

Segregation's Effect on the Provision of Local Public Goods: Replication of Edjemyr, Kramon, and Robinson (2017)

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0.1 Abstract

Ejdemyr, Kramon, and Robinson (2017), show that ethnic segregation is a key determinant in whether ethnic favoritism plays a role in the provision of public goods. I was able to successfully replicate the authors' results. For my extension, I used the same models as for the replication except instead of using boreholes (wells) as my proxy for public goods provision as the authors did, I used health clinics and schools. When using these other dependent variables, I found that the effects of segregation were different from those presented in the paper.

0.2 Introduction

The paper by Ejde myr, Kramon, and Robinson (2017), hereafter referred to as EKR, explores the issues of public goods provision and how ethnicity may play a role in how these goods are distributed. The authors find that segregation is an important factor in local public goods provision. The authors argue that ethnic segregation within communities promotes greater local public good provision and to greater ethnic favoritism. This is because public goods by nature are not excludable, meaning that everyone in the community has access to them. Thus, if ethnic favoritism is a driving factor in the provision of public goods, it makes sense that areas with more ethnic homogeneity would receive more goods. This paper uses data from Malawi to look at how ethnic segregation within electoral districts relates to the provision of boreholes, or wells. The authors use boreholes as their measure of public goods provision because these goods are in high demand, and in Malawi, MPs have influence over their provision. To understand the relationship between ethnicity, segregation, and public good provision, the authors collected data on the ethnicity of MPs, the electoral districts, and the ethnicities of the localities which are smaller areas within electoral districts. The authors use two models to understand the relationship between segregation and local public goods provision. The first model is a standard generalized linear model in which segregation is a continuous variable and regressed on the change in the number of boreholes between 1998 and 2008. The second model is a difference in differences model in which segregation is a categorical variable, defined as either, low, medium, or high, and is regressed on the probability that a locality has a borehole. As shown in the figure (Figure 3) and table 2, the difference in differences model finds that in areas with high and medium segregation, when a coethnic is elected to parliament, the likelihood that the locality has a borehole increases. Both models find that higher levels of segregation are associated with a greater increase in the number of boreholes within a locality.

For my replication of EKR (2017), I used R Studio to run the authors' code and replicate their results. I found the authors' code online alongside their paper here. With the code and data provided by the authors, I was able to run their models and successfully recreate all of their results. My replication, including the authors' code can be found at my github.¹

For my extension of EKR's paper, I was interested in looking at whether their findings held true for local public goods other than just boreholes. While the authors explained that they used boreholes due to their high demand and MP's ability to influence their production, I wanted to know whether other public goods would have similar results. In the dataset used for the glm model, there was data on the number of schools and health clinics in a locality between 1998 and 2008. To test the robustness of the paper's findings, I ran

¹https://github.com/asnorris/Norris_EKR2017_Replication

the same glm model used to create Table 1 but this time, instead of using boreholes as the dependent variable using health clinics and schools as proxies for the provision of public goods. My models were not consistent with EKR’s findings. The model for health clinics showed a small positive but statistically insignificant positive relationship between segregation and the provision of health clinics. The model for schools showed a negative but statistically insignificant relationship between segregation and the provision of schools in a locality.

0.3 Lit Review

This section of the paper is a literature review of academic literature that is related to the subject matter of the paper by EKR and my replication. One concept essential to this paper is the idea of ethnic favoritism on the African continent. There is much literature that suggests that coethnics of political leaders in Africa experience a number of positive outcomes including better health and education (Franck and Ranier, 2012), better infrastructure (Burgess et al., 2015), and greater access to foreign aid (Jablonski 2014; Briggs 2014)². Interestingly, the literature on ethnic favoritism does not reign true across the board, with studies showing variation in the prevalence of ethnic favoritism (e.g. Franck and Ranier 2012; Kramon and Posner (2013)).³ This variation in the prevalence of ethnic favoritism is at the crux of the puzzle that EKR (2017) seek to explore. There is much literature exploring the relationship between ethnic clustering and the provision of public resources (e.g. Bates, 1983; Kasara, 2007; Kimenyi, 2006)⁴, and the relationship between diversity and the provision of public resources (e.g., Alesina et al., 1999; Easterly and Levine, 1997; Habyarimana et al., 2009; Miguel and Gugerty, 2005)⁵. EKR (2017) draws from this literature and examines the ideas of ethnic clustering and diversity, exploring how segregation within electoral districts in Malawi affects the provision of local public goods.

