills, and employers often provide training. These opportunities enhance workers' skills and increase their positive expectations. China's aid will decrease people's perception of inequality by the channel of POUM. This mechanism can be explained in two ways. On the one hand, there is ample evidence that China's aid has promoted employment and increased the number of skilled workers in recipient areas. (Brautigam 2011; Pi & Zhou 2012; Banlik 2013; Busse et al. 2016; Dreher 2018 & 2021; Martorano et al. 2020). On the other hand, China's aid promoted POUM by ensuring equal opportunities. Scholars have noted that in some cases, foreign aid is like oil because it is fungible, unconditional, and constant (Ross 2001; Hernandez 2017; Brazys & Vadlamannati 2021). However, most of China's aid are infrastructure projects and those are less fungible and unconditional since most of them are designed, built and even operated by Chinese firms. Moreover, infrastructure is observable, which means that people can benefit from it. Therefore, my theoretical argument is that China's aid reduces perceptions of inequality in recipient areas because it increases employment and thereby increases the POUM of local people.

2.3 Alternative Explanations

South Africa is one of the most unequal countries in the world. Since the end of the apartheid system, although South Africa has a comprehensive constitution, its inequality has not changed significantly (Francis & Webster 2019). South Africa has a higher Gini coefficient, which is around 0.7⁵. In South Africa, the top 10% of the population controls nearly 90% of the wealth (Orthofer 2016; Chatterjee et al. 2022). However, in 2017, 55% of the population still lived below the poverty line⁶ (Stat SA 2017). Moreover, different from other SSA countries, racial inequality is very significant in South Africa. Although apartheid has ended, this historically formed pattern of inequality is stubbornly surviving and deeply shaped South Africa's socio-economic conditions (Terreblanche 2002). Former South African President Thabo Mbeki described South Africa as "two nations," with the minority White population controlling most of the wealth. According to Finn (2015), in South Africa, less than 1% of Whites and 20.5% of Asians are poor⁷, while the proportion is significantly higher for Colored and African, which are 56.8% and 70.75%. Income inequality among ethnic groups is also significant. In South Africa, the average monthly income of Africans in 2008 was about R2500, only one-sixth of that of whites (Leibbrandt et al. 2010 & 2012). Table 2.1 shows the employment status by ethnic group in South Africa in 2018⁸. From the table, we can see that over 70% of South African Whites are employed full time or receiving pensions while about 53% of Blacks are

⁵ Calculated by Finn (2015) and Hundenborn et al. (2018).

⁶ R992 per month.

⁷ Which means living under the poverty line (R992 per month).

⁸ Data from SASAS 2018 Survey. See Human Sciences Research Council (2021).

unemployed. Therefore, racial inequality seems to be an important factor of South African’s inequality.

Table 2.1 Employment status (by ethnic group; %)

Ethnic Group	black	colored	Asian	White
unemployed and not looking for work	11.06	14.44	15.09	14.89
unemployed and looking for work	42.42	30	13.84	4.26
employed less than part-time	2.96	0.56	0.63	0
Part-time employed	5.59	4.44	6.29	4.26
Full-time employed or pension	37.97	50.56	64.15	76.6

Nevertheless, we cannot assume that racial inequality still plays as decisive a role in subjective inequality as it does in objective inequality. This is because, first, racial objective inequality in South Africa is decreasing, and inequality within ethnic groups has become significant. Francis & Webster (2019) found that in 2012, inequality within ethnic groups accounted for 68 percent of total inequality. Gender, class, and even sexual orientation within these groups have become significant. Second, differences in subjective inequality between ethnic groups are not significant. Khumalo (2021) found that over 50% of people in all ethnical groups believe that their current income does not meet their desired standard of living, and the difference between groups is not large⁹. The SASAS survey also provides some evidence, as shown in Tables 2.2 to 2.4. As we

Table 2.2 Attitude toward inequality (%)¹⁰

⁹ Measure by “Income evaluation question” (IEQ). See Figure 2.5 of Khumalo (2021).

¹⁰ Question: “Differences in income in South Africa are too large”.

	Black	Colored	Asian	White
Strongly agree	27.02	37.78	20.75	26.24
Agree	59.52	48.89	52.2	46.81
Neither agree nor disagree	9.46	8.89	13.84	23.4
Disagree	2.74	4.44	12.58	2.84
Strongly disagree	1.25	0	0.63	0.71

can see from Table 2.2, the proportion of people in all groups who strongly agree or agree with the statement that "income difference in South Africa is too highly" is over 70%, and only 4% of people in the White and African groups disagree or strongly disagree with this argument. Table 2.3 shows the causes of poverty. As we can see, over 30% of people in all racial groups believe that poverty is caused by an unjust society. While there are some differences in the explanation of the causes of poverty among racial groups, for example, Africans are less likely to attribute poverty to laziness, these differences are not as pronounced as those for objective inequality. Table 2.4 shows attitudes toward redistribution, we can observe an even smaller differences across racial groups. Surprisingly, 34.45% of African respondents "agree" or "strongly agree" that the government should reduce spending on the poor, which is the highest of any group, while only 29.46% of whites hold the same view. This evidence suggests that while ethnical groups can explain much of the inequality in South Africa, we cannot take them for granted when discussing subjective inequality.

Table 2.3 Attitude toward poverty (%)¹¹

	Black	Colored	Asian	White
Laziness	19.65	28.82	46.1	36.43

¹¹ Question: "Why, in your opinion, are there people who live in poverty".

Inevitable	15.8	11.18	8.44	20.93
Unlucky	21.89	15.88	10.39	10.85
Injustice	42.66	44.12	35.06	31.78

Table 2.4 Attitude toward (reducing) redistribution (%)¹²

	Black	Colored	Asian	White
Strongly agree	8.58	4.71	1.95	5.43
Agree	25.87	15.29	11.69	24.03
Neither agree nor disagree	10.7	12.94	14.94	25.58
Disagree	33.08	33.53	42.21	29.46
Strongly disagree	21.77	33.53	29.22	15.5

Now consider China's aid. Some scholars believe that China's aid may be distorted by some factors, which may reduce its impact. First, China's aid may be misallocated. Dreher et al. (2019) found that Chinese aid is more likely to flow to leaders' birthplaces. Similarly, Chen et al. (2012) found that in Africa, Chinese aid favors resource-rich areas. Considering ethnic groups, we should ask if Chinese aid to South Africa flow disproportionately to areas with a higher population of white (or black) people. As Figure 1-3 shows, although Chinese aid projects are clustered around Johannesburg and Cape Town, there is no evidence that Chinese aid flows disproportionately to cities with larger white populations.¹³ This is intuitive because Chinese aid is fundamentally not explainable in black-and-white narratives, or in other words, in nature, China's aid does not favor a specific ethnic group (Chaponnière 2009; Power & Mohan 2010).

