The Effects of Foreign Aid on Rent Seeking Incentives in the Presence of Ethnic Heterogeneity

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May 6 2010

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Submitted to the Department of Economics of Amherst College in partial fulfillment of the requirements for the degree of Bachelor of Arts with honors.
Acknowledgments

First I wish to thank my advisors Professor Barbezat and Professor Alpanda for their patience, support and ideas. Without them this work would not have been possible. Also thank you to Professor Reyes as my academic advisor and reader and for her guidance in the early stages of the thesis process. Thank you to Professor Rivkin for providing me with insightful comments as my reader. I also wish to thank my family for indulging my academic curiosity on this continent and beyond (despite a certain amount of trepidation). Finally, thank you to my friends for supporting me throughout this period of mental deterioration, for always providing “intelligent” dinner conversation and for helping me to avoid PTSD.
Abstract

I develop a model that incorporates elements of rent seeking into a model considering the impact of ethnic heterogeneity on education provision. The model shows how foreign aid can lead to increased incentives to rent seek, leading lower provisions of education in ethnically heterogeneous localities. In my model, groups are faced with a tradeoff between private production and rent seeking effort. The government’s budget can either be spent on providing education (consumed equally by all groups) or the budget can be appropriated to the groups’ private consumption. Appropriation is based on rent seeking effort and the amount of fungible government budget. The model takes the form of a utility maximization problem; groups maximize utility subject to private production and rent seeking production constraints. The model shows that, as foreign aid rises, group incentives to rent seek rise. Within this theoretical framework, I use education provision as an indication of rent seeking because rent seeking is itself impossible to measure. The model is empirically tested using school-level data from a randomized study conducted from 1996-2000 in western rural Kenya. I find that ethnic heterogeneity does lead to statistically significant worse school outcomes for some specifications of education quality and quantity. The results regarding foreign aid are mixed and specification-dependent. Further analysis and a larger dataset are needed to fully understand the interaction between ethnic heterogeneity and allocations of foreign aid.
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1. Introduction: the Effect of Ethnic Heterogeneity on Foreign Aid Effectiveness

This thesis fills the gap in the existing literature by merging a model of group rent seeking with a model of education provision in the presence of ethnic heterogeneity. Foreign aid, as a windfall to the government’s budget, increases the incentives to rent seek. The model also elucidates the effects of taxes, education quality, and ethnic heterogeneity on these incentives. Because rent seeking is not directly seen within an economy, empirical tests of rent seeking models are difficult. This model shows one way rent seeking is manifested—rent seeking contributes to lower provisions of education where there are competing social interests, providing one possible way to test for rent seeking. To test this channel, the model is applied using data from two rural Kenyan districts, aiming to highlight the effects of rent seeking on education outcomes based, in part, on variations in ethnic heterogeneity.

This thesis is structured as follows. In the rest of this section I present some background of growth and foreign aid in Kenya. Section 2 outlines the relevant literature on rent seeking and education provision in the presence of ethnic heterogeneity. The model and utility maximization are presented in section 3. Sections 4 and 5 describe schooling in Kenya and the data used for the empirical analysis of the propositions derived in section 3. The results are presented in section 6. Section 7 outlines some steps for future research and section 8 concludes.

1.1 Background

After African countries gained their independence, multinational organizations, former colonizing nations, and the United States began donating billions of dollars to help the new nations build infrastructure, establish stable democracies, and educate the
population. The United States alone donated USD$25,439 million official development aid to developing countries. According to OECD data for 2006-2007, Sub-Saharan African received USD$27,187 million.\(^1\) Despite this large amount of aid, most African countries, with the exception of Botswana and Mauritius, have experienced little or negative growth. This has lead to controversy over the most effect aid policy and a burgeoning body of literature discussing the best way to help the developing world. There is a growing body of literature that investigates why billions of dollars of annual foreign aid has led to little or no growth and why aid effectiveness varies substantially across countries.

Many African countries stand out from those around the world because they are former colonies, have high levels of political instability, large endowments of valuable natural resources, high rate of HIV/ AIDS infection, and high levels of ethnic fragmentation and ethnic conflict. All of these factors have been shown to negatively impact growth in Africa, leading to low levels of physical and human capital, and high risk for further instability. The Kenyan post-independence experience is one such example.

Kenya has received foreign aid from the International Monetary Fund (IMF), the World Bank, USAID, and non-governmental organizations (NGOs) since its independence in 1963. This aid has come in a variety of forms; early aid from the IMF was conditional on Kenya achieving macroeconomic goals such as low inflation and deficit reduction. Since the 1990s, aid has become more decentralized, targeted to specific regions or districts and aimed at specific projects such improving health outcomes, increasing primary school enrollment or expanding infrastructure development.

\(^1\) This figure includes aid from all donors, not just the United States.
While official development aid to Kenya has been continually high and rising, these aid flows have not translated into consistent GDP growth. Since 2003, Kenya’s average GDP growth is 3.3%, ranging from a low of 0.8% percent in 2003 to a high of 7% in 2008, then falling to 1.7% in 2009. GDP per capita has grown on average only 0.1% a year from 1990 to 2008. This is slower than the country’s 1.2% per capita average annual growth rate from 1970 to 1990 (UNICEF).

In addition to stagnating growth, in the past decade, Kenya has experienced political instability and ethnic conflict. After the 24-year long dictatorship of Daniel arap Moi ended in 2002, Kenya became a model for democratic progress in Eastern Africa. In December 2007, Kenya’s democracy was shaken by election violence when the challenger, Raila Odinga, accused the incumbent, President Mwai Kibaki, of election fraud, ethnic favoritism and rampant government corruption. In the days that followed, the country descended into ethnic conflict between the Kikuyu, Kibaki’s ethnic group, and the Luo, Odinga’s ethnic group, leaving hundreds dead and thousands displaced. Thus, anecdotally, ethnicity plays a key role in the inability of Kenya to maintain a stable democracy.

Easterly and Levine (1997) offered the first extensive study of ethnicity in an empirical framework, examining high ethnic heterogeneity as a possible explanation for slow growth in Africa. The authors find heterogeneity is a significant cause of the growth gap between African countries and others. Based on Easterly and Levine (1997), other authors have begun to investigate the mechanisms through which ethnic heterogeneity leads to worse growth outcomes. The quantity and quality of primary schools in Kenya has been found to depend on the ethnic heterogeneity of school districts—schools in

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2 CIA World Factbook.
areas with a high level of diversity are found to have lower funding and worse school facilities than those in low diversity areas (Miguel 2000). Miguel and Gugerty (2005) corroborate this finding and also find that ethnic heterogeneity is weakly associated with worse water well maintenance.³

Ethnic heterogeneity is also found to lead to a higher level of “patronage goods;” government spending on this type of good crowds out government spending on public goods (Cohen 1995, Kimenyi 2006). Within Kenya, Cohen (1995) examines several foreign aid projects implemented in Kenya, focusing mainly on the early 1990s. He notes that ethnicity and ethnic pressures are a salient issue in designing and implementing aid packages and projects. Though the paper is more anecdotal than econometric, it does show that ethnic competition can lead to policies that hamper economic growth and is a prominent feature of Kenyan society.

2. Literature

The relevant literature for this thesis comes from several areas, including literature on rent seeking, cooperation among heterogeneous groups for publically provided goods, and that assessing the effectiveness of foreign aid. My model is based on Hodler (2007), which addresses the effects of foreign aid and rent seeking using a basic growth model and Miguel (2000), which examines the provision of education in heterogeneous societies.⁴

³ Kenya is a highly fractionalized country, with an ethnolinguistic fractionalization statistic (ELF) of 0.86 in 2001. In contrast, the United States has an ELF of 0.49 according to the 2000 Census, Denmark has an ELF of 0.09 as measured in 1996.⁵ As calculated by Easterly and Levine (1997), the ELF statistic is high if a country is heterogeneous and low is homogeneous.

⁴ Miguel’s study refers to education as a public good. This definition will be carried over to the present study.
2.1 Rent Seeking

The literature on rent seeking stems from the work of Tullock (1993) and Krueger (1974) who both model the unproductive nature of rent seeking. Rent seeking creates a deadweight loss that detracts from society’s overall welfare and therefore prevents welfare maximization—it results in underproduction and less consumption than in a free market. However, there is an additional cost because rent seeking diverts resources away from productive activity and, in some cases, is illegal (i.e. bribery). Therefore, it causes a larger deadweight loss than is shown through the simple analysis of monopoly behavior and can have significant negative effects on growth, leading to the implementation of welfare diminishing policies (Krueger 1974, Shleifer and Vishny 1993). In the presence of rival social groups, rent seeking for the benefit of the group over the country as a whole can have adverse effects on growth and, in an extreme case, civil war (Szeftel 2000).

2.2 Applying Rent Seeking to Foreign Aid

Rent-seeking models have been used to theoretically show how groups vie for common resources (Hodler 2007, Hodler 2006, Svensson 2000). These models are based on the interactions between groups who each have a tradeoff between productive and rent seeking activities. When there is a windfall to the government budget, from foreign aid or the discovery of natural resources, the incentive to rent seek for use of these resources changes—as the budget increases the incentives to rent seek rise. This makes non-rent seeking cooperation harder to maintain (Holder 2006, Svensson 2000).