0.4 Paper Review

As mentioned above, EKR’s paper is an exploration of the relationship between ethnic segregation within electoral districts and the provision of local public goods. The paper seeks to answer the question: How does ethnic favoritism relate to the provision of local public goods in Malawi. Informed by literature on the effects of ethnic favoritism by politicians, the authors hypothesize that “ethnic group segregation helps account for variation in ethnic favoritism”, and more specifically, “that segregation promotes greater overall investments

²Literature is as cited in EKR (2017)

³Literature is as cited in EKR (2017)

⁴Literature is as cited in EKR (2017)

⁵Literature is as cited in EKR (2017)

in local public goods and leads to more ethnic favoritism in their distribution” (p.1). To explain the logic of their hypothesis, the authors created Figure 1, two hypothetical electoral districts with smaller localities located within, and a local public good. Each of the larger squares represents an electoral district while the smaller squares represent the smaller localities located within the districts. Each person in the district is represented by a dot with the black and gray dots representing two different ethnicities. Both districts have the same level of diversity amongst the localities but the district on the left is much more segregated than the district on the right. The large black diamonds in each electoral district represent a local public good and the circle around the diamond represents the circle of access, meaning that everyone within the circle is able to access the public good. As shown in Figure 1, in the district with higher segregation, the good can be provided in a place where people of one ethnicity have greater access to the good than other ethnicities. In the district with lower segregation, access to the good is more equal amongst the different ethnicities. This figure is crucial to understanding the authors’ hypothesis. They posit that due to the ability to discriminate, districts with higher levels of segregation will have a greater provision of public goods as a result of MPs being able to act upon ethnic favoritism.

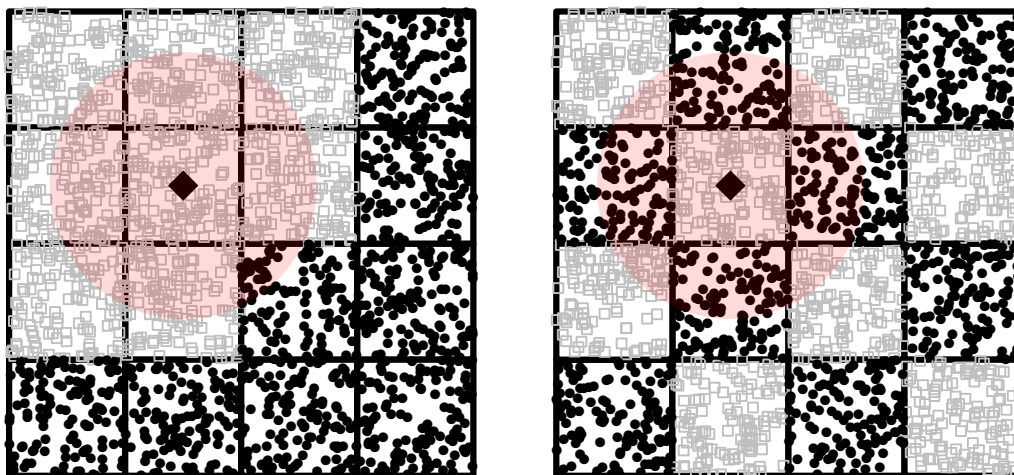


Figure 1: Hypothetical Electoral Districts

To test their hypothesis, EKR used boreholes (wells) as a proxy for local public goods. The authors chose boreholes as their proxy for local public goods because there is high demand for the goods and MPs are able to exert influence over their provision. To test whether there is a relationship between ethnic segregation and the provision of boreholes, the authors used two models: a generalized linear model in which segregation is a

continuous variable and is regressed on change in the number of boreholes between 1998 and 2008; and a difference in differences model in which segregation is a categorical variable and localities that never had a coethnic MP are compared to localities that had a coethnic MP after 1998.

The first model, the glm showed a positive relationship between segregation and the provision of boreholes. These results can be seen in Table 1 which is my replication of Table 1 of the EKR paper. The correlation coefficient for segregation is both positive and statistically significant at the $p < 0.05$ level suggesting that these results are robust. This model shows that more boreholes were built between 1998 and 2008 in electoral districts where there was greater segregation.