¹² Question: "The government should spend less on benefits for the poor."

¹³ Data comes from Stat SA's census in 2011, see https://www.statssa.gov.za/?page_id=3836, and AidData's Global Chinese Developmental Finance Dataset (3.0). Different colors in polygon shows different share of White people in this municipal (third administrable level of South Africa). Red dots show the location of China's aid from 2007 to 2018. Noted that some aid projects may be geological overlapped.

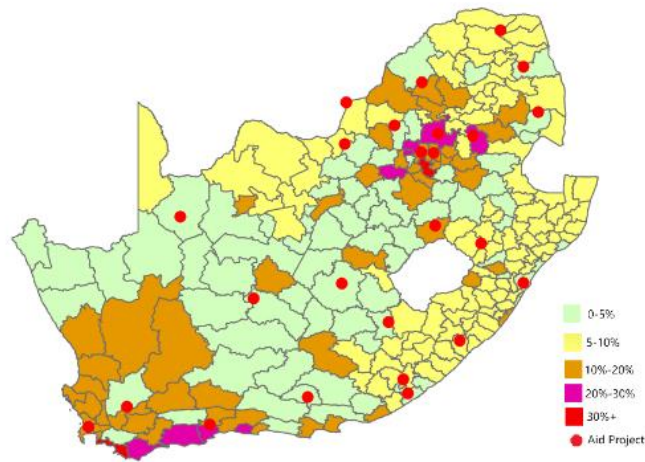


Figure 2.1 Ethnic group and China's aid allocation in South Africa¹⁴

The second concern is that Chinese aid may be influenced by some political factors. To address this concern, we should first clarify which agent decides to accept Chinese aid. AidData does not provide direct evidence on this. However, for some aid projects, AidData coded the direct recipient agency, which is shown in Figure 1-5. As we can see, 67% of aid goes directly to the government and state-owned enterprises. This suggests that formal institutions play an important role in decision-making. However, at the national level, South Africa's political situation is quite stable. From 2008 to 2018, which is the period of interest of these study, all of the presidents are from the African National Congress (ANC), a center-left African majority party. The ANC also controls more than 50% of the seats in parliament. And the president has not changed most of the time. From 2009 until February 2018, the president was Jacob Zuma. Therefore, despite some fluctuations, politics at the national level in South Africa is

¹⁴ ADM3, municipal level

stable. As for the provincial level, seven out of nine provincial governors have always been from the ANC since 1994. From 2008 to 2018, we can only observe turn over in West Cape Province, with the ANC was replaced by the predominantly white, center-right party, Democratic Alliance (DA). Figure 2.2 shows the trends in Chinese aid to South African provinces from 2007 to 2017.¹⁵ As we can see, with the exception of Gauteng, the number of Chinese aid received by all other provinces is relatively low. After 2015, Chinese aid to South Africa increased rapidly. In particular, the upward trend in the DA-governed Western Cape was as significant as in other ANC-governed areas. The Western Cape received the second highest amount of aid in the country in 2018, just behind Gauteng, where Johannesburg and Pretoria are located. Therefore, while the influence of political factors on aid cannot be completely ruled out, there is no evidence that China's aid to South Africa is significantly biased or influenced by these political factors.

¹⁵ Data from AidData. Aid is measured by frequency of aid received by the province from 2007 to 2017.

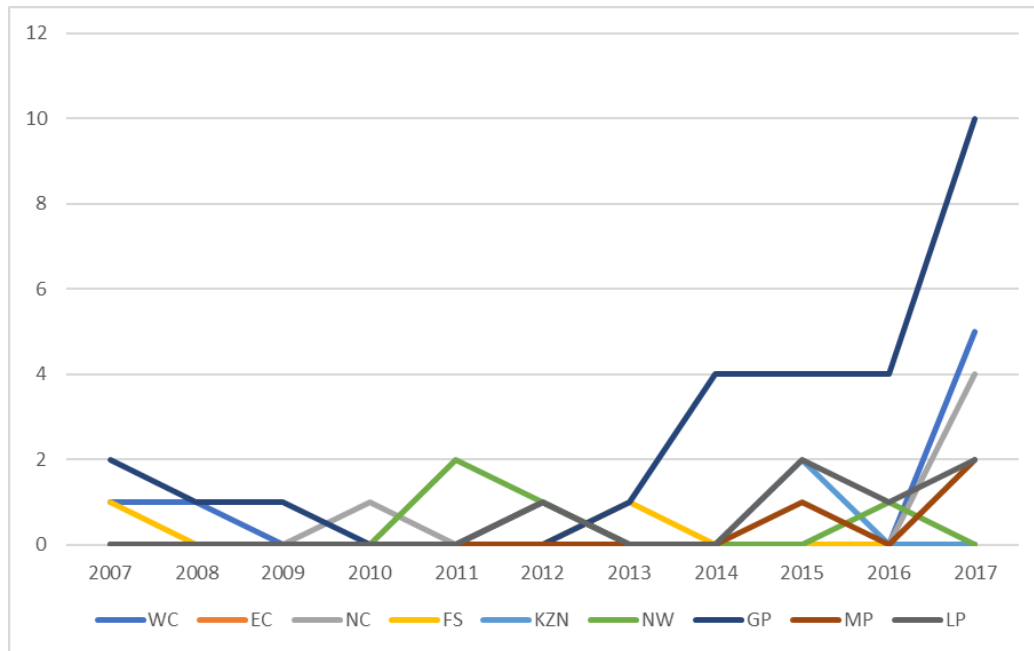


Figure 2.2 Frequency of China's aid by province (2007-2017)

The last concern is whether and to what extent China's aid benefits the local population and, who benefit from it. A common criticism is that Chinese companies involved in aid to Africa still employ a significant number of Chinese workers, thereby failing to improve local employment¹⁶. However, recent evidence from Guo & Jiang (2021) finds that Chinese aid significantly improves unemployment conditions within 50 km of the aid recipient area, at least within 3 years. In addition, we find some long-term effects in infrastructure projects such as hospitals, schools, and power plants. In South Africa, the employment effects of China's aid may be even more significant. One reason is that, according to state media, Chinese companies have created more

¹⁶ See Brautigam (2011).

than 20,000 jobs in South Africa from 2018 to 2020¹⁷. Another reason is that South Africa has a strict labor policy. For “general workers”, employers must prove that South African employees cannot fill the position, even after “an extensive searching”¹⁸. Otherwise, the government will not issue a work permit. For workers with “special skills”, a complex review process is required, and there are quota restrictions¹⁹. As a result, Chinese companies in South Africa have hired a large number of local workers. A report by Development Reimagined and Oxford China International Consultancy (OCIC) shows that the proportion of Chinese employees in Chinese companies in South Africa is less than 1%.²⁰ As for racial issues, although there is no direct evidence, based on the geographical distribution of Chinese aid and the demand for employed populations, we cannot assume that Chinese companies favor any particular ethnic group. Last but not least, some scholars also mentioned that China pay less to African workers²¹ However, recent studies show that the gap between Chinese aid projects and other projects in the recipient countries is not significant, and in many industries, China’s firms paid more than local firms (Oya & Schaefer 2023)²². The situation is similar in South Africa. No evidence showed that Chinese firm pay less to South African workers.