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3 Krueger models a case in which interest groups lobby for protectionist trade policy. Society ends up worse off for two reasons: there is a deadweight loss from rent seeking and the trade policy is more inefficient than the free trade policy that exists when interest groups do not rent seek.
Svensson (2000) finds that foreign aid, and other windfalls to the government budget, including terms of trade shocks and natural resource discoveries, are associated with higher levels of rent seeking. He uses an index of corruption to proxy for rent seeking activity and finds that this result is larger in countries with competing social groups. Social heterogeneity thus leads to higher levels of rent seeking in the presence of a budget windfall and ultimately to lower growth outcomes. Rather than replicate Svensson’s empirical approach in this thesis, education provision will be the channel through which rent seeking activity is manifested. This is a viable identification strategy because resources that are grabbed though rent seeking activity cannot be used for education provision—there is a tradeoff between rent seeking and education provision. Hodler (2007) models this tradeoff as a group’s choice between productive activity and rent seeking. In this study, groups appropriate part of the government budget for their own use, precluding the use of that budget in public investment.

The effect of foreign aid on rent seeking incentives should depend, not only on ethnicity, but also on the conditionality and nature of the donated aid (Mavrotas and Ouattara 2006, McGillivray and Ouattara 2005). Mavrotas and Ouattara (2006) divide foreign aid into four types, project aid, program aid, technical assistance and food aid. They find that the government responds differently depending on the type of aid—project and program aid are found to have a direct positive effect on public investment while technical assistance and food aid have a more ambiguous effect. All types of aid are found to have a negative effect on the amount of tax revenue collected by the local government. The relationship between tax rate and foreign aid is not addressed in this study, but is an area ripe for future research. Aid is also found to substitute for borrowing.
Mavrotas (1998) corroborates this result using data from India and Kenya. The results from these studies show that earmarked aid, tailored to country conditions and needs are more effective in spurring growth than general budget windfalls. The results of these studies form the basis for including a conditionality measure in the model.

2.3 Heterogeneity

Easterly and Levine (1997) is the seminal study on the effects of ethnic heterogeneity on growth, using a measure of heterogeneity to explain a significant portion of the growth gap between Africa and other developing and developed countries. They also find that Africa’s high level of ethnic heterogeneity can explain the frequent occurrence of political instability and differences in public policy and macroeconomic indicators. Other authors have looked more specifically at the effects of social heterogeneity on the provision of publicly provided goods. In the United States measures of social heterogeneity (racial, generational and socioeconomic) are found to adversely affect the provision of city public spending on education, roads, sewers, and trash pick up (Alesina et al. 1999). This effect is larger if the public spending benefits a particular group over another, as is the case with education and welfare (Culter et al. 1993, Poterba 1997). Luttmer (2001) finds that welfare is lower in heterogeneous states.

The quantity and quality of primary schools in Kenya has been found to depend on the ethnic heterogeneity of the school district (Miguel 2000). Schools in areas with high level of diversity are found to have lower funding and worse school facilities than those in low diversity areas. Miguel and Gugerty (2005) corroborate this result and also find that ethnic heterogeneity is weakly associated with worse water well maintenance. Ethnic heterogeneity is also found to lead to a higher level of “patronage goods;”
government spending on this type of good crowds out government spending on public goods (Kimenyi 2006).

The fact that ethnic heterogeneity leads to worse outcomes in the provision of public goods is supported by various studies, leading to the question: through what mechanism does this occur? Groups may demand different amounts of public goods, leading to a need for cooperation in the presence of many diverse groups. If groups take each others’ preferences into account while making decisions on goods provisions, the level and type of public good provided will reflect this (Habyarimana 2007). Other mechanisms have been identified, as well. In homogeneous societies, the ability to use social sanctions to punish free riders is more of an option because it is easier to identify and punish transgressors. The loss of this ability in heterogeneous societies may lead to lower provisions of public goods—groups choose not to allocate resources to public goods if there is a high chance of free riders. Evidence from Uganda suggests that this mechanism is important (Habyarimana 2007). Rent seeking, however, has not been applied as a mechanism through which ethnic groups may compete for common resources.

This thesis aims to synthesize this literature by deriving a model that shows the theoretical link between foreign aid, public good provision and ethnic heterogeneity using a rent-seeking model. The model builds off the work of Miguel (2000), which studies the effect of ethnic heterogeneity on the provision of education. Into this model is incorporated the work of Svensson (2000) and Hodler (2006, 2007), which examine the effects of windfalls to the government budget on rent seeking incentives in the presence of rival social factions, i.e. ethnic groups. Introducing rent seeking to a model of foreign
aid allocations for education provision will help to highlight one channel through which ethnic heterogeneity can adversely affect education outcomes.

2.4 Relevant Models

The model of school provision derived in Miguel (2000) allows the quality of the public school to depend on funding, input quality and ethnic heterogeneity. Utility for each household depends on the public good, minus the cost of transportation to school. In this model, ethnicity affects education provision through a breakdown of collective action, formalized in a rent-seeking model in the presence of foreign aid. Miguel (2000) does not directly address the issue of foreign aid in his model of education provision.

Hodler (2007) introduces foreign aid and rent seeking into the Barro (1990) growth model, finding that aid effectiveness depends on the level of the aid, fiscal policies and the quality of institutions through which rent seeking agents seek appropriation (in countries with better institution quality, less rent is appropriated). The author postulates that different rent seeking levels is a possible explanation for why aid effectiveness varies widely across countries. In the model, agents optimally divide their time between rent seeking and productive activities. Although the model does not explicitly address the effect of ethnic heterogeneity on foreign aid and rent seeking incentives, it does allow for noncooperative rent seeking agents. This can be extended to include ethnicity, one of the main sources of social cleavage in Sub-Saharan Africa.

Hodler (2006) develops another related and relevant model to provide insight into why natural resources maybe increase incentives to rent seek under certain conditions. In the model, natural resources increase the incentive to engage in “fighting” activity, which
reduces the amount of resources devoted to productive activity.\textsuperscript{6} Fighting activity also weakens property rights, further decreasing the incentives to engage in production. If there are enough rival social groups, the decrease in aggregate production will offset the positive effect of the natural resource, decreasing overall welfare. This paper’s model is a one-shot Cournot game in which groups maximize their private income, yielding symmetric reaction functions. The model shows that equilibrium fighting activity increases with the amount of natural resources. Additionally, the effectiveness of property rights, included in the model as a measure of institution quality, decreases as the number of rivaling social groups increases and fighting activity becomes more appealing.

This model is relevant to the present study because it models a one-period game showing the relationship between budget windfalls, social heterogeneity and “fighting,” rent seeking. However, the model does not include a publicly provided good as a tradeoff to rent seeking appropriation, which is added in this thesis.

The literature on rent seeking shows growth as the outcome of foreign aid donation, which affects rent-seeking incentives within the economy (Svensson 2000, Hodler 2006, 2007). Instead of looking at growth as the outcome of foreign aid and rent seeking, this thesis instead will follow the work of Miguel (2000), examining the variations in education provision, in Kenya. Kenyan schools have wide variety in education quality and quantity. Miguel focuses on ethnic heterogeneity as a reason for these differences, finding that ethnicity is an important factor in determining education outcomes. Miguel’s paper does not include the windfall from foreign aid, nor does it address rent seeking as a possible mechanism through which education provisions may be

\textsuperscript{6} The author notes that “natural resources” could be generalized to include other windfalls to the government’s budget, including non-conditional aid flows.
lower in ethnically diverse regions. Using insights from rent seeking models, a possible channel through which education is adversely affected by ethnic heterogeneity may be examined.

3. The Model

3.1 Set Up

In this section I present the model set up, based on the rent seeking model of Hodler (2007) and the education provision model of Miguel (2000). Hodler (2007) models the effects of foreign aid and rent seeking using a basic growth model. This model shows rent seeking after a foreign aid donation, which is incorporated into Miguel (2000), which examines the provision of education in heterogeneous societies. The model is simplified to focus on the theoretical linkages between ethnic heterogeneity, foreign aid, and rent seeking incentives. I model the tradeoff between productive activity and rent seeking production. The equilibrium is found as a maximization problem that maximizes group utility subject to private production and rent seeking production functions.

First I assume that there are $n$ groups in a country in which there are $X$ labor inputs for production. For simplicity it is assumed each group is of the same size,

$$x_i = \frac{X}{n}$$

(1)

where the amount of labor available to group $i$ is $x_i$. Each group faces a tradeoff between private production, $q$, and rent seeking, $z$. This tradeoff is represented in the choice variable $\phi$, representing the effort the group expends on production. Production and rent seeking for each group are represented by the production functions,

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7 This is a simplifying assumption. It is possible that groups have different amount of labor inputs, but, for theoretical simplicity, labor is assumed to be equally distributed among the groups.
\[ q_i = \varphi_i a_i x_i \quad (2) \]
\[ z_i = (1 - \varphi_i) x_i \quad (3) \]

In the production function \( a_i \) is a measure of productivity, \( a > 0 \). The equation for \( z_i \) is a production function for rent seeking services. Note that, as \( \varphi_i \) rises the amount of private production rises while rent seeking falls. The production function for rent seeking, \( z_i \), is the amount of rent seeking “services” a group chooses to provide and is inversely related to group production effort.

