Preferences in New Democracies: Why citizens prefer different types of public goods

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Abstract

Purpose National Core Welfare Indicators Question Survey (CWIQ) conducted in Nigeria revealed that households’ preferences vary across different types of public goods. For example, some prefer roads while others favor education. We explain why households demand specific types of public goods from their government.

Design/methodology/approach We analyze data on 123,000 Nigerian households to explain the variation in preferences for eight types of public goods. We implement a simultaneous equations model to estimate the determinants of preferences across multiple public goods simultaneously as a households’ preference for one type of public good affects its preferences for other public goods.

Findings We show that the perceived distributional consequences of specific public goods differ conditional on the personal characteristics of households. In particular, households demand the type of public good that (a) increases the utility of assets they already own, (b) resonates with their past experiences involving the lack of particular public goods, and (c) corresponds to their immediate living environment.

Originality/value There are two reasons why citizens’ preferences are particularly important in the context of new democracies like Nigeria. First, democratization gives citizens the means to express their preferences and demand services from their government. Second, preferences are likely more intensely felt in the context of new democracies. Evidence suggests that the mere fact of living in a democracy affects individuals’ self-perception as well as their expectations of the government. In this context, it is important to understand where these preferences come from.

Keywords Public goods, Preferences, Developing countries, Nigeria, Simultaneous estimation

Paper type Research Paper
Democratization in Africa has been a slow but steady process. According to data by the Freedom House Foundation, in 1990 only three African countries were classified as electoral democracies featuring a competitive multiparty system, universal suffrage, and regularly contested elections. By 2006, 24 countries were considered democratic — including Nigeria, which democratized in 1999.

Scholars are still trying to understand the effects of democratization in developing countries. Seemingly contradictory findings point to a complicated relationship. For example, while social spending is typically higher in democracies than in dictatorships (Lake and Baum, 2001; Brown, 2004; Stasavage, 2005), the poorest of the poor often do not benefit from the increased spending (Nelson, 2007; Ross, 2006). In terms of outcome, democracies appear to have increased life expectancy (Sen, 1999), but not been successful in addressing poverty (Varshney, 2000).

In the search for explanations, scholars frequently apply theories developed in the context of western democracies to recently democratized developing countries. For example, beginning with Verba, Nie, and Kim (1978), scholars have analyzed factors that might explain citizen participation in new democracies. According to Bratton and Mattes (2001), the purpose of these studies was to examine whether “[citizens in sub-Saharan Africa] resemble citizens in new democracies elsewhere in the world in their willingness to support a regime based on human rights, competing parties and open elections?” (Bratton and Mattes, 2001).

This research agenda suggests that there are significant differences in participation rates. For example, research in western democracies indicates that participation among more entrepreneurially minded individuals, as well as those with higher incomes, is particularly high. In the context of developing countries, Verba and Nie (1972), Hickey (2005), and Isaksson (2014) confirm that socio-economic status plays a significant role in explaining participation in African democracies, which might provide insights into the
heterogeneous performance of democracies described above.

We point to a different possibility. Besides participation, the provision of public goods by governments in new democracies might depend on what citizens demand. After all, citizens often have heterogeneous preferences across the different types of services a government could potentially provide. For example, in September of 2013, protests erupted in the Nigerian city of Abeokuta, calling for the government to increase spending on education. In February of 2014, Nigerians protested in Ikotun, demanding that the government provide better electricity infrastructure, to lower electricity prices. The fact that citizens in these two cities demanded different types of goods is puzzling in light of the respective districts’ spending priorities: Abeokuta’s district actually spends a larger share of its budget on education than Ikotun’s district, yet its citizens demand further increase in education spending. In contrast, Ikotun’s district spends more on infrastructure than Abeokuta’s district, yet its citizens want their local government to spend even more on infrastructure.

This example illustrates the significant variation in preferences of citizens in new democracies. Yet, there is scant evidence explaining why these differences exist. Most research simply assumes these differences. For example, scholars suggest that “there are strong reasons to believe that when compared with urban groups, rural groups in Africa are more concerned with spending on primary education, relative to tertiary education” (Stasavage, 2005, p. 344). Wary of these assumptions, we analyze the reasons for the differences in preferences. In particular, our goal is to explain why citizens’ preferences vary across different types of public goods.

There are two reasons to believe that preferences are particularly important in the context of new democracies. First, democratization gives citizens the means to express their preferences and demand services from their government. Based on survey data from 20 emerging democracies in Africa, Isaksson (2014) finds that citizens participate politi-
cally when given the opportunity. Second, citizens’ preferences are not only more likely to be expressed, but they are likely more intensely felt in the context of new democracies. Evidence suggests that the mere fact of living in a democracy affects individuals’ self-perception as well as their expectations of the government. For instance, Carbone (2012) argue that “democratic reform processes are often supplemented by expectations of tangible improvements in social welfare.” Bratton and Mattes (2001) adds that Africans often anticipated that democratic reforms would deliver a number of additional goods. Furthermore, Mani and Mukand (2007, p. 508) show that in the context of new democracies, changing voter expectations through greater political activism can help improve provision of public goods. In short, preferences are more likely expressed and more intensely felt in newly democratized countries.