¹⁷ See <https://global.chinadaily.com.cn/a/202204/18/WS625cbcc7a310fd2b29e577f9.html>

¹⁸ See <https://www.dha.gov.za/index.php/immigration-services/types-of-visas>

¹⁹ See <https://www.dha.gov.za/index.php/scarce-skills-work-quotas>

²⁰ See <https://developmentreimagined.com/chinese-workers-in-africa-whats-the-real-story/>

²¹ See Baah & Jauch (2009); Gadzala (2010).

²² Other evidence of wage can be found in Bashir (2015), Lee (2017).

Therefore, based on the above discussion, we can conclude that, first, the impact of Chinese aid on regional subjective inequality is observable and comparable, although some regional variation may bias the result. Second, while racial issues are very important in the context of inequality in South Africa, the effect of racial inequality tends to be smaller when we discuss aid and subjective inequality. Finally, the impact of Chinese aid on employment is direct, real, and widespread, and there is clear evidence that Chinese aid has improved the employment situation of local people. Therefore, the theory of this paper is feasible and viable.

3 Research Design

This study focuses on South Africa from 2008 to 2018. The dependent variable is perceptions of inequality, coded by a question from eleven rounds of the South African Social Attitudes Survey (SASAS). The independent variable is last year's Chinese aid to South Africa. The data on Chinese aid comes from AidData's Global China Developmental Finance Dataset (version 2.0), which is a detailed and geocoded dataset covering 13427 Chinese aid projects from 2000 to 2017 around the world. In this paper, I will include 96 Chinese aid projects in the data. The detailed information of the dependent and independent variables will be discussed later. The basic hypothesis of this study is that accepting Chinese aid will reduce individuals' perceptions of inequality through employment.

The distribution of aid is not random. For example, aid tends to flow to regions with political stability and better economic conditions. Individuals living in these areas naturally have more opportunities and thus already have a higher probability of upward mobility (POUM), independent of the impact of aid. Scholars have used various methods to address this endogeneity issue. Similar to the approach of Dreher et al. (2017), I will use China's steel production as an instrument variable to reduce endogeneity. The logic is this: China uses foreign aid to address overproduction, which means that when steel supply in China exceeds domestic demand, the Chinese government will "digest"²³ this

²³ In Chinese Government's word.

overproduction by increasing foreign investment. Therefore, we can expect a positive relationship between steel production and aid, which supports the relevance assumption. Moreover, intuitively, steel production can only affect outcome variables, such as inequality, through the channel of aid, which supports the exclusion assumption.

The independent variable is China's aid, which comes from AidData's Global Chinese Development Finance Dataset, Version 2.0. In this paper, I will measure aid in three ways, the first is a binary variable of receiving China's aid. The second is the number of Chinese aid. The third is the committed amount of China's aid. Following the suggestion of Dreher et al. (2021), we excluded the following projects: (1) Projects coded as "Recommended for Aggregates=NO", which are projects that did not sign a contract or projects that were canceled. (2) "Umbrella" projects, which include technology transfer agreements, investment plans, and debt relief or forgiveness. (3) Projects for which location information is not available. This leaves 96 projects in the dataset.

The dependent variable is perceptions of inequality. The data are from eleven rounds of the SASAS. Questions used to measure inequality in the baseline model are: "Do you agree that difference of income in South Africa is too high? " The response to this question is on a scale of 1 (strongly agree) to 5 (strongly disagree). Although AidData contains detailed geographic information for each aid project, SASAS is not geocoded, only respondent information at the province level is available. Therefore, for each

respondent, I will code them as receiving aid if the province where the respondent lives has received aid from China. The instrumental variable in this study is the steel

Table 3.1 Summarize²⁴

Variables	Unit	Mean	Sd	Min	Max
Place/ Time					
Province		4.87	2.60	1	9
Year		2,013	3.265	2,008	2,018
Dependent Variables					
Inequality	Strongly Agree—Strongly Disagree	1.77	0.80	1	5
Independent Variables					
Committed Aid Binary		0.29	0.45	0	1
Numbers Of Committed Aid		0.66	1.56	0	10
Logged Committed Aid Amount		0.53	2.39	-	7.91
Control Variables					
Position	Far Left--Far Right	3.59	1.51	1	7
Gender	Female/ Male	1.60	0.49	1	2
Race	Black--Colored--Indian--White	1.76	1.09	1	4
Age		45.1	16.3	16	101
Marital	Married--Never Marry	3.26	2.09	1	6

²⁴ Data for year 2012 is missing.

		0	1		
Education	Grade 1--Doctor	12.4	4.83	1	27
		5	7		
Religion	No/ Yes	1.12	0.33	1	2
		8	4		
Geological type	Urban--Rural	1.67	1.01	1	4
		7	5		
Living standard	Low--High	2.27	0.67	1	3
		3	9		
Instrument Variable					
Logged China Steel Production		11.2	0.18	10.83	11.4
		1	8		4
Mechanism Variable					
Unemployment Rate		0.36	0.06	0.206	0.46
		8	3		2
Employment Status	Unemployed--Full Time	3.50	1.60	1	5
		7	8		

productivity in China, which comes from China Statistical Yearbooks²⁵. The mechanism variable is employment rate, which comes from Quarterly Labor Force Survey (QLFS) by Department of Statistics of South Africa (Stats SA)²⁶. The employment rate in South Africa is collected quarterly, so I will use the mean of four seasons as a proxy for the employment of the whole year. All the control variables are individual characteristics, which include political position, marital status, gender, age, highest level of education, religion, race, place of residence (urban or rural), and self-reported standard of living. All of this information is collected in the SASAS. To minimize the effect of ethnic

²⁵ See <https://www.stats.gov.cn/sj/ndsj/>

²⁶ https://www.statssa.gov.za/?page_id=16408#:~:text=The%20Quarterly%20Labour%20Force%20Survey,measures%20of%20employment%20and%20unemployment.

differences, which is an important factor in South Africa, in the baseline models, I will also do regression by races. Table 3.1 provides a summary of these variables.