In addition to the groups, there is also a government. The government’s budget comes from two sources: it collects tax revenue from each group’s private production at a rate of \( \tau \), \( 0 < \tau < 1 \), and receives foreign aid \( \theta \) from international donors, \( \theta > 0 \). For simplicity, it is assumed that \( \theta \) is exogenously determined.\(^8\) Donors can earmark their aid for certain public good project. The amount of aid to which these earmarks apply is denoted by \( s \), where \( s\theta \) is the amount of aid that goes directly to education projects and there is assumed to be no rent seeking for these funds. The parameter \( s \) represents the proportion of total aid that is earmarked or “conditional” and ranges from 0 to 1.\(^9\) The government also uses tax revenue to provide these public projects. The parameter \( r \), \( 0 < r < 1 \) is the percent of the government budget that is recurrent expenditure; the model assumes this portion of the budget is unavailable for appropriation as rent. The minimum amount of the good \( g_i \) that can be provided, then is

\[ g = s\theta + r\tau \sum_{i=1}^{n} x_i \quad (4) \]

---

\(^8\) \( \theta \) (aid) could be related to macroeconomic or microeconomic conditions within the economy. For example, the International Monetary Fund (IMF) and World Bank often makes loans conditional on growth rates, curbing inflation rates, or tax collection. The basic model, however, will abstract from this type of conditionality.

\(^9\) Conditional money can be spent in a way that benefits one group over another. Therefore, it is conceivable that even earmarked aid could be subject to rent seeking. In this simplified model, conditional aid cannot be captured through rent seeking effort.
If groups do not rent seek, it is possible that aid that is not earmarked (more than s) and other than recurrent government expenditure can be put towards education. However, the model functions such that everything that is not conditional is captured through rent seeking.\textsuperscript{10}

If groups engage in rent seeking \( (z_i > 0) \), the government loses rent \( y_i \) to the groups, lessening the amount of budget available for public good provision. The maximum amount of rent available for appropriation is

\[
\sum_{i=1}^{n} y_i = (1 - s)\theta + (1 - r)\tau \sum_{i=1}^{n} q_i
\]

where \((1-s)\theta\) is aid that is not earmarked (i.e. aid that comes without specific provisions). The final term represent government budget not devoted to recurrent expenditure. The amount of rent appropriated through rent seeking activities to group \( i \) is thus given by

\[
y_i = \frac{z_i}{\sum_{i=1}^{n} z_i} \left[ (1 - s)\theta + (1 - r)\tau \sum_{i=1}^{n} q_i \right]
\]

This rent is appropriated from the government’s budget for public good provision. While \( z_i \), represents the proportion of inputs devoted to rent seeking effort, \( y_i \) represents the actual amount of rent the group receives. The amount of rent is based, in part, on other group behavior and the size of the government’s budget. Therefore, the final amount of the good provided in the economy to each group, \( g_i \), is given by

\[
g_i = \frac{\theta}{n} + \frac{\tau \sum_{i=1}^{n} q_i}{n} - \frac{\sum_{i=1}^{n} y_i}{n}
\]

\textsuperscript{10}The literature on foreign aid concludes overall that conditional aid (earmarked for projects) is generally more conducive to growth than general budget windfalls. This thesis assumes this is the case by showing that funds that are not conditional do not go to the provision of the government good. The model therefore assumes that \( s \) is increasing in \( g \). The assumption that all non-earmarked aid is captured through rent seeking is strong. However, I believe it does not hinder understanding rent seeking dynamics in the simple model. Further models should explore the effects of cooperation in which groups do not capture everything through rent seeking.
The amount of the good each group consumes is $g_i$. The nature of the public is such that it is divided evenly among the groups—all groups have equal access to the good. Rents appropriated to the groups from the government budget are not spent on the good.

Each group maximizes the utility function given by

$$U_i = (1 - \tau)q_i + \alpha g_i + y_i$$

(8)

$\alpha$ is a measure of public good quality—as the public good is of higher quality ($\alpha$ rises) the group receives greater utility from the good. To determine how much effort to put into rent seeking versus private production, each group will maximize this utility function with respect to $\varphi$, the effort choice variable.

### 3.2 Utility Maximization

In equilibrium, groups maximize their utility by choosing $\varphi$ subject to the production constraints $q_i = \varphi_i a_i x_i$ and $z_i = (1 - \varphi_i) x_i$. Substituting into the utility function (equation 8) yields

$$U_i = (1 - \tau)\varphi_i a_i x_i + \alpha \left( \frac{\theta}{n} + \frac{\tau \sum_{i=1}^{n} \varphi_i a_i x_i}{n} - \frac{(1 - s)\theta + (1 - r)\tau \sum_{i=1}^{n} \varphi_i a_i x_i}{n} \right)$$

$$+ \frac{(1-\varphi_i)x_i}{\sum_{i=1}^{n}(1-\varphi_i)x_i} (1 - s)\theta + (1 - r)\tau \sum_{i=1}^{n} \varphi_i a_i x_i$$

(9)

The first term of the utility function represents the utility to the group from private production. The second term represents the utility from the government provided good; as noted above, $\alpha$ is a parameter of the quality of the good. The final term is the utility the group gains from rent seeking activity, which is dependent on the total amount of rent seeking in the economy.

Taking the first order condition,
\[
\frac{\delta U_i}{\delta \varphi_i} = (1 - \tau) \frac{\delta q_i}{\delta \varphi_i} + \alpha \frac{\delta g_i}{\delta \varphi_i} + \frac{\delta q_i}{\delta \varphi_i}
\] (10)

For simplicity, the equilibrium is assumed to be symmetric. In this case,

\[\varphi_i = \varphi_j = \cdots = \varphi_n = \varphi^*\]

\[x_i = x_j = \cdots = x_n\]

The first order condition of the utility function is

\[
\frac{\delta U_i}{\delta \varphi_i} = (1 - \tau)ax + \alpha \left( \frac{tax}{n} - \frac{(1-r)tax}{n} \right) + \frac{(1-n)}{n^2(1-\varphi)} [(1-s)\theta + \varphi n(1-r)tax] + \frac{(1-r)tax}{n^2}
\] (11)

The first term in equation 11 indicates the marginal utilities to group \(i\) from private production. The second and third terms show the marginal utility of education provision—groups gain positive utility from education, related to their private production and the quality of the education, minus the amount of education lost to rent seeking appropriations. The term lost to rent seeking includes \((1-r)\), the amount of the budget not included in recurrent expenditure because nonrecurring expenditure is assumed to be more subject to rent seeking appropriation than recurrent expenditure. The last two terms of the first order condition show the marginal utility to each group gained from rent seeking efforts.

After algebra (see appendix), the equilibrium effort level on production is found:

\[\varphi^* = \frac{n(1 - \tau) + \tau(\alpha r + (1-r)) - (n - 1)(1-s)\theta}{n(1 - \tau) + \tau(\alpha r + 2(1-r))}\]

(12)

This variable represents the tradeoff between production and rent seeking effort.
3.3 Testable Propositions

Because effort not expended on production is use in rent seeking \((1-\varphi^*)\), this equilibrium production effort can be used to draw conclusions about the changes in rent seeking, as well as production, as the parameters change.

By design, effort on rent seeking will fall as \(s\), aid conditionality rises. The derivate of \(\varphi^*\) with respect to \(s\) provides the proof—it is positive for all parameter values (see appendix), implying that as the proportion of earmarked aid rises, effort on production rises while effort on rent seeking necessarily falls.

Other parameters provide more interesting insights into what affects the incentive for private production versus rent seeking. They also provide testable hypotheses that can indicate levels of rent seeking without needing a measure for rent seeking itself. A focal point of the model and the empirical section of this thesis is the effect of foreign aid on rent seeking incentives.

**Proposition 1**

As aid \(\theta\) increases, rent seeking rises. Intuitively, as the government’s budget rises, all else constant, there are more fungible funds available. This increases the potential payoff to rent seeking while increasing the opportunity cost of using resources in private production over rent seeking. These factors contribute to the rise in rent seeking as foreign aid rises.

**Proof**

The second derivate of \(\varphi^*\) with respect to aid \(\theta\) yields the concavity of production effort with respect to aid. As shown in the appendix, this derivate is negative for all values of variables, \(n > 1\); \(\varphi^*\) is decreasing in \(\theta\). Therefore \((1-\varphi^*)\), or the effort spent on
rent seeking, is increasing in $\theta$. As aid increases, the amount of effort spent on rent seeking is expected to increase and depends, in part on the number of ethnic groups ($n$) in the economy.

Another variable of interest is $n$, the number of ethnic groups. The literature suggests that ethnic heterogeneity has adverse affects on the provision of publicly provided goods and growth outcomes, especially throughout Africa. In Kenya specifically, where the data for the empirical section of this thesis is collected, ethnicity is a main social cleavage.

**Proposition 2**

As the number of ethnic groups ($n$) increases, rent seeking falls.

**Proof**

The proof is the derivative of $\phi^*$ with respect to $n$. As shown in the appendix, the derivative of $(1-\phi^*)$, representing effort put into rent seeking, is negative as the number of ethnic groups, $n$, rises. $(1-\phi^*)$, the equilibrium effort groups put into rent seeking, decreases. This result implies that as the number of groups becomes large, each individual group gains less from rent seeking, possibly because each group has less influence over the government’s budget allocation decisions. Groups, according to this proposition, choose to allocate more effort to production.