Table 1: Segregation and Borehole Investments across Electoral Districts

| | <i>Dependent variable:</i> | | | |
|---|----------------------------|-------------------|-------------------|-------------------|
| | Number of New Boreholes | | | |
| | (1) | (2) | (3) | (4) |
| Segregation (continuous) | 1.86** (0.72) | 1.76** (0.76) | | |
| Dummy for Medium Segregation | | | 0.43*** (0.15) | 0.50*** (0.16) |
| Dummy for High Segregation | | | 0.38** (0.17) | 0.38** (0.19) |
| Ethnic Diversity (ELF) | -0.89** (0.39) | -0.63 (0.61) | -0.86** (0.38) | -0.45 (0.60) |
| Population Density (ln) | 0.52*** (0.20) | 0.41* (0.21) | 0.38** (0.18) | 0.25 (0.20) |
| Urban Proportion (ln) | -0.05 (0.04) | -0.02 (0.04) | -0.04 (0.04) | -0.02 (0.04) |
| Land Area (square KM) (ln) | 0.69*** (0.15) | 0.63*** (0.15) | 0.66*** (0.14) | 0.56*** (0.15) |
| Boreholes per 10,000 residents in 1998 | 0.24** (0.09) | 0.23** (0.10) | 0.24*** (0.09) | 0.22** (0.09) |
| Electoral Competitiveness | | 0.005 (0.005) | | 0.01 (0.005) |
| MP Coethnic Population Share | | 0.02 (0.42) | | 0.16 (0.42) |
| President Coethnic Population Share | | 0.78 (1.14) | | 0.50 (1.13) |
| Distance to Nearest City (ln) | | 0.31 (0.83) | | -0.03 (0.82) |
| Water Aid Projects per 10,000 residents | | 0.31 (0.47) | | 0.07 (0.49) |
| All Aid Projects per 10,000 residents | | -0.07 (0.05) | | -0.05 (0.05) |
| Constant | -0.62 (0.82) | -2.25 (4.84) | -0.19 (0.80) | 0.05 (4.82) |
| Admin. District Fixed Effects | ✓ | ✓ | ✓ | ✓ |
| Observations | 183 | 182 | 183 | 182 |

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

The second model, the difference in differences model looks at localities in which the dominant ethnicity

was never aligned with that of their MP between 1998 and 2008 and compares them to localities in which the ethnicities became aligned after 1998. Figure 2 of this paper (Figure 3 in the EKR paper) shows three graphs, one in which there is low segregation, one with medium segregation, and the last with high segregation. As shown in the first graph, localities with low segregation saw little difference in the probability that the locality had a borehole when the MP became ethnically aligned with the people in the locality. Conversely, the graphs for medium and high segregation show a significant increase in the probability of a borehole being provided to the locality when the MP becomes ethnically aligned with the locality. The authors are able to attribute this increase to ethnic favoritism and segregation because of the low segregation case in which the trend for aligned localities was basically parallel to that of non-aligned localities. Table 2 of this paper shows the results of the model and shows a statistically significant relationship between segregation and the probability of a borehole being dug in the medium and high segregation cases.

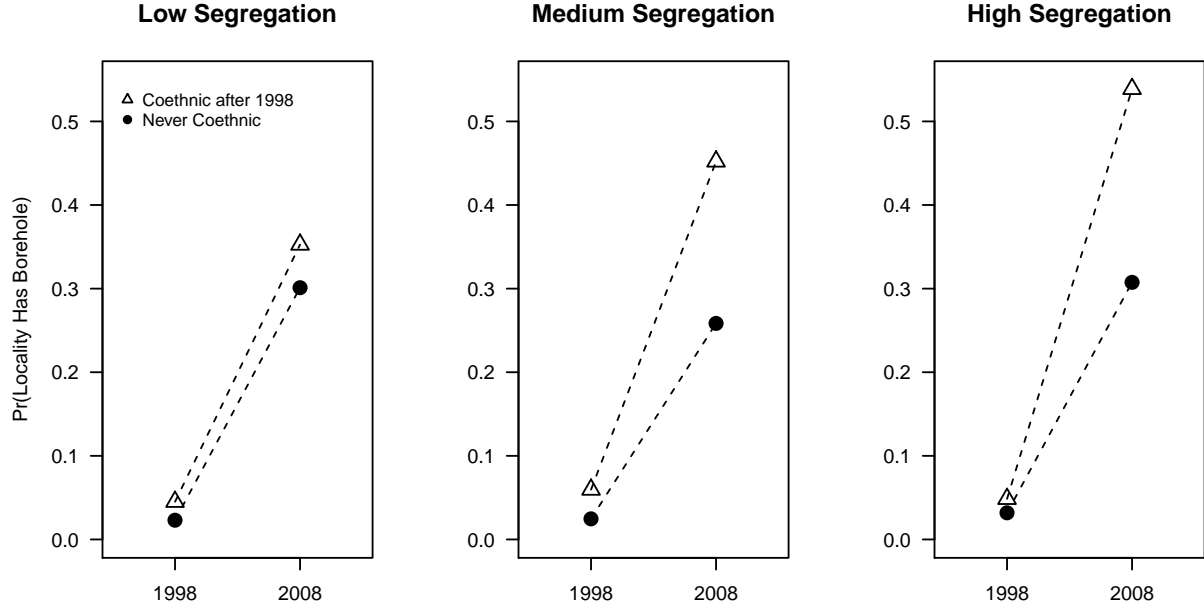


Figure 2: Difference in Differences Model

Both models used in this paper support EKR's hypothesis, suggesting that there is a positive relationship between segregation, ethnic favoritism, and the provision of public goods, in this case, boreholes. I was interested in learning whether EKR's findings were applicable more broadly to other public goods and explore that idea in my extension.