4 Results

4.1 Baseline Results

The results of the baseline regressions are shown in Table 4.1. In these regressions, China's aid is measured by a binary variable (receive or not), that is, if a location receives one or more aid commitments in that year, I code it as 1. OLS is used from model 1 to model 6. Since SASAS is not a follow-up survey, the data are cross-sectional instead of panel. model 1 shows the relationship between China's aid and subjective inequality without controlling for any variables. As we can see, receiving China's aid makes respondents more likely to disagree with the statement that income inequality in South Africa is too high, in other words, receiving China's aid reduces South Africans' perception of inequality. model 2 includes control variables. model 3 controls regional fixed effect. In model 4 and model 5, we use the number and logged amount of China's aid as independent variables. As we can see, China's aid significantly reduces local people's perception of inequality. The results are similar to the previous models. These regressions show that China's aid is correlated with local perceptions of inequality but given that perceptions of inequality may also be affected by other unobservable socioeconomic and psychological factors, these estimates do not constitute causal effects. Differences among ethnic groups are also reported in this table. As we can see, for all models, aid significantly decreased Asian/ Indian citizens perception of inequality, and if

aid is measured by binary or amount, we can also find positive effect on African citizens, although this effect is smaller than Asian people. Among Colored people, aid is negative related to the tolerance of inequality, although they are insignificant. We cannot find significant effect among White people, which means that they may be less affected by China's aid.

Table 4.1 Baseline Regressions²⁷

Model	(1)	(2)	(3)	(4)	(5)
Full Sample	aid binary	aid binary	aid binary	aid numbers	aid amount ²⁸
aid	0.071* (0.034)	0.062 (0.035)	0.058 (0.047)	0.021* (0.010)	0.021*** (0.005)
Observations	14,667	14,576	14,576	14,576	12,944
By Ethnic Groups					
African	aid binary	aid binary	aid binary	aid numbers	aid amount
aid	0.050** (0.021)	0.045** (0.022)	0.073*** (0.024)	0.004 (0.008)	0.010** (0.005)
Colored	aid binary	aid binary	aid binary	aid numbers	aid amount
aid	-0.022 (0.038)	-0.032 (0.037)	-0.033 (0.057)	-0.001 (0.016)	0.0184 (0.019)
Asian	aid binary	aid binary	aid binary	aid numbers	aid amount
aid	0.279*** (0.060)	0.279*** (0.044)	0.248*** (0.067)	0.084*** (0.023)	0.110*** (0.011)
White	aid binary	aid binary	aid binary	aid numbers	aid amount

²⁸ If not specified, the amount of aid is logged.

²⁸ Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Year 2012 is missing in all models. OLS are used in all models. Standard errors are clustered in provincial level. "All" means regressions that include all respondents. "African", "Colored", "Asian" and "White" means regressions that only include specific group of respondents, respectively. "aid" is the result of independent variable. When regressing by groups, control variable "race" is dropped.

aid	0.070 (0.046)	0.062 (0.047)	-0.016 (0.077)	0.015 (0.009)	0.020 (0.031)
Control Variables	NO	All	All	All	All
Fixed Effect	RE	RE	Province	Province	Province

4.2 Instrument Variables

The results of the instrumental variable regressions are presented in Table 4.2 and Table 4.3, while the former is the result of first stage regressions, and the former is the result of second stage regression. All models passed the weak-instrument test. As we can see, China's steel production significantly increases China's aid, which is consistent with the proposition that China uses aid to solve its domestic overproduction. After introducing instrumental variables, the effect of China's aid on local perceptions of inequality remains unchanged. As for ethnic groups, aid significantly reduces perception of inequality in African and Asian group, except when aid is measured by numbers. This result may increase our confidence in the casual relationship between aid and perceptions of inequality. Aid is still positively related to subjective inequality among Colored group, and when aid is measured by among, the result is significant. As for White group, aid reduces subjective inequality, but the result is only significant when aid is measured by amount.

4.3 Mechanism

As we mentioned in the previous part, China's aid increases local employment, thereby increasing people's prospects of upward mobility, so receiving China's aid can reduce local people's perception of inequality. I test the mechanism by using the interaction between China's aid and

Table 4.2 Instrument Variable Regressions (first stage)²⁹

Model	(1)	(2)	(3)
Method	OLS	OLS	OLS
Full Sample	steel ³⁰	steel	steel
aid	0.422*** (0.0339)	2.273*** (0.128)	2.911*** (0.776)
By Ethnic Groups			
African	steel	steel	steel
aid	0.649** (0.236)	2.150* (1.092)	2.976** (0.914)
Colored	steel	steel	steel
aid	-0.489 (0.628)	1.116 (1.185)	2.593** (0.801)
Asian	steel	steel	steel
aid	0.593*** (0.103)	3.549 (3.052)	2.558** (0.931)
White	steel	steel	steel
aid	0.415 (0.401)	3.307 (2.177)	2.959*** (0.852)

²⁹ Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. 2SLS are used in all models Year 2012 is missing in all models. All control variables are included. Provincial fixed effects are controlled, standard errors are clustered in provincial level. "Full sample" means regressions that include all respondents. "African", "Colored", "Asian" and "White" means regressions that only include specific group of respondents, respectively. When regressing by groups, control variable "race" is dropped.

³⁰ If not specified, this variable is logged.

employment³¹. Results of the first stage are shown Table 4.4 and Table 4.5, and the results of second stage of are shown in Table 4.6 and Table 4.7. In Table 4.4 and Table 4.6, unemployment is measured by the provincial-level unemployment rate (released by Stat SA) is used. In Table 4.5 and Table 4.7, unemployment is measured by "employment status", which is derived from SASAS.

Table 4.3 Instrument Variable Regressions (second stage)³²

Model	(4)	(5)	(6)
Full Sample	aid binary	aid numbers	aid amount
aid	0.588*** (0.106)	0.109*** (0.019)	0.099** (0.050)
By Ethnic Groups			
African	aid binary	aid numbers	aid amount
aid	0.347*** (0.078)	0.105 (0.092)	0.083* (0.049)
Colored	aid binary	aid numbers	aid amount
aid	0.074 (0.205)	-0.032 (0.033)	-0.050** (0.023)
Asian	aid binary	aid numbers	aid amount
aid	1.109*** (0.308)	0.185 (0.172)	0.296** (0.127)
White	aid binary	aid numbers	aid amount
aid	0.791	0.0993	0.139**

³¹ This is a two-step process. In the first stage, we should regress the independent variable on the mechanism variable (employment ~ aid). In the second stage, we should regress the independent variable, and the interaction between independent variable and the mechanism variable, on the dependent variable (inequality ~ aid + aid*employment). See Baron & Kenny (1986).

³² Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. 2SLS are used in all models Year 2012 is missing in all models. All control variables are included. Provincial fixed effects are controlled, standard errors are clustered in provincial level. "Full sample" means regressions that include all respondents. "African", "Colored", "Asian" and "White" means regressions that only include specific group of respondents, respectively. When regressing by groups, control variable "race" is dropped.

(0.709)

(0.080)

(0.061)

In Table 4.4 and Table 4.6, respondents who are unable to work (sick, disabled or student) are dropped. The variable "employment status" is an ordinal variable, where 1 means "unemployed and not looking for work", 2 means "unemployed and looking for work", 3 means "employed less than part-time", 4 means "employed part-time" and 5 means "employed full-time" or retired with pension. Obviously, the higher the number, the "better" the employment status of the respondent.

Table 4.4 Mechanism (first stage; unemployment)³³

Model	(1)	(2)	(3)
Full Sample	aid binary	aid numbers	aid amount
aid	-0.0044*** (0.0009)	-0.0047** (0.0017)	-0.0012*** (0.0002)
By Ethnic Groups			
African	aid binary	aid numbers	aid amount
aid	-0.0031 (0.0107)	-0.0045*** (0.0003)	-0.0002 (0.0025)
Colored	aid binary	aid numbers	aid amount
aid	0.0046 (0.0113)	-0.0026 (0.0030)	-0.0023 (0.0021)
Asian	aid binary	aid numbers	aid amount
aid	-0.0202*** (0.0024)	-0.0057*** (0.0008)	-0.0053*** (0.0014)
White	aid binary	aid numbers	aid amount
aid	-0.0115 (0.0102)	-0.0053*** (0.0009)	-0.0033 (0.0022)

³³ Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Year 2012 and 2013 is missing in all models. OLS are used in all models. All control variables are included. Provincial fixed effects are controlled, standard errors are clustered in provincial level. "All" means regressions that include all respondents. "African", "Colored", "Asian" and "White" means regressions that only include specific group of respondents, respectively. When regressing by groups, control variable "race" is dropped.

Table 4.5 Mechanism (first stage; employment status)³⁴

Model	(4)	(5)	(6)
Full Sample	aid binary	aid numbers	aid amount (logged)
	0.1750*** (0.0369)	0.0453*** (0.0133)	0.3450*** (0.0391)
By Ethnic Groups			
African	aid binary	aid numbers	aid amount
aid	0.230*** (0.0491)	0.0504* (0.0241)	0.0397*** (0.0092)
Colored	aid binary	aid numbers	aid amount
aid	-0.0760 (0.0443)	-0.0668*** (0.0093)	-0.0640** (0.0221)
Asian	aid binary	aid numbers	aid amount
aid	0.0675 (0.0714)	-0.0294*** (0.0028)	0.0194 (0.0131)
Colored	aid binary	aid numbers	aid amount
aid	-0.1820 (0.1160)	-0.0410*** (0.0089)	0.0454 (0.0326)

As we can see from Table 4.4 to Table 4.5, in all group, aid can significantly promote employment, no matter it is measured by objective unemployment rate or self-reported employment status. However, when we take ethnic groups into consideration, the results become unstable. When employment is measured by unemployment rate, for African and White people, we can only

³⁴ Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Year 2012 and 2013 is missing in all models. OLS are used in all models. All control variables are included. Provincial fixed effects are controlled, standard errors are clustered in provincial level. “All” means regressions that include all respondents. “African”, “Colored”, “Asian” and “White” means regressions that only include specific group of respondents, respectively. When regressing by groups, control variable “race” is dropped.

Table 4.6 Mechanism (second stage; unemployment)³⁵

Model	(1)	(2)	(3)
Full Sample	aid binary	aid numbers	aid amount
aid	0.850** (0.322)	0.669** (0.211)	0.242 (0.131)
aid*mechanism	-1.224** (0.467)	-0.983** (0.320)	-0.358 (0.204)
By Ethnic Groups			
African			
aid	0.599** (0.288)	0.801*** (0.234)	0.282* (0.151)
aid*mechanism	-0.844* (0.464)	-1.222*** (0.355)	-0.444 (0.246)
Colored			
aid	0.771** (0.235)	0.338*** (0.0785)	0.233*** (0.0284)
aid*mechanism	-1.128*** (0.315)	-0.500*** (0.122)	-0.325*** (0.0430)
Asian			
aid	4.157*** (0.483)	2.286*** (0.269)	0.187 (0.661)
aid*mechanism	-6.152*** (0.774)	-3.363*** (0.408)	-0.127 (1.105)
White			
aid	0.418 (0.702)	0.668** (0.272)	0.235 (0.201)
aid*mechanism	-0.646 (0.933)	-0.980** (0.405)	-0.340 (0.301)
Observations (all)	14,576	14,576	12,944

³⁵ Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Year 2012 and 2013 is missing in all models. OLS are used in all models. All control variables are included. Provincial fixed effects are controlled, standard errors are clustered in provincial level. "All" means regressions that include all respondents. "African", "Colored", "Asian" and "White" means regressions that only include specific group of respondents, respectively. "Mechanism" is the interaction variable between mechanism and independent variable (aid employment). When regressing by groups, control variable "race" is dropped.

observe a significant effect when aid is measured by numbers. As for Asian, aid always significantly reduce unemployment. However, those results are unreliable since employment rate is calculated on the (whole) provincial level. When employment is measured by self-reported employment status, the results become more unstable. As we can see, receiving aid can promote African people's self-reported employment status. However, in other groups, receiving aid will demote their employment status, this is contradicted to the theory.

The result of interactions is shown in Table 4.6 and Table 4.7. In model 1 and model 2, when aid is measured as a binary or numbers, all coefficients of independent variables are still positive and significant. The interaction variables are negative and significant. Which means that aid decrease local people's perception of inequality by reducing unemployment. These results show that China's aid reduces the perception of inequality through the channel of increasing employment of local people. In model 4 to 6, we alternatively use subject employment status. However, in these models, we cannot find significant relationship among aid, employment and inequality. The reason for this may be that some people, such as housewives, will never be affected by external factors, in other words, they are "outliers". We can also observe between-groups differences. The effect of employment is much stable when it is measured by real unemployment rates. However, when employment is measured by status, most of these significant effects disappeared. We can only observe a significant effect in Asian groups. These results show that the mechanism between aid and perception of inequality may be weak.