This result of the model is in opposition to the finding of Miguel (2000) that ethnic heterogeneity leads to lower education provision. The discrepancy may be partially explained with a perfect competition story: as the number of ethnic groups becomes large, there is essentially perfect competition—no one group is large enough to change government allocation of funds by increasing rent seeking. It is therefore more profitable
to devote resources to private production. This theory suggests that, with a smaller number of groups, rent seeking should increase, and then decrease as the number of groups rises. The derivative shows a nonlinear relationship between $\varphi^*$ and $n$, but is still strictly positive for all parameter values, which may be a function of the assumed linear relationships in the model. This nonlinear aspect of the derivative implies that the way groups reallocate from rent seeking to production depends on the range of $n$. The empirical portion of this paper attempts to deal with this nonlinearity, but further exploration is necessary to theoretically reconcile this proposition with the finding in Miguel (2000) that ethnic heterogeneity leads to worse school outcomes.

The tax rate has a complicated effect on utility. Increasing the tax rate lowers the amount of private production groups keep for themselves, so they may need to produce more to maintain utility. However, a higher tax rate also increases the amount of budget available for both the government-provided good and for appropriation through rent seeking. The second derivate of $\varphi^*$ with respect to $\tau$ elucidates this relationship.

**Proposition 3**

As the tax rate $\tau$ increases, the effort $(1-\varphi^*)$ expended on rent seeking increases. This is intuitive for two reasons. As the tax rate rises, the payoff to the group from private production falls as groups keep a smaller percent of what they produce. Additionally, an increase in the tax rate means that the government’s budget has risen, increasing the amount of funds groups can appropriate through rent seeking, all else constant.

**Proof**

The proof of this proposition is the derivative of $\varphi^*$ with respect to $\tau$ (see appendix). This derivative is negative. Thus, since $\varphi^*$ is decreasing in $\tau$, $(1-\varphi^*)$ is
increasing in $\tau$. This means that as the tax rate rises, the effort on production falls, while the effort put into rent seeking rises. Taxes erode the amount of private production put towards a group’s utility, lowering the opportunity cost of rent seeking.

The final parameter considered is $\alpha$, the quality of education. Improvements in education quality affect groups by raising the amount of utility they gain from consuming education. Changing quality therefore changes incentives to rent seek.

**Proposition 4**

As the quality of education $\alpha$ rises, the effort on rent seeking falls. Intuitively, as the quality of education rises, groups gain higher utility from sending their children to better-quality schools. Therefore, the opportunity cost to rent seeking has risen; funds that are appropriated through rent are not used for education. Groups expend more effort on production and consume more of higher-quality education.

**Proof**

As shown in the appendix, the derivative of $\varphi^*$ with respect to $\alpha$ is positive. Therefore, since $\varphi^*$ is increasing in $\alpha$, $(1-\varphi^*)$ is decreasing in $\alpha$. Conceptually, as education quality rises, groups get higher utility from sending their children to education. The opportunity cost to rent seeking therefore rises, making rent seeking more costly. This leads to a decline in rent seeking and a rise in private production as education quality rises.

The above propositions consider the effects of parameters on the choice variable, which denotes the effort on production. There are now four testable propositions:

1. As aid increases, rent seeking rises.
2. As ethnic heterogeneity rises, rent seeking falls.
3. As the tax rate rises, rent seeking rises.

4. As education quality rises, rent seeking falls.

The empirical section of this paper attempts to test these propositions with rent seeking as manifested through education provision in two districts in Western Kenya.

4. The Setting: Schooling in Kenya

Schooling in Kenya consists of 8 years of primary education, 4 years of secondary education and 4 years of university or tertiary education. Exams are administered by the Ministry of Education twice during the education process, after primary school (Kenya Certificate of Primary Education) and after secondary school (Kenya Certificate of Secondary Education). Besides administering these exams, the Ministry of Education is responsible for setting the curriculum, providing some school facilities, hiring teachers for local schools, and paying teacher and administrator salaries. Local communities and parents are responsible for paying for tuition, textbooks, and other school supplies, as well as most school facilities. Money raised locally goes directly to local schools.

Though Kenya is comprised of over 40 different ethnic groups, each with its own language, English is the official language of the Kenyan schooling system. In some areas, early primary school years are taught in Swahili or other local language, but all instruction after that is conducted in English. Kenya is divided into eight administrative regions, Coast, Central, Eastern, Nairobi, Rift Valley, Western and North Eastern; education activity in each region is coordinated by the Provincial Director of Education. The curriculum of each level of schooling, however, is determined by the Ministry of Education, a branch of the central government.
As enrollment reaches a diverse range of students, there has arisen large difference in education quality, and quantity, across Kenya. Adult literacy, for example, ranges from 8% in the North Eastern province to 87% in the Nairobi province. Similarly, net enrollment ranges from 82.2% in the Central province to 14.5% in the North Eastern province (Hungi and Thuku 2009). Education outcomes vary across ethnic groups, as well. For example, the Kikuyu, a powerful ethnic minority, have approximately a 90% literacy rate, while the Maasai, a marginalized ethnic minority, have a literacy rate of about 12%. The Kikuyu are more widely represented in government and thus have significant support for their schools from the central government, beyond locally raised funds. The Maasai and Somalis do not have such consistent support (Fern 2007). With the rapid expansion of schooling, and the push towards universal education, Kenyan schools became much more heterogeneous in terms of the economic and educational background of the students. Because the school system is centralized, it is not well equipped to deal with heterogeneous student needs, especially in terms of catching up those who fall behind (Glewwe, Kremer, Moulin 2007).

Until 2003, Kenyan parents were charged a school fee to send their children to public school. In 1995, these fees ranged from 200-500 Kenyan Shillings (USD$5-12 USD), which was a significant portion of annual income, especially in poor, rural areas. With the abolition of school fees in 2003, school cost dropped dramatically and school enrollment increased by 1.3 million from 5.9 million students enrolled in 1998 to an estimated 6 million in 2000 and 7.4 million in 2004; 40% of the primary school population was enrolled before free primary education was introduced and this figure jumped to over 90% after free education was introduced (Fleshman 2005). This rapid
expansion of school enrollment was met with a slower expansion of resources devoted to schooling, leading to a rise in pupil-teacher ratios, in both public and private schools, and a shortage of school facilities across the country. In the following years, the government did increase school spending, but because of the large numbers of local schools, the increase amounted to a government grant of about USD$380 per school, not enough to cover basic supplies and the building of new facilities (UNICEF). Donations from international organizations and other countries, including USAID, UNICEF, the United Kingdom, Belgium and Japan, has closed some of the gap in schooling funds and educational development expenditure.\textsuperscript{11} The money has gone to a variety of uses, including buying supplies, repairing schools, and training teachers.

The abolition of school fees also changed the way schools were financed. The majority of money now comes from the central government. The amount of the government’s budget devoted to spending on education has increased dramatically since 2003: in 2005, public expenditure on education amount to 22.5\% of total expenditure, and 6.3\% of GDP.\textsuperscript{12} However, less than 1\% of GDP is spent on primary education; a significantly higher percent is spent on secondary and tertiary education.

Besides funding from the central government, money is also raised at community fundraising events called \textit{harambees}. Meaning “come together” in Swahili, \textit{harambees} are village fundraisers that raise a large portion of the money that is put towards primary schools and other local public goods. Approximately 40\% of school funds came from


\textsuperscript{12} The average expenditure on education is 5.2\% in high-income countries. UNESCO Education Sector Report.
these meetings in the late 1990s (Miguel 2000). Prominent public figures, such as Members of Parliament, often attend these events and make contributions. At *harambees*, ethnicity becomes a salient social cleavage, sometimes preventing effective collective action from occurring. In field interviews in rural western Kenya Miguel find that ethnicity “is perhaps the primary cleavage in Kenyan political and social life…” and “…ethnic ‘rivalry over ownership’ of the school and over ‘who will take control of the school’ was the central challenge facing Matumbai [a primary school in the Teso district of western Kenya]” (Miguel 2000 p. 7). Similarly, in Buduta primary school has an ethnic minority that “lack[s] ‘a sense of ownership’ for the school and ‘feel[s] less committed to the school…” (Miguel 2000 p. 7). This thesis aims to model how this ethnic tension leads to fewer provisions of funds for schools through rent seeking dynamics.

The model does not include the *harambee* as a game situation, as modeled in Wilson (1992). Miguel (2000) presents a multi-stage game to model the decision of parents to send their children to one school over another and the level of fee to charge, based in part on ethnic heterogeneity. In this thesis, I abstract from the dynamics of the *harambee* and a multi-stage game to model the rent seeking occurring at the point of deciding how much education to provide. I treat school fees as a given tax on families. This allows the model to be applied beyond Kenya and is more general. The model assumes parents have already decided where to send their children and the fees charged at the school. The model aims to establish why the amount of education provided per school varies beyond the amount of fees parents are required to pay. This assumption is in line with the data where school fees have already been established and are taken as given by the parents of students.
5. Data Sources and Methodology

The data to empirically test the model comes largely from two school assistance programs (SAP), random experiments conducted in the Busia and Teso districts from 1996 to 2000. These districts are rural districts in Western Kenya. In total, there are 333 primary schools in these districts, 100 of which were selected by the Ministry of Education (MOE) to participate in these programs. The schools were selected because they were deemed “needy” by the MOE, but had not participated in a 1994 textbook provision study run by the World Bank. The programs were funded by International Christelijk Steunfonds (ICS), a Dutch nongovernmental organization. 1996 was the first year of the study and is the base year for comparison.