Table 2: Segregation and Ethnic Favoritism in the Provision of Boreholes

| | <i>Dependent variable:</i> | | | | | | |
|-------------------------------|---|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|
| | Indicator for whether locality has a borehole | | | | | | |
| | Low (1) | Med. (2) | High (3) | All (4) | All (5) | All (6) | All (7) |
| Match with MP | 0.03 (0.03) | 0.16*** (0.02) | 0.21*** (0.04) | 0.05** (0.02) | 0.03 (0.02) | 0.05** (0.02) | -0.02 (0.05) |
| Match x Med. Seg. | | | | 0.08*** (0.03) | 0.09*** (0.03) | 0.07*** (0.03) | |
| Match x High Seg. | | | | 0.18*** (0.04) | 0.18*** (0.04) | 0.15*** (0.04) | |
| Match x Continuous Seg. | | | | | | | 0.29** (0.11) |
| Locality Fixed Effects | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Time Period Fixed Effects | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Time Varying Controls | | | | | ✓ | ✓ | ✓ |
| Fixed Controls x Time Period | | | | | | ✓ | ✓ |
| Number of Electoral Districts | 42 | 43 | 35 | 120 | 120 | 120 | 120 |
| Number of Localities | 1315 | 1542 | 645 | 3502 | 3502 | 3502 | 3502 |
| Number of Observations | 2630 | 3084 | 1290 | 7004 | 7004 | 7004 | 7004 |

*p<0.1; **p<0.05; ***p<0.01

0.5 Replication

As mentioned in the introduction, I was able to successfully replicate all of the models used in the paper. I was also able to create Figures 1 and 3 of the paper but not Figure 2. Figure 2 involves two maps of electoral districts color coded with the ethnicities of each person in the district, whether they are a coethnic or not a coethnic. To make this figure, I would need spatial data on the two electoral districts. This was not provided in the available code or data. That being said, this figure serves mainly to display how similar levels of diversity within a district can have different levels of segregation, and thus is not important when observing the authors' findings. Figure 2 is a real-life example of the hypothetical presented in Figure 1 which shows how segregation could affect access to a resource by different ethnicities.

0.6 Extension

For my extension, I replicated the first model of the paper but instead of using boreholes as the dependent variable and proxy for public goods, I used health clinics and schools. Data for the change in the number of health clinics and schools between 1998 and 2008 was available in the dataset. While the authors justified their choice of boreholes arguing that they were in high demand and MPs exerted influence over their provision, I believe that it is important to explore whether these findings are true for other goods. Again, using a

generalized linear model, I regressed the continuous variable segregation on the change in the number of health clinics or schools respectively. Interestingly, my findings for health clinics and schools were not consistent with EKM's findings using boreholes. The results from the model for health clinics, Table 3, showed a very small and statistically insignificant relationship between segregation and the provision of health clinics. The results from the model for schools, Table 4, showed a sizeable negative but statistically insignificant relationship between segregation and the provision of schools.