Table 4.7 Mechanism (second stage; employment status)³⁶

Model	(4)	(5)	(6)
Full Sample	aid binary	aid numbers	aid amount
aid	0.0522 (0.0589)	0.0183 (0.0110)	0.0148 (0.0117)
aid*mechanism	0.00422 (0.00634)	0.000504 (0.000882)	0.00209 (0.00191)
By Ethnic Groups			
African	aid binary	aid numbers	aid amount
aid	0.0447 (0.0602)	-0.00290 (0.0147)	0.00428 (0.0128)
aid*mechanism	0.00633 (0.00913)	0.000881 (0.00142)	0.00136 (0.00219)
Colored	aid binary	aid numbers	aid amount
aid	-0.0727 (0.0847)	0.0256 (0.0258)	0.0301 (0.0263)
aid*mechanism	0.00886 (0.0150)	-0.00753 (0.00663)	-0.00285 (0.00435)
Asian	aid binary	aid numbers	aid amount
aid	0.462*** (0.120)	0.0977*** (0.0247)	0.0926*** (0.0162)
aid*mechanism	-0.0235 (0.0267)	-0.00376** (0.00122)	0.00394 (0.00278)
White	aid binary	aid numbers	aid amount
aid	0.0296 (0.0952)	0.0122 (0.0116)	0.0495** (0.0179)
aid*mechanism	0.00241 (0.0132)	0.00128 (0.00229)	-0.00517 (0.00642)
Observations	14,576	14,576	12,944

³⁶ Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Year 2012 and 2013 is missing in all models. OLS are used in all models. All control variables are included. Provincial fixed effects are controlled, standard errors are clustered in provincial level. "All" means regressions that include all respondents. "African", "Colored", "Asian" and "White" means regressions that only include specific group of respondents, respectively. "Mechanism" is the interaction variable between mechanism and independent variable (aid employment). When regressing by groups, control variable "race" is dropped.

4.4 Robustness

I tested robustness on several dimensions. On the first dimension, I consider different methods. The dependent variable, inequality, is an ordinal variable. Therefore, OLS regression can lead to bias. To address this, we introduce Order Logit (Ologit) and Order Probit (Oprobit) models. Moreover, since many observations of the independent variable are clustered around 0 (only a few places received aid), models that solve this zero-inflation problem should be used. We introduce a Poisson Pseudo Maximum Likelihood (PPML) model to address this problem. The results are shown in Table 4.8. We use only the amount of aid as the dependent variable. As we can see, in all models the results are similar to the baseline model. Therefore, although theoretically the use of OLS might not be so appropriate in this situation, to ensure the consistency of the paper, we will continue to use OLS in the remaining part of this paper.

Table 4.8 Different methods³⁷

Model	(1)	(2)	(3)
Method	Ordered logit	Ordered probit	PPML
aid	0.0619** (0.0247)	0.0345** (0.0143)	0.0128** (0.0061)
Observations	12,944	12,944	12,944

³⁷ Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All samples are included. All control variables are included. Year 2012 is missing in all models. In all models, aid is measured by amount. In all regressions, we use random effect. Standard errors are clustered in provincial level.

Table 4.9 Different Measurements (by status)³⁸

³⁸ Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Year 2012 is missing in all models. 2SLS are used in all models. Instrument variable is logged steel production. All control variables included. “aid” is the result of independent variable in the second stage regression. “steel” is the result of instrument variable in the first stage OLS regression. In all regressions, Provincial fixed effects are controlled, standard errors are clustered in provincial level.

Model Type	(1) Implement	(2) Complete
	aid numbers	aid numbers
aid	0.357*** (0.0681)	0.363*** (0.0707)
steel	0.694*** (0.0711)	0.684*** (0.0801)
Observations	14,576	14,576

On the second dimension, we consider variants of variables. The results are presented in Table 4.9 to model 4.11. In model 1 and model 2, we use implemented and completed aid projects instead of committed aid. This is reasonable because some aid projects exist only on paper. In model 3 and model 4, we regress different classes of aid, ODA and OOF. Typically, ODA flows to the government of recipient countries and is more aimed at promoting local welfare. In model 5 and model 6, we regressed different types of aid, grants, and loans. Technically, repayment is required for loans, although Chinese government always provide debt forgiveness to African countries, but people's attitude towards different types of aid is different. In model 7 and model 8, we consider two types of aid, infrastructure aid and non-infrastructure aid. As Dreher (2016) pointed out, infrastructural aid is a type of aid with "Chinese characteristics," which differs from traditional OECD aid. In each model, I will still use steel production as IV and report the result of the second stage regression. In model 1 and model 2, aid is measured by number, while in model 3 through model 8, aid is measured by total amount

As we can see from the table, receiving grant aid tends to increase rather than decrease local perceptions of inequality. This may be because grant aid goes directly into the pockets of governments and is distributed by local governments, and therefore may be sensitive to corruption. The effect of infrastructural aid is significant while the effect of non-infrastructural aid is not. This may be because infrastructural aid may be less likely to be captured. This type of aid is visible and can benefit local people directly. However, non-infrastructural aid is “hidden” (to local people) and is less likely to affect people’s attitude and behavior.

Table 4.10 Different Measurements (by class)³⁹

Model	(3)	(4)
Class	ODA	OOF
	ODA amount ⁴⁰	OOF amount
aid	0.433* (0.236)	0.169** (0.0862)
steel	0.607* (0.303)	1.915** (0.716)
Observations	14,003	12,687

Table 4.11 Different Measurements (by type)⁴¹

³⁹ Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Year 2012 is missing in all models. 2SLS are used in all models. Instrument variable is logged steel production. All control variables included. “aid” is the result of independent variable in the second stage regression. “steel” is the result of instrument variable in the first stage OLS regression. In all regressions, Provincial fixed effects are controlled, standard errors are clustered in provincial level.

⁴⁰ Logged. So was grant amount, loan amount, infrastructure amount and non-infrastructure amount.