In this context, it is important to understand where these preferences come from. For this reason, we follow the example of the scholars cited above and apply theories developed in the context of western democracies to a new democracy in Africa. Research in industrialized economies suggests that asset ownership, past experiences, and physical location strongly shape individual level preferences across public goods. We test whether these concepts also explain the preferences of Nigerian citizens across a range of public goods.

More specifically, we argue that the perceived distributional consequences of different public goods vary across citizens. We show that individuals rationally demand public goods with distributional consequences that align with their household’s individual-level characteristics. We argue that households are significantly more likely to demand the type of public good that (a) complements assets owned by the respective household, (b) resonates with their past experiences involving the lack of particular public goods, and (c) corresponds to their immediate living environment. Despite the non-rivalrous and non-exclusionary character of public goods, the perceived value of these goods differs in
predictable ways. We suggest nine different operationalizations that capture the arguments (a), (b), and (c).

For obvious reasons, obtaining reliable data on citizens’ preferences across different types of public goods in any new democracy is a challenge. Therefore, it is no surprise that research on citizens’ preferences in African countries is relatively scarce. We contribute to these efforts by analyzing survey data on 123,000 Nigerian households that includes information on stated preferences as well as socio-economic characteristics of those same households.

In addition to the data, our methodological contribution is the simultaneous estimation of preferences across multiple public goods. Previous work has analyzed the factors explaining the preferences for one particular type of public good in isolation. However, this approach assumes that the preferences for one type of good are independent from the preferences for another type of good. Yet, an individual’s attitude towards education is likely to spill over to her preferences regarding health. We therefore analyze the determinants of preferences for multiple types of public goods concurrently using a simultaneous equation approach.

The article proceeds as follows. The next section reviews existing approaches to explaining the variation of preferences across public goods. Section 2 introduces our three hypotheses, while Sections 3 and 4 introduce the data and method, respectively. The empirical findings, along with a robustness test, are presented in Section 5. Section 6 concludes.

1 The Provision of Public Goods

Scholars analyzing public goods have long recognized that citizens’ preferences vary with respect to social spending. In the context of developing countries, ethnicity has been
a common departure point for explaining the variation of demand for public goods. A number of scholars argue that the ethnic identity of an individual affects the demand for a certain public good. For example, Easterly and Levine \cite{Easterly1997} review scholarly work that assumes politicians provide different public goods as a function of different preferences across ethnic groups. More recently, Lieberman and McClendon \cite{Lieberman2013} found that preferences vary across ethnic groups in most sub-Saharan African countries, and that the subsequent policy demands correlate highly with ethnic associations. Moreover, ethnic groups will systematically disagree over the kinds of public policies they want the government to focus on, suggesting divergent preferences across different types of public goods (Miguel, \citeyear{Miguel2004}; Habyarimana et al., \citeyear{Habyarimana2009}).

However, the focus on ethnicity has two important drawbacks. First, these approaches are not generalizable. Different countries have different ethnic groups. Thus, it is challenging to apply findings obtained in Kenya to the situation in Nigeria. Second, the approach is descriptive as it argues that particular ethnic groups prefer one type of public good to another for cultural and historical reasons. This precludes the possibility to identify particular causal mechanisms pertaining to why some individuals prefer one type of public good over another. For these reasons, the contradictory findings are less surprising. For example, Lieberman and McClendon \cite{Lieberman2013} argue that ethnicity is a significant predictor for demand of public goods, while Habyarimana et al. \cite{Habyarimana2009} p.81) find that ethnic dummies are never jointly significant.

The literature has advanced in a different direction in the context of industrialized economies. Here, preferences concerning social spending are seen as intimately related to the concept of risk. Public goods are understood as providing an insurance function providing security to individuals at risk (Hacker, \citeyear{Hacker2004}; Cusack, Iversen, and Rehm, \citeyear{Cusack2006}).

First generation models explain variation in citizens’ preferences by pointing to different levels of exposure to macroeconomic phenomena. Rodrik \cite{Rodrik1998} p. 998) argues that
citizens of countries exposed to international trade “demand (and receive) an expanded
government role as the price for accepting larger doses of external risk.” Similarly, Mughan
(2007) argues that exposure to globalization increases workers’ sense of economic insecurity, resulting in more support for public good provisioning by the government. Scheve and Slaughter (2004) focus their analysis on sectoral- instead of cross-country differences. They show that individuals working in sectors with greater exposure to FDI are more likely to demand social spending because of increased economic insecurity.