The first SAP was a textbook provision study, and the study which lends its data best to the present thesis, aimed at discerning whether textbooks improved test scores. In early 1996, 25 out of the selected 100 schools were randomly chosen to receive official government textbooks (written in English). Textbooks at the time cost about USD$2-3. Compared to Kenya’s per capita GDP of USD$330, this was a significant cost, especially since incomes tend to be lower than the national average in rural areas such as the Busia and Teso districts. In 1997, 25 other schools were randomly selected to receive grants of USD$2.65 per student. 43% of the grants went to textbook expenditure, 46% went to construction and the rest was spent on other teaching equipment and supplies (Glewwe, Kremer and Moulin 2009).

The randomization for this program was done as follows. Schools were listed alphabetically within geographic divisions; these lists were then combined into a single list arranged alphabetically by division name. From this list, every fourth school starting
with the first was assigned to group 1. Groups 2, 3 and 4 were created in the same manner. Group 1 received textbooks in early 1996, group 2 received grants in early 1997, group 3 received similar grants in 1998, and group 4 received its grants in 2000. Because group 4 received its grant after 1998 (the year this thesis will analyze), these schools’ grants are excluded from the sample. For this thesis, conditionality of foreign aid will be considered a binary dummy variable. Textbook grants will be considered “earmarked” aid, and grant aid will be considered unearmarked (less conditional). Aid was provided on a per-student basis; textbook schools received books at a set ratio and grant schools received USD$2.65 per student.

To assess the effects of textbooks on test scores, questionnaires were administered each year to pupils, teachers and school committees. Additionally, information was collected regarding students’ home environment, including the condition of their homes, number of siblings, and ownership of books and school clothes. Glewwe, Kremer and Moulin (2009) and find that the textbooks grants overall have no statistically significant effect on student test scores. The textbooks did improve the test scores of top students, however, possibly because less academically-strong students had trouble reading and understanding the official government textbooks. The second school assistance program conducted in Busia and Teso districts was a similarly random evaluation of a program designed to improve teacher’s incentives. The same schools were involved in this program, which took place from 1996 to 1999, although data on test scores were not available for 1997. Data from this study is not used in the present paper.

In conducting these studies, ICS collected a variety of data on students’ and schools’ financial and demographic conditions in 1996. The student questionnaires

13 The textbooks are written in English, which is many students’ third language.
focused on schooling background, family educational characteristics, ownership of assets (e.g. livestock), and number of siblings and other people living in the household. The school questionnaires, filled out by schoolmasters, contained information on school infrastructure, inputs, finances and student enrollment. Teacher questionnaires focusing on teacher qualifications were filled out by the teachers themselves. Finally, questionnaires were administered regarding the content, attendance and decisions of school committee meetings.

5.1 Regression Specification and Coefficient Predictions

The effects of aid and ethnicity on education outcomes are tested through regression analysis. The complete regressions take the form

\[
\text{school outcome} = \beta_0 + \beta_1 \text{ethnicity} + \beta_2 \text{ethnicity}^2 + \beta_3 \text{textbook aid} + \beta_4 \text{grant aid} + \beta_5 \text{ethnic} \times \text{aid(textbook)} + \beta_6 \text{ethnic} \times \text{aid(grant)} + \alpha \text{school characteristics} + \mu
\]

Explanations and specifications of the included variables are listed in table 1. The interaction term between ethnicity and aid conditionality allows ethnicity to have a varying effect on outcomes depending on whether a school received textbooks or grants. The level of aid is included to capture the effects of different amounts of aid in the presence of ethnic heterogeneity. This variable represents \( \theta \) in the model.

Data on ethnicity \((n)\) comes from questionnaires distributed to school council members as part of the randomized study of textbooks on test scores. The school council members were also asked how many children they had in the school, which allows for a proxy calculation of the ethnic heterogeneity of the student body. The model shows that increases in ethnic heterogeneity should lead to less rent seeking and therefore better
education outcomes. Because both measures of ethnicity ($elfsc$ and $elfstud$) range from $\frac{1}{n}$ (extreme heterogeneity) to 1 (complete homogeneity), if this theory is seen in the data, the coefficients on ethnicity will be negative. Miguel (2000) and Miguel and Gugerty (2005) find that ethnic heterogeneity leads to worse education outcomes. If this is seen in the data, the coefficients on $elfsc$ and $elfstud$ will be positive, indicating that homogeneity (high elf) leads to better outcomes. As noted earlier, this discrepancy may arise from the linear specifications in the model. To tease out possible nonlinear effects, ethnicity squared is included in the regression specifications.

The model suggests that higher levels of aid lead to more rent seeking. Therefore, higher aid should be associated with worse school outcomes; the coefficients on $grant$ and $totaltexts$ should be negative. The interaction variables allow the effects of changing aid to vary as ethnicity changes. If higher aid leads to higher rent seeking in the presence of ethnic heterogeneity, these variables should be positive—for higher levels of homogeneity (elf nears 1), aid is more effective. However, if ethnicity leads to lower rent seeking and therefore better school outcomes as more aid is donated, these interaction terms will be negative.
Table 5.1 Variable Description and Identifications

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Description and Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Independent Variables</strong></td>
<td></td>
</tr>
<tr>
<td>elfstud</td>
<td>Ethnic homogeneity of students, calculated using the Herfindahl statistic (ELF=$\sum_{i=1}^{n} s_i^2$, where s is the fraction of members from a single ethnic group) from a sample of students</td>
</tr>
<tr>
<td>elfsc</td>
<td>Ethnic homogeneity proxy of student council members</td>
</tr>
<tr>
<td>elfstud/sc squared</td>
<td>Ethnicity squared, included to capture nonlinear effects of ethnicity</td>
</tr>
<tr>
<td>totaltexts</td>
<td>Number of textbooks schools received in 1997</td>
</tr>
<tr>
<td>grant</td>
<td>Amount of grant schools received (half in 1997, half in 1998)</td>
</tr>
<tr>
<td>totfee</td>
<td>The amount of total fees required per child (standard 1-8) and per family (standard 1-8)</td>
</tr>
<tr>
<td>totpup</td>
<td>Total number of students</td>
</tr>
<tr>
<td>librbks</td>
<td>Number of library books the school owns (prior to textbook donations from schools in the study)</td>
</tr>
<tr>
<td>ptr</td>
<td>Pupil teacher ratio (number of pupils per school/ number of teachers)</td>
</tr>
<tr>
<td>kcpemean</td>
<td>Mean KCPE test score per school (proxy for pupil characteristics), collected as part of 1996 pupil questionnaire</td>
</tr>
<tr>
<td>distanc1</td>
<td>The distance to the nearest primary school</td>
</tr>
<tr>
<td><strong>Dependent Variables</strong></td>
<td></td>
</tr>
<tr>
<td>totmoney (logtotmoney)</td>
<td>The amount of school fees collected (per student and per family) and other donations given to the school</td>
</tr>
<tr>
<td>totprojcost</td>
<td>The amount of money spent on projects for the school</td>
</tr>
<tr>
<td>ptaparen</td>
<td>The number of parents enrolled in the PTA</td>
</tr>
</tbody>
</table>

Taxes should increase the incentives to rent seek, leading to worse schooling outcomes based on the model. The coefficient on totfee (which proxies for school taxes in this model) should therefore be negative.

Increasing quality of education ($\alpha$) is seen to decrease rent seeking incentives in the model. Therefore, variables that proxy for school quality ($ptr, kcpemean, librbks$) should have a positive effect on schooling outcomes. School characteristics include the amount of required fees, the number of pupils and test scores from before the grant or textbook program started. In addition, various measures of school socioeconomic status were used, including pupil-teacher ratio and the number of library books the school owns.
The independent variables were regressed against several dependent variables in an attempt to see which identifications of “education outcome” are most sensitive to the effects of foreign aid and ethnic heterogeneity. The dependent variables are chosen to capture the channel through which rent seeking lowers the provision of education both in terms of quantity and quality. Rent seeking, in the model, eats away at the amount of government budget devoted to education, \( g \). Lower \( g \) (education outcome) should be an indication of higher rent seeking; the model provides an explanation for how this theoretically functions. The dependent variables focus on school council meetings because these meetings are the arena of collective action in school funding; at these meetings, fees are collected, donations are made and voting on construction and other projects occurs. Actions during and outcomes from these meetings should, therefore, be the best representation of rent seeking behavior.

The amount of money available for school committee use is a dependent variable to capture rent seeking, as well as potential free-riding. This variable is a composite of both the amount of school fees actually collected and donations to the school (money given to the school beyond fees). Though a certain school fee amount (set by the school committee) is required of all parents, there is potential for free-riding and evasion of the fee during the collection process. In ethnically diverse schools, parents may not want to support the school and, with a break-down of intra-ethnic monitoring, free-riding may be easier. In schools that receive foreign aid, there may also be a crowding-out effect—parents feel they do not need to give money to the school or pay fees because the school had received outside assistance.
Using the total cost of projects initiated by the school council members as a dependent variable attempts to capture a similar effect with a different identification. When ethnically diverse schools receive grants (versus textbooks), rather than spending the money on the school, council members may choose to use the money for school materials that do not benefit an entire school, such as buying materials for individual students when the marginal benefit of construction or buying classroom materials is higher. Therefore, grant aid to ethnically diverse schools may lead to inefficient education provision as parents attempt to divert spending away from projects that benefit all students. This predicts that the total cost of projects initiated by the school council will be lower in ethnically diverse schools that receive aid. The number of parents enrolled in the PTA attempts to capture parents’ willingness to become involved with the school and is also used as a dependent variable.