⁴¹ Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Year 2012 is missing in all models. 2SLS are used in all models. Instrument variable is logged steel production. All control variables included. “aid” is the result

Model Type	(5) grant	(6) loan	(7) infrastructure	(8) non-infrastructure
	aid amount	aid amount	aid amount	aid amount
aid	-0.597 (0.496)	0.0966* (0.0523)	0.107*** (0.0194)	0.224 (0.2651)
steel	-0.503 (0.350)	2.559*** (0.724)	2.192* (1.029)	1.156 (1.151)
Observations	12,822	14,424	14,082	13,009

Table 4.12 Different Measurements⁴²

Model Inequality	(1) reason	(2) response	(3) spend	(4) class	(5) scale
	aid amount	aid amount	aid amount	aid amount	aid amount
inequality	-0.0732** (0.0292)	-0.0091 (0.0476)	0.0200 (0.0694)	0.0871*** (0.0155)	-0.2000** (0.0837)
steel	4.389** (0.2528)	3.3000 (0.8715)	5.0766*** (1.7937)	3.3000 (0.8715)	3.3000 (0.8715)
Observations	8,635	11,193	9,988	11,193	11,193

On the third dimension, I will use alternative measures of the outcome variable. Results are shown in Table 4.12. The first alternative measurement is the reason of poverty, which is an ordinal variable in SASAS. There are four values for this variable, 1 refers to “laziness”, 2 refers to “inevitable part of modernization”, 3 refers to “unlucky” and 4

of independent variable in the second stage regression. “steel” is the result of instrument variable in the first stage OLS regression. In all regressions, Provincial fixed effects are controlled, standard errors are clustered in provincial level.

⁴² Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Year 2012 is missing in all models. Year 2009 and 2008 is missing in model (1). Year 2008 is missing in model (3). Year 2012 is missing in all models. 2SLS is used in all models. Instrument variable is logged steel production. All control variables included. “aid” is the result of independent variable in the second stage regression. “steel” is the result of instrument variable in the first stage OLS regression. In all regressions, Provincial fixed effects are controlled, standard errors are clustered in provincial level.

refers to “injustice in society”. Obviously, the higher the value, the more likely it is that the respondent supports a large redistribution, or in other words, believes that inequality is high. The second alternative measure is the attitude towards redistribution, which includes two questions, "It is the government's responsibility to reduce the difference in income" and "The government should spend less on the poor". The value of these variables ranges from 1 to 5, which means "strongly agree" to "strongly disagree" respectively. The third measure is self-perceived social status, which includes two questions, "What class do you belong to? (1 to 5, lower to upper)", and “how will you place yourself (1 to 10, bottom to top). The results are shown in Table 4.7. As we can infer from model 1, receiving aid from China makes people less likely to believe that poverty is caused by an unjust society. Model 4 shows that receiving China's aid increases people's self-placed social class level, but when people are asked to place themselves in a large scale, the result becomes negative. This shows that self-placed social status may not be a good proxy for subjective inequality. Moreover, we found no evidence that aid affects people's attitudes towards the government. This result reminds us that there is a gap between perception of inequality and attitude toward redistribution, in other words, not everyone dislike inequality.

On the fourth dimension, following Dreher et al. (2016)’s advice, I will use different instruments and placebo instruments to test the robustness. Model 1 and model 2, which are in Table 4.13, tested alternative instruments. In model 1, following Dreher et al.

(2019), since the original instrument cannot determine provincial level differences, we interact the steel production with the

Table 4.13 Different Instruments (alternative)⁴³

Model	(1)	(2)
Instrument	Steel ⁴⁴ * probability of aid	China's net export
	Aid amount	Aid amount
Aid	0.0536*** (0.0151)	0.152* (0.0893)
Instrument	8.678*** (2.502)	0.600* (0.302)
Observations	12,944	12,944

Table 4.14 Different Instruments (placebo)⁴⁵

Model	(3)	(4)	(5)	(6)
Instrument	USA steel ⁴⁶	Japan steel	Russia steel	EU steel
	aid mount	aid mount	aid mount	aid mount
Aid	0.325 (0.283)	-1.465 (4.210)	0.135* (0.0781)	-0.0852 (0.0904)
Instrument	0.874 (0.541)	-0.142 (0.493)	6.694*** (1.811)	-1.216 (0.672)

⁴³ Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Year 2012 is missing in all models. 2SLS is used in all models. Instrument variable is logged steel production. All control variables included. "aid" is the result of independent variable in the second stage regression. "instrument" is the result of instrument variable in the first stage OLS regression.

⁴⁴ Logged. So was China's net export.

⁴⁵ Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Year 2012 is missing in all models. 2SLS is used in all models. Instrument variable is logged steel production. All control variables included. "aid" is the result of independent variable in the second stage regression. "instrument" is the result of instrument variable in the first stage OLS regression.

⁴⁶ Logged. So were other countries' steel production.

	12,944	12,944	12,944	12,944
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probability of a province receiving aid. The probability of receiving aid is measured by the share of year between 2007 to 2017 that a province receiving China's aid. In model 2, I use China's current account balance as a new instrument of China's aid. Theoretically, the more China earn from trade, the higher supply of China's aid will be. All these two models are positive and significant. In Table 4.14, I use USA, Japan, Russia and European Union's steel production as placebo instruments. It can be easily inferred that other countries' steel production cannot affect China's productivity. Results are shown in table 4.8. As we can see, since both the sign and the significance level of coefficients became unstable, in some models, the R-squared are negative. Therefore, the placebo tests were passed. We can be more confident that the instrument is effective.

4.5 Unsolved problems

Although we have already tested the robustness on several ways, due to the limitation of data, methodology and theory, many problems remain unsolved. I will try to discuss those problems and their potential solutions.

The first problem is spillover. For different aid projects, the regions and people that are impacted by aid varies. Some projects may only hire people from certain areas or with certain skills, while the employees of other firms may be nationwide. Therefore, the

actual treatment may not be captured. However, since the data of the independent variable only include geographical information at the provincial level, this problem is difficult to solve. Previous scholars have shown that the effects of most aid projects are primarily localized. Isaksson & Kotsadam (2018) and Blair et al. (2020) both found that when the respondent's residence is more than 50 km away from the project, the effect of aid is no longer significant. Furthermore, although South Africa does not impose restrictions on internal migration, the impact of internal population migration is insignificant, at least in this context. This is because South Africa has only nine provinces, each of which is large enough to make interprovincial migration time consuming and costly. Scholars have found that South Africa's rural population prefers to migrate to nearby cities for economic reasons. As a result, the proportion of people who work in cities close to their homes is much higher than the proportion who work in cities far from their homes. (Bakker et al. 2019). This pattern of urbanization is quite different from that in China, where urbanization first started in the southeastern areas, leading people from all over the country to migrate to provinces such as Guangdong and Fujian in the 1980s (Ma & Lin 1993). Therefore, although we cannot estimate the spillover effects, we can be confident that these effects are not that strong in the South African context.