Table 3: Segregation and Health Clinic Investments across Electoral Districts

| | <i>Dependent variable:</i> | | | |
|---|------------------------------|------------------|-------------------|------------------|
| | Number of New Health Clinics | | | |
| | (1) | (2) | (3) | (4) |
| Segregation (continuous) | 0.27 (1.09) | 0.27 (1.16) | | |
| Dummy for Medium Segregation | | | 0.16 (0.26) | 0.06 (0.28) |
| Dummy for High Segregation | | | 0.38 (0.30) | 0.42 (0.32) |
| Ethnic Diversity (ELF) | 1.72*** (0.60) | 0.86 (0.94) | 1.72*** (0.60) | 0.79 (0.95) |
| Population Density (ln) | 0.37 (0.32) | 0.42 (0.33) | 0.36 (0.29) | 0.37 (0.32) |
| Urban Proportion (ln) | -0.08 (0.06) | -0.11* (0.07) | -0.06 (0.06) | -0.09 (0.07) |
| Land Area (square KM) (ln) | 0.52** (0.25) | 0.49* (0.25) | 0.49** (0.25) | 0.46* (0.25) |
| Health Clinics per 10,000 residents in 1998 | -0.49* (0.27) | -0.50* (0.27) | -0.49* (0.27) | -0.56* (0.28) |
| Electoral Competitiveness | | 0.01 (0.01) | | 0.004 (0.01) |
| MP Coethnic Population Share | | -1.12* (0.64) | | -1.17* (0.66) |
| President Coethnic Population Share | | 0.39 (1.93) | | 1.14 (2.00) |
| Distance to Nearest City (ln) | | 0.82 (1.30) | | 0.80 (1.30) |
| Water Aid Projects per 10,000 residents | | 0.15 (0.60) | | 0.24 (0.64) |
| All Aid Projects per 10,000 residents | | 0.04 (0.07) | | 0.04 (0.07) |
| Constant | -3.23** (1.40) | -6.79 (7.57) | -3.02** (1.38) | -6.41 (7.53) |
| Admin. District Fixed Effects | ✓ | ✓ | ✓ | ✓ |
| Observations | 183 | 182 | 183 | 182 |

*p<0.1; **p<0.05; ***p<0.01

These results do not support the endogeneity of EKR's findings but do not necessarily invalidate them. The authors chose boreholes as their dependent variable because of the fact that they are in high demand and MPs are able to exert control over them being built. The different results seen in my models for health

Table 4: Segregation and School Investments across Electoral Districts

| | <i>Dependent variable:</i> | | | |
|---|----------------------------|--------------------|--------------------|--------------------|
| | Number of New Schools | | | |
| | (1) | (2) | (3) | (4) |
| Segregation (continuous) | −0.59 (0.88) | 0.004 (0.92) | | |
| Dummy for Medium Segregation | | | 0.20 (0.21) | 0.12 (0.21) |
| Dummy for High Segregation | | | 0.27 (0.24) | 0.43* (0.25) |
| Ethnic Diversity (ELF) | 1.35*** (0.48) | 0.71 (0.71) | 1.47*** (0.47) | 0.75 (0.71) |
| Population Density (ln) | 0.73*** (0.26) | 0.61** (0.27) | 0.84*** (0.23) | 0.66*** (0.25) |
| Urban Proportion (ln) | −0.12** (0.05) | −0.09 (0.06) | −0.10* (0.05) | −0.07 (0.06) |
| Land Area (square KM) (ln) | 0.89*** (0.19) | 0.84*** (0.18) | 0.90*** (0.19) | 0.86*** (0.19) |
| Schools per 10,000 residents in 1998 | −0.43*** (0.06) | −0.46*** (0.06) | −0.43*** (0.06) | −0.47*** (0.06) |
| Electoral Competitiveness | | −0.01* (0.01) | | −0.01** (0.01) |
| MP Coethnic Population Share | | −0.32 (0.52) | | −0.29 (0.52) |
| President Coethnic Population Share | | 0.92 (1.47) | | 1.42 (1.49) |
| Distance to Nearest City (ln) | | −1.21 (1.00) | | −1.27 (1.01) |
| Water Aid Projects per 10,000 residents | | 1.25** (0.56) | | 1.32** (0.58) |
| All Aid Projects per 10,000 residents | | −0.12** (0.06) | | −0.13** (0.06) |
| Constant | −2.56** (1.07) | 5.10 (5.82) | −2.69** (1.05) | 5.40 (5.84) |
| Admin. District Fixed Effects | ✓ | ✓ | ✓ | ✓ |
| Observations | 183 | 182 | 183 | 182 |

* p<0.1; ** p<0.05; *** p<0.01

clinics and schools may be because of the nature of these goods. Health clinics and schools are seemingly more expensive to build and require paid personnel to man them than boreholes. This greater cost could result in greater federal oversight of these goods, resulting in MPs having less control over their provision and therefore creating the results seen in Tables 3 and 4. This is a possible explanation for the differences in results but remains untested. I would need to have a much greater understanding of how Malawi funds schools and health clinics before I could make a more certain claim about why there are differences in the results for boreholes, health clinics, and schools.

0.7 Conclusion

This paper successfully replicates the findings of EKR (2017), supporting the authors' hypothesis that there is a positive relationship between segregation and the provision of local public goods. My extension of this paper builds upon the work by EKR (2017) by using their generalized linear model with health clinics and schools as the dependent variables. With my extension, I did not find the same positive statistically significant relationship as found by the authors when using boreholes as the dependent variable. My findings challenge the robustness of EKR's findings suggesting that the positive relationship they found may not be replicable with other local public goods.

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