These variables are gathered for the Busia and Teso districts as part of the randomized study on the effects of textbooks on test scores described earlier in this
Table 5.3 Descriptive Statistics by Subsample

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Min</th>
<th>Max</th>
<th>Std. dev.</th>
<th>Obs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Textbk Sch.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>elfsc</td>
<td>0.875</td>
<td>0.510</td>
<td>1</td>
<td>0.192</td>
<td>19</td>
</tr>
<tr>
<td>elfstud</td>
<td>0.879</td>
<td>0.512</td>
<td>1</td>
<td>0.183</td>
<td>19</td>
</tr>
<tr>
<td>totaltexts</td>
<td>196</td>
<td>84</td>
<td>454</td>
<td>96.22</td>
<td>25</td>
</tr>
<tr>
<td>toffee</td>
<td>3686.42</td>
<td>920</td>
<td>7684</td>
<td>1570.05</td>
<td>24</td>
</tr>
<tr>
<td>kcpemean</td>
<td>331.8</td>
<td>206.6</td>
<td>383.4</td>
<td>45.8</td>
<td>23</td>
</tr>
<tr>
<td>totpop</td>
<td>372</td>
<td>129</td>
<td>803</td>
<td>163.3</td>
<td>25</td>
</tr>
<tr>
<td>ptr</td>
<td>38.05</td>
<td>12.9</td>
<td>59.5</td>
<td>11.43</td>
<td>24</td>
</tr>
<tr>
<td>librbks</td>
<td>4.76</td>
<td>0</td>
<td>100</td>
<td>21.82</td>
<td>21</td>
</tr>
<tr>
<td>distanc1</td>
<td>2.1</td>
<td>0.25</td>
<td>4</td>
<td>1.04</td>
<td>25</td>
</tr>
<tr>
<td>totmoney</td>
<td>33911.48</td>
<td>1400</td>
<td>157550</td>
<td>40114.19</td>
<td>25</td>
</tr>
<tr>
<td>logtotmoney</td>
<td>9.85</td>
<td>7.24</td>
<td>11.97</td>
<td>1.17</td>
<td>25</td>
</tr>
<tr>
<td>totprojcost</td>
<td>17789.7</td>
<td>1050</td>
<td>60000</td>
<td>18900</td>
<td>18</td>
</tr>
<tr>
<td>ptaparen</td>
<td>67.83</td>
<td>15</td>
<td>230</td>
<td>42.78</td>
<td>24</td>
</tr>
</tbody>
</table>

| **Grant Schools** |       |      |      |           |      |
| elfsc          | 0.874 | 0.5  | 1    | 0.171     | 30   |
| elfstud        | 0.899 | 0.502| 1    | 0.177     | 30   |
| grant          | 976.38| 357.75| 5146.3| 732.30    | 47   |
| toffee         | 3763.11| 300 | 10820| 1770.05   | 47   |
| kcpemean       | 317.4 | 260  | 400  | 36.3      | 22   |
| totpop         | 368   | 135  | 1942 | 272.6     | 48   |
| ptr            | 35.24 | 15.69| 114.23| 14.83     | 49   |
| librbks        | 5     | 0    | 160  | 24.58     | 48   |
| distanc1       | 2.63  | 0.5  | 7    | 1.39      | 47   |
| totmoney       | 27799.9| 0   | 155000| 34282.7   | 47   |
| logtotmoney    | 9.86  | 7.68 | 11.95| 0.91      | 44   |
| totprojcost    | 31386.2| 1000| 241100| 43329.4   | 39   |
| ptaparen       | 64.32 | 0    | 166  | 35.52     | 48   |

| **Control Sch.** |       |      |      |           |      |
| elfsc          | 0.902 | 0.556| 1    | 0.174     | 20   |
| elfstud        | 0.926 | 0.456| 1    | 0.160     | 20   |
| toffee         | 3690.55| 400 | 5420 | 1152.00   | 22   |
| kcpemean       | 308.2 | 248.8| 381.1| 39.6      | 18   |
| totpop         | 359   | 117  | 1084 | 221.4     | 24   |
| ptr            | 35.34 | 14.63| 63.76| 14.08     | 23   |
| librbks        | 0     | 0    | 0    | 0         | 21   |
| distanc1       | 2.23  | 0.5  | 5    | 0.95      | 25   |
| totmoney       | 18154.54| 0   | 96085| 19660.4   | 24   |
| logtotmoney    | 9.50  | 7.77 | 11.47| 0.84      | 23   |
| totprojcost    | 27411.6| 1597| 126000| 34404.9   | 23   |
| ptaparen       | 54.52 | 15   | 207  | 50.52     | 22   |
section. Though data is available for 1996-2000, the years of the study, the varying availability of variables and specification across this time frame makes identification for a panel study difficult. Therefore, a cross-section analysis for 1998 is conducted. The analysis includes all 100 schools, including those that received neither textbooks nor grants as of 1998. 1998 is chosen because it is in the middle of the study, long enough after the textbook and grant provisions to begin to see effects from the different types of aid. Summary statistics are shown in table 5.2 for the sample as a whole and in table 5.3 for schools broken into three subsamples, those that received textbooks, those that received grants, and schools that received neither form of aid.

6. Results

Several specifications of education outcome were used to assess the effects of the independent variables, as described in section 5. The first specification is the total amount (monetary cost) of school-improvement projects initiated by the school committee (totprojcost). The second is total amount of money available to the school committee, from required school fees and donations to the school (totmoney). While a set amount of fees are required per family and per child, the actual level collected is not necessarily equal to the required amount—the variation in actual amount of fees collected may vary depending on ethnic heterogeneity and type of aid. The log of total money raised (logtotmoney) is also tested as a dependent variable specification. The number of parents involved with the school’s parent-teacher association (ptaparen) is another specification. Overall, these dependent variables proxy for aspects of education provision that rely on collective action and group decision to support the local school.
Two specifications of ethnic homogeneity were used; one is calculated based on a sampling of school committee members and represents the ethnicity of the school committee itself. The other is a proxy for ethnicity of the student body, based on the ethnicity of the school committees. The correlation coefficient between these measures is very high (0.92). These variables are termed ethnic “homogeneity” (rather than “heterogeneity”) when discussing the results because they range from 0 to 1, where 1 is completely homogeneous. Interpreting coefficients and understanding the effects of ethnicity on outcomes is best thought of in terms of homogeneity. An ethnic homogeneity squared term is also tested to capture nonlinear effects of ethnicity on outcomes. Other independent variables are those pertaining to aid—textbooks and grants donated as part of the randomized study described in section 5. The amount of required school fees is included, as well. The final controls are for school and student characteristics, including mean KCPE score, total number of pupils, total required fees, distance to the nearest primary school, and pupil-teacher ratio (PTR). Pupil-teacher ratio is highly correlated with total pupils (correlation of 0.8367) and is therefore not included in the final regressions. The number of library books the school owned prior to the aid is included as an alternative measure of school characteristics, but controlling for the number of library books does not change the regressions or significance of key variables and is not itself significant. It is therefore excluded from the final regressions. Correlations between dependent variables are shown in table 6.1.

Regressions on total project cost (totprojcost) show consistently positive signs on ethnic homogeneity for both specifications of the variable (see table 6.2). This is in line with the theory from Miguel (2000) that ethnic heterogeneity leads to worse schooling
outcomes. However, these variables are not significant at conventional levels. Including the squared term of ethnicity \((elfscsq)\) shows that ethnicity has a negative effect on outcomes for low \(elfsc\) (high heterogeneity). As the schools become more homogeneous, this effect disappears; homogeneity has a positive effect on schooling outcomes. This is in line with a nonlinear effect of ethnicity on outcomes and the theory of Miguel (2000)—high heterogeneity leads to worse schooling outcomes.

Aid variables (\(grant\) and \(totaltexts\)) are consistently negative, indicating that aid had an adverse effect on the amount of project cost initiated by the school committees. However they are not statistically significant. The interaction terms between ethnicity and aid are positive, which is consistent with the theory that there is a positive effect of ethnic homogeneity in the presence of aid.