The second concern is that although we have differentiated and analyzed different types and classes of aid, we still cannot fully capture all of China's investment in South Africa, nor can we exclude the impact of investment from other sectors. First, we did not distinguish between aid from governments, state-owned enterprises, and the private

sector. This is because, only aid from non-private sectors is coded in the data. Figure 4.1 shows the funding agency of Chinese aid to South Africa since 2007, according to the AidData dataset. As we can see, all aid comes from the non-private sector; moreover, almost 65% of the aid is funded by the Chinese government. Second, we have not distinguished between aid projects, which are intended to help people, and other foreign direct investment (FDI), which is profit-driven. This is crucial. However, there are no theories or data that clearly distinguish FDI from aid. Definitions and scopes of FDI and aid are mixed, although their origins and outcomes can be very different. Due to data availability, we can only assume that aid and FDI are similar. Finally, we have not distinguished between aid from China and aid from other countries. This is because South Africa is not a typical aid recipient; its economy is not dependent on aid, which may be different from its African counterparts. According to World Bank data, from 2007 to 2017, South Africa received only nine aid projects from OECD countries, which is not comparable to China's aid. Therefore, given the current availability of data, this issue can only be addressed in the future.

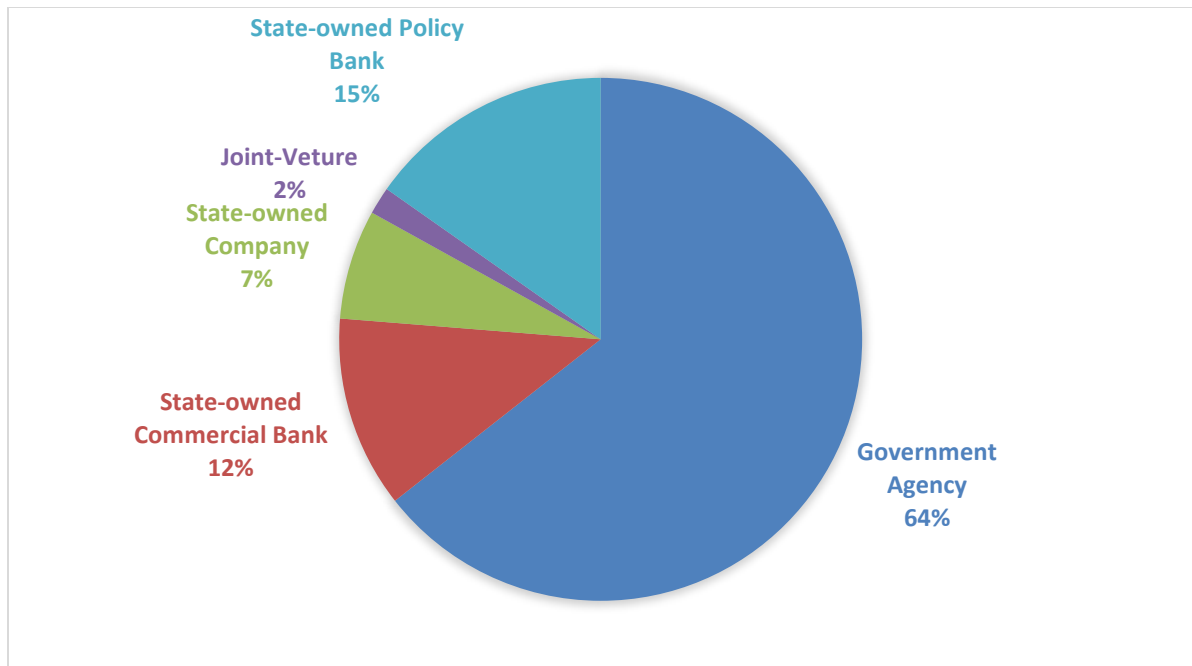


Figure 4.1 Funding Agency of China's Aid

Last but not least, the unit of this paper is the province, but the perception of inequality is an individualized variable. This is critical. However, it is not possible to obtain detailed geographic information for each individual in the SASAS data. Therefore, this paper can only set the unit of research at the provincial level, using average attitudes and average personal characteristics at the provincial level as a proxy for the characteristics of all individuals in the province. This compromise can by no means represent the vast differences among individuals within provinces, since each province in South Africa is a large administrative unit with an average population of six million. Nevertheless, through a substantial amount of data, regressions by ethnic groups, and numerous robustness checks, we can still be confident that China's aid can reduce perceptions of inequality in

South Africa. A more detailed analysis of the effect, however, requires more precise, geocoded data on perceptions of inequality.

5 Conclusion

Many works have found that the socio-economic structure and situation of a country is deeply affected by "windfalls" (oil, aid, etc.) . For example, scholars found that foreign aid reduces poverty in one place while increasing inequality in another. Perceptions of inequality are also an important topic in political economy. Scholars noticed that mis(perceived) inequality can affect people's attitudes toward redistribution and people's policy preferences, this process may be inconsistent with the actual level of inequality. However, the relationship between foreign aid and perceptions of inequality has received little attention. Using the latest China's aid dataset from AidData and the SASAS survey, this paper tries to find a relationship between aid and perceived inequality in South Africa. I found that receiving China's aid makes people more likely to disagree that "the difference of income is too high", in other words, aid reduces the perception of inequality. Moreover, we can also find some variance between races, China's aid seems to benefit Africans and Asians more.

However, the distribution of aid is not random. It is likely that a rich place is more likely to receive an aid project, while the perception of inequality may also be affected by economic development. To address this, I introduced China's steel production as an instrument variable. The relevance assumption holds because both scholars and official documents have shown that China has always used foreign investment to deal with overproduction. Since most of China's industry relies on steel and iron, steel production

can be a good proxy for China's productivity. Exclusive assumption also holds since China's steel production cannot affect South African people's perception of inequality, unless by affecting China's aid. After using instrumental variables, the results did not change. This paper also tries to discover the mechanism of this relationship. I proposed that Chinese aid reduces people's perceptions of inequality by increasing their POUM. I used the real unemployment rate and self-reported employment status as proxies for POUM. This mechanism is partially tested by using mediation effect regressions; however, the results shows that this mechanism is weak.

Questions remain. First, due to data limitations, this research can only be conducted at the provincial and cross-sectional level; given that South Africa is a large country, and the province is the highest administrative level, this project is vulnerable to many unobserved factors that may also affect the outcome. Second, unemployment rate and self-reported employment status may not be an effective indicator of POUM, a better one should be found. As we can see in the results, these mechanisms are not strong. Third, comparisons between China's aid and other countries' aid are needed. Finally, as the second largest economy in Africa, South Africa may not be a good example of aid recipient, thus, the external validity of this paper is uncertain. Therefore, we still need to go further and dive deeper.

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