Of the schools that received aid, homogeneous schools that received grants have the highest amount of projects initiated, all else constant, over the benchmark school (heterogeneous school receiving no aid, see table 6.2 column 4). Homogeneous schools receiving no aid yield a high outcome, followed by homogeneous schools that received textbooks. Heterogeneous schools receiving textbooks have the worst outcomes compared to the benchmark school. This shows that aid (in this case, textbooks) lead to worse education outcomes than no aid, a result exacerbated in the presence of ethnic heterogeneity (KSH -110 in heterogeneous schools versus KSH 31,721 for heterogeneous schools receiving textbooks). However, these results are based on coefficients that are not significant at conventional levels. The variables controlling for school conditions and fees are also not significant. Distance to the nearest primary school \((distance1)\) is negatively significant at the 10% level.
<table>
<thead>
<tr>
<th></th>
<th>elfsc</th>
<th>elfstud</th>
<th>totaltexts</th>
<th>grant</th>
<th>toffee</th>
<th>totfee</th>
<th>kcpemean</th>
<th>ptr</th>
<th>distanc1</th>
</tr>
</thead>
<tbody>
<tr>
<td>elfsc</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>elfstud</td>
<td>0.9162</td>
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<td></td>
<td></td>
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| R²                    | .02     | .03     | .03     | .26     | .26     | .23     |
| Observations          | 57      | 56      | 56      | 42      | 42      | 42      |

***Significant at 1%, standard deviations in parenthesis below coefficient, ** Significant at 5%, *Significant at 10%
Table 6.3 Regressions on Total Money ($\text{totmoney}$)

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***Significant at 1%, standard deviations in parenthesis below coefficient, ** Significant at 5%, *Significant at 10%
Table 6.4 Regressions on logtotmoney

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***Significant at 1%, standard deviations in parenthesis below coefficient, ** Significant at 5%, *Significant at 10%
Table 6.5 Regressions on PTA Parent Enrollment (ptaparen)

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<td>(0.18)</td>
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<td>0.07**</td>
<td>0.06*</td>
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<td>(0.03)</td>
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<td>0.001</td>
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<td>(4.47)</td>
<td>(4.22)</td>
<td>(4.11)</td>
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</table>

R² | .00 | .03 | .05 | .52 | .58 | .51 |
Observations | 64 | 64 | 64 | 51 | 51 | 51 |

***Significant at 1%, standard deviations in parenthesis below coefficient, ** Significant at 5%, *Significant at 10%
Initial correlations between total money raised (totmoney) and ethnic homogeneity yield a weak but positive relationship between homogeneity and the amount of money raised for the school. This holds for both specifications of ethnicity. In preliminary regressions including ethnic homogeneity, level of aid and interaction terms, the regressors display expected signs, but are not significant at conventional levels (see table 6.3). The coefficient on ethnic homogeneity is positive (more homogeneous schools raise larger amounts of money) for one proxy (elfsc) and negative for the other (elfstud). However, neither coefficient is significant at conventional levels. When the squared ethnicity term is added, both ethnic homogeneity variables are significant at the 5% level and show that the effects of ethnicity vary with the range of homogeneity; for heterogeneous schools, outcomes are negative, while more schools have better education outcomes as homogeneity increases (elf rises).

The coefficients on aid are negative; schools that received aid have lower amounts of money raised, suggesting that aid may crowd out locally raised funds. The coefficients on interaction terms between aid and ethnicity are positive. This indicates that aid is more beneficial for homogeneous schools than heterogeneous ones—the negative aspects of aid are partially offset by the positive coefficient on the interaction term. For example, homogeneous schools receiving textbooks raise KSH 8,204 over the benchmark school (heterogeneous, no aid). A heterogeneous school receiving textbooks is worse off by KSH 132, all else constant, than the benchmark case. Homogeneous schools see the benefits of the positive coefficient on the interaction term between aid variables and ethnicity measures. In the full regressions, the interaction terms and aid variables maintain the expected signs, but are not significant at conventional levels.
In the full regression on total money, higher school fees are associated with larger amount of total money raised. This coefficient is not significant at conventional levels. The model proposition suggests that higher taxes (fees) lead to rent seeking, and thus lower school outcomes, which is not found in this specification of school outcome, the coefficient on `totfee` is positive. This may indicate that required fees are not a good proxy for school taxes or that a more complex relationship between taxes and education outcomes exists.

The results for regressions on log of total money (`logtotmoney`) show similar results to those discussed above with respect to aid—level variables are negative in both the basic and full regressions, while interaction variables remain positive (see table 6.4). The ethnic homogeneity variable is positive in the full regression, but not significant at conventional levels. Including ethnicity squared again shows the nonlinear effect of ethnicity on outcomes, but the coefficients are not statistically significant. `Grant` and `totaltexts` variables are positive and significant when no controls are included, but lose this significance and are negative in more complete regressions. The interaction terms between ethnicity and aid are positive when included in the regression. The coefficients on fees are negative, but insignificant. Controls for school quality have mixed signs, but are insignificant in the complete regression.

The final dependent variable tested is the number of parents enrolled in the parent-teacher association (`ptaparen`). For both specifications of ethnic homogeneity, the coefficient is negative, but not significant, in the full regressions (see table 6.5). When the ethnicity squared term is included in the regression, both ethnicity variables are significant at the 5% level. The signs of these coefficients indicate that outcomes increase
with ethnicity as schools becomes more homogeneous while at low levels of *elf* (heterogeneity) schools have worse outcomes than at higher levels (homogeneity). As in the other dependent variable specifications, this shows that the effects of ethnic heterogeneity on education outcomes depend on the range of heterogeneity.

Coefficients on *grant* and *totaltexts* are significant at 10% and 5% significance levels, respectively, in regressions on *ptaparen*. The negative signs on these coefficients are consistent with the theory from the model and the results from the other regressions; as foreign aid rises, rent seeking rises, leading to worse education outcomes. The coefficients of the interaction terms between ethnicity and aid are positive and significant in regressions for both specifications of ethnic homogeneity. This suggests that aid is more effective in homogeneous schools, consistent with the other dependent variable specification regressions. These schools may be better able to negotiate the use of the aid for productive use, rather than resort to rent seeking for private utility. The coefficients on variables for fees and school initial conditions are not significant at conventional levels.

The magnitudes of the coefficients overall show that ethnically heterogeneous schools (low *elfsc* or *elfstud*) that received aid have the worst education outcomes. Additionally, heterogeneous schools that received textbooks have overall worse outcomes than those receiving grants. This is somewhat contrary to the model that indicates that education provision should rise when aid is earmarked (conditional), as textbooks are. However, Glewe, Kremer, Moulin (2009) find this that ineffectual type of aid because many students cannot read them, which may partially explain this result.
7. Discussion

The signs on coefficients in the regressions are largely suggestive that the hypotheses and theories proposed in this thesis are worth future empirical exploration. The overall negative signs on aid variables suggest that there is a crowding-out effect from aid donations to schools, leading to worse education outcomes in the presence of aid even independent from the effects of ethnic heterogeneity. The positive signs on interaction terms indicate that the aid leads to better education outcomes in homogeneous schools; the crowding-out effects of aid are partially offset in homogeneous schools by the positive signs on interaction terms. This is not the case for heterogeneous schools, which experience only the negative effects of aid donation. There is also a nonlinear effect of ethnic heterogeneity on education outcomes: at low levels of ethnic homogeneity education outcomes have an additional negative impact from ethnicity. This disappears at higher levels of homogeneity leading to better education outcomes. This thesis is a first step to capturing the effects of foreign aid on rent seeking incentives in the presence of ethnic heterogeneity. There are several theoretical and empirical steps future research can take to more fully represent these effects.

7.1 Model Extensions

The model assumes linear relationships between the parameters. Changing the functional forms may give insight into relationships between parameters that are not modeled in the present paper. One such parameter that may benefit from this addition is $s$, aid conditionality. In the model, I assume that any un-earmarked aid is captured through rent seeking. However, this may not be the case and is one assumption that should be explored in future research. There is evidence that aid that is “too” conditional, does not
lead to better outcomes (Glewwe, Kremer and Moulin 2009). This is also suggested here as schools receiving textbooks often have worse education outcomes than those receiving grant. This is because aid is donated by foreign entities who often do not have perfect information about the conditions and needs of the country to which they are donating. Therefore, donating aid that is earmarked for a specific sector (education, for example) and monitoring that aid may be more helpful than donating a good, such as textbooks. Allowing aid to be allocated by local authorities will take advantage of local knowledge and may lead to more effective aid allocation. There may exist a tradeoff between rent seeking and conditionality—in the model, a donor who cares about outcomes in the aid-receiving country, would set conditionality such that the marginal benefit of conditionality is equal to the marginal benefit of rent seeking. Further models on this subject should attempt to capture this tradeoff.

A different specification of relationships between variables will also better capture the effects of ethnicity on education quantity and quality. There is potential for a nonlinear relationship between ethnic heterogeneity and outcomes, a possibility that should be explored in future research. The more realistic specification of nonlinear relationships may reconcile the different theoretical results in this paper from those in Miguel (2000) in which ethnic heterogeneity leads to lower education outcomes. The result of Miguel (2000) is also seen in the data from Kenyan schools.

In combination with other functional forms of the model relationships, the introduction of a monitoring agent in a multi-stage game may be instructive. Foreign aid will be more effective if it is not appropriated through rent seeking or corruption. Ensuing the aid is not appropriated depends, not only on local conditions, but also on effective
donor monitoring, which depends on donor incentives. Therefore, including a monitoring agent in the model is a beneficial step for future research and allows further exploration of the game-theoretic implications of the simple model.

An additional theoretical extension is deriving the model with asymmetric groups. For simplicity, the equilibrium here is assumed to be symmetric, implying that all groups have the same inputs and, though not modeled, the same influence. This leads to the same amount of production and rent seeking for every group. However, other theoretical insights may be gained from modeling asymmetric groups, where one has more inputs. This would be the case of a majority group and one or more minority groups. In many areas in Kenya, as well as elsewhere in Africa, this is a more accurate representation of ethnic realities.

7.2 Empirical Extensions

One empirical extension is allowing for the aid conditionality to be a continuum, from 0 to 1, rather than as a bivariate, textbooks (conditional) and grants (unconditional). This will more accurately represent and capture the effects of conditionality on education outcomes. However, the data collection for this requires more information than is currently available for Kenyan districts and schools. To represent conditionality on a continuum, data on aid flows to each school is needed. Such data would consist of project allocations, grants to schools from foreign donors, as well as the central government, and funds raised at local harambees. The data also needs to include the monitoring capabilities of the donors—without sufficient monitoring, even earmarked aid can be fungible. This depth of data is not currently available. Future efforts to collect it will be
necessary to more accurately represent the aid conditionality of donations to Kenyan schools.

More recent data collection is also necessary for future research. The data used in the current study come from a study conducted from 1996-2000. This study was conducted before the abolition of school fees in 2003, at which point school enrollment expanded and the government and NGOs increased their contribution to schooling. After 2003, the percent of students enrolled, as discussed earlier, rose dramatically with the final goal of free primary education for all children. Analyzing data collected after the official abolition of schools fees will provide other insights into the effects of foreign aid on group rent seeking incentives. Without schools fees, schools became more diverse in terms of socioeconomic status, prior educational experience and success and cultural and ethnic identity. In addition, the way schools were funded shifted, putting more pressure on the central government to provide for local schools. Capturing these changes empirically is beyond the scope of the present study because the disaggregated aid and budget data is not available to do so. However, as more studies are conducted in Kenyan primary schools, future research should target assessing the effects of the abolishment of school fees.

Better controls for family socioeconomic status and schools conditions before the donation of aid would also produce more robust results and elucidate the role of foreign aid on education outcomes. Data on family livestock ownership, household agricultural production, income from businesses and other aid organizations would all help to determine and control for family socioeconomic status.
Finally, expanding the study to include more schools within Kenya, more Kenyan districts, and to other countries, will garner a better understanding of the effects of aid conditionality on rent seeking incentives. However, this requires a data collection effort beyond the scope of the present study. Exploring the effects of rent seeking, foreign aid and ethnic heterogeneity on other types of government-provided goods is also a direction for future research.

8. Conclusion

Ethnicity is an important social cleavage in Kenya, as seen in the provision of local primary schools. This thesis has aimed to understand the channel through which ethnic heterogeneity affects schooling outcomes using a rent seeking model. In the model, foreign aid increases the incentives to rent seeking by increasing the government’s budget and therefore the amount of money available for group appropriation. This is problematic because, not only is production foregone for rent seeking, rent seeking effort itself is a deadweight loss. Empirical analysis of schools in western Kenya shows that ethnic heterogeneity is associated with worse schooling outcomes, especially in the presence of foreign aid. Further data collection and econometric analysis is necessary to understand the dynamics of school provision in Kenya and other countries.

The model points to one way foreign aid policy can be designed to avoid this effect: earmark and monitor aid to avoid increasing rent seeking incentives. Other solutions include promoting inter-ethnic cooperation and providing assistance for heterogeneous schools dealing with collective action problems. While there is a well-documented adverse effect of ethnic heterogeneity on the provision of publicly provided
goods, the channel through which this occurs has yet to be clearly understood. This thesis is a first attempt to formalize one such channel and opens the way for future research in this area.
9. Appendix

Maximize utility:

$$U_i = (1 - \tau)q_i + \alpha g_i + y_i$$

Subject to production functions:

$$q_i = \varphi_i a_i x_i$$
$$z_i = (1 - \varphi_i) x_i$$

Substitute production functions into utility:

$$U_i = (1 - \tau)\varphi_i a_i x_i + \alpha \left( \frac{\theta}{n} + \tau \frac{\sum_{i=1}^{n} \varphi_i a_i x_i}{n} - \frac{\sum((1 - s)\theta + (1 - r)\tau \sum_{i=1}^{n} \varphi_i a_i x_i)}{n} \right)$$

$$+ \left( \frac{1 - \varphi_i}{\sum_{i=1}^{n} (1 - \varphi_i)} \right) [(1 - s)\theta + (1 - r)\tau \sum_{i=1}^{n} \varphi_i a_i x_i]$$

The first order condition yields:

$$U_i = (1 - \tau)a_i x_i + \frac{\tau a_i x_i}{n} - \frac{(1 - r)\tau a_i x_i}{n}$$

$$+ \frac{-x_i [(1 - x_i) x_i + (1 - x_j) x_j + \cdots + (1 - x_n) x_n] + x_i^2 (1 - \varphi_i)}{[(1 - x_i) x_i + (1 - x_j) x_j + \cdots + (1 - x_n) x_n]^2}$$

$$[(1 - s)\theta + (1 - r)\tau \sum_{i=1}^{n} q_i] + \left( \frac{z_i}{\sum_{i=1}^{n} z_i} \right) (1 - r)\tau a_i x_i$$

Assuming symmetry yields:

$$\frac{\delta U_i}{\delta \varphi_i} = (1 - \tau) a x + \alpha \left( \frac{\tau a x}{n} - \frac{(1 - r)\tau a x}{n} \right)$$

$$+ \frac{(1 - n)}{n^2 (1 - \varphi)} [(1 - s)\theta + \varphi n (1 - r)\tau a x] + \frac{(1 - r)\tau a x}{n}$$

To maximize utility, set the first order condition of utility equal to zero:

$$0 = (1 - \tau) a x + \alpha \left( \frac{\tau a x}{n} - \frac{(1 - r)\tau a x}{n} \right)$$

$$+ \frac{(1 - n)}{n^2 (1 - \varphi)} [(1 - s)\theta + \varphi n (1 - r)\tau a x] + \frac{(1 - r)\tau a x}{n}$$
Solve for $\varphi$:

$$0 = n^2(1 - \varphi)(1 - \tau)ax - n(1 - \varphi)\alpha \tau ax + \varphi \alpha \tau ax - (n - 1)(1 - s)\theta$$

$$-\varphi n(1 - r)\tau ax + n(1 - \varphi)\tau ax - n(1 - \varphi)\tau ax$$

$$0 = n^2(1 - \tau - \varphi - \varphi \tau)ax + n(1 - \varphi)\alpha \tau ax - (n - 1)(1 - s)\theta - \varphi n(1 - r)\tau ax$$

$$+ n\tau ax - \varphi n\tau ax - n\tau ax + \varphi n\tau ax$$

$$0 = n^2ax - n^2\tau ax - \varphi n^2ax + \varphi n^2\tau ax + n\alpha \tau ax - \varphi n\alpha \tau ax - (n - 1)(1 - s)\theta$$

$$- \varphi n(1 - r)\tau ax + n\tau ax - \varphi n\tau ax - n\tau ax + \varphi n\tau ax$$

$$\text{LHS} = \varphi ax(n^2(1 - \tau) + n\alpha \tau + 2n\tau (1 - r))$$

$$\text{RHS} = ax(n^2(1 - \tau) + n\alpha \tau + (1 - r)) - (n - 1)(1 - s)\frac{\theta}{ax}$$

$$\varphi^* = \frac{n(1 - \tau) + \tau(\alpha r + (1 - r)) - (n - 1)(1 - s)\frac{\theta}{ax}}{n(1 - \tau) + \tau(\alpha r + 2(1 - r))}$$

As noted in the text, the derivate of $\varphi^*$ with respect to $s$, the proportion of earmarked aid is positive:

$$\frac{\delta \varphi^*}{\delta s} = \frac{\theta}{ax} \frac{n - 1}{n(1 - \tau) + \tau(\alpha r + 2(1 - r))}$$

For the propositions, derivatives of this equilibrium condition were taken.

Proposition 1: The derivative of $\varphi^*$ with respect to $\theta$ is negative.

Proof:

$$\frac{\delta \varphi^*}{\delta \theta} = \frac{-(n - 1)(1 - s)\frac{1}{nax}}{(n(1 - \tau) + \tau(\alpha r + 2(1 - r)))}$$

Proposition 2: The derivative of $\varphi^*$ with respect to $n$ is positive.
Proof:

\[
\frac{\delta\varphi^*}{\delta n} = \frac{1}{\left(n(1 - \tau) + \tau(\alpha r + 2(1 - r))\right)^2} (\tau(1 - \tau)(1 - r) - \frac{\theta}{\text{nax}}((1 - \tau)(1 - s) - (1 - \tau)(n - 1)(1 - s)) - \frac{\tau\theta}{\text{nax}^2}(\alpha r + 2(1 - r))(1 - s)
\]

Proposition 3: The derivative of \(\varphi^*\) with respect \(\tau\) is negative.

Proof:

\[
\frac{\delta\varphi^*}{\delta \tau} = \frac{1}{\left(n(1 - \tau) + \tau(\alpha r + 2(1 - r))\right)^2} \left(\frac{n(1 - \tau) + \tau(\alpha r + 2(1 - r))}{\text{nax}}(\tau(1 - \tau) - \frac{n}{\text{na}}) + (\alpha r + 1 - r))\right) - (n(1 - \tau) + \tau(\alpha r + 1 - r)) - (n - 1)(1 - s)\frac{\theta}{\text{nax}}(\alpha r + 1 - r))
\]

Proposition 4: The derivative of \(\varphi^*\) with respect to \(\alpha\) is positive.

Proof:

\[
\frac{\delta\varphi^*}{\delta \alpha} = \frac{\tau^2 r(1 - r) + \tau r(n - 1)(1 - s)}{(n(1 - \tau) + \tau(\alpha r + 2(1 - r)))^2} \frac{\theta}{\text{nax}}
\]
10. References