Subsequent approaches show that the perception of risk is conditional on individual-level characteristics. Rehm (2009) argues that an individual’s occupation shapes her uncertainty about future income as well as her attitude towards redistribution (Kitschelt and Rehm, 2014). Some occupations require specific skills that are less transferrable across different industries, thereby increasing the exposure to risk, in turn shaping preferences in favor of redistribution. Similarly, Iversen and Soskice (2001) argue that workers with specific skills are at higher risk of facing long periods of unemployment and reduced income in the event of job loss. Therefore, the relative reliance on skilled versus unskilled workers across economies explains variation in demand for public goods.

Rehm (2011) suggests that countries where citizens have a relatively similar chance of becoming unemployed due to their skill specificity will exhibit strong support for an extensive welfare state, while public support for social spending in countries with heterogeneous exposure to risk will be lower. Extending this argument, Rehm, Hacker, and Schlesinger (2012) argue that support for the welfare state will be particularly strong in countries where the disadvantaged sections of the population (i.e., low income, lower class) do not overlap with the sections of the population that are insecure (i.e., high risk because of asset specificity concerns). Besides the variation in exposure to risk, other factors have been found to moderate the risk once exposed. For example, the assets individuals own shape their preferences with respect to government spending. Ansell (2014) shows that
homeownership has a distinct impact on preferences for social spending. Increased house prices raise an individual’s permanent income, which homeowners perceive as insurance against income loss. They subsequently become less supportive of redistribution and spending on public goods as their home values appreciate. Scheve and Slaughter (2001) add that preferences concerning trade protection depend on asset values. In regions with higher housing demand and correspondingly higher home prices, individuals will demand less protection.

All of these approaches focus on explaining preferences with respect to the overall level of public goods using an individual’s preferences with respect to the total spending on public goods as the dependent variable. The lack of differentiation between different types of public goods is unsettling as individuals’ preferences differ: Some prefer education to infrastructure, while others favor the opposite. Focusing on the overall level of public good does not allow for differentiating between preferences for education versus infrastructure.

Certainly, some scholars have examined citizens’ preferences for individual public goods. Examples are the preferences for employment protection (Rueda, 2006) or support for unemployment benefits (Rehm, 2011). However, these studies analyzed individual public goods in isolation. In each scenario, the dependent variable was constructed from survey data that offered only one question on a single public good. Yet, it is unlikely that the preferences for one type of public good are completely independent from preferences for other public goods; an individual’s preferences for education are likely related to preferences for health care. We argue that it is necessary to examine the factors affecting citizens’ preferences for multiple types of public goods simultaneously.

Third, as noted above, the work on preferences for public goods in developing and industrialized economies has diverged significantly. Causal mechanisms developed in the context of industrialized countries have not yet been applied to developing countries. We extend the scholarship on public goods preferences by applying concepts tested only in the
context of industrialized economies — individual-level characteristics, assets, and living situations — to developing countries.

2 Explaining heterogeneity in preferences across different types of public goods

Researchers commonly assume that public goods benefit everyone equally because of their non-rivalrous and non-exclusionary properties. For instance, Mesquita et al. (2002) write, “Imagine that the leader has a pool of $1,000 with which to provide goods and that spending the entire $1,000 would produce a public good worth $20 to everyone in society.” (Mesquita et al., 2002, p.562). We believe that this view is imprecise. While public goods are non-rivalrous and non-exclusionary, their perceived distributional consequences differ across various citizens. Schools, for example, might only directly benefit citizens with children, while those without children might not value the per capita spending as much. Similarly, public spending on roads is perceived as useful only to owners of vehicles, while those without cars or motorcycles might not value the spending as highly. In other words, per capita may not translate into a perceived value of $20 for each individual; individual level preferences across the types of public goods likely differ.

In order to predict the ways in which these preferences differ systematically we argue that actors are aware of their own socio-economic characteristics. In particular, citizens will have stronger preferences for public goods whose distributional consequences are perceived to be complementing their own characteristics. We categorize three specific types of individual characteristics — asset ownership, past experience, and immediate environment — that systematically affect household demands for certain public goods. Using these categories, we connect individual-level characteristics (instead of non-generalizable attributes such as ethnicity) to the perceived distributional consequences of specific types
of public goods (rather than a single generic public good).

**Asset ownership** Our first hypotheses suggest that the assets individuals own affect their political preferences. We argue that citizens prefer public goods complementary to the private assets they already possess. We hypothesize that

**Hypothesis 1** *Households prefer public goods that increase value, productivity, and usefulness of assets they already own.*

Note that the impact of assets differs from that of general wealth or income. Critics may contend that wealthier individuals demand different public goods than those at lower income levels because their basic needs are met. While the poorest individuals might demand access to basic education and health services, wealthier individuals who can already afford these goods might instead demand goods such as all-season roads, electricity, and improved police services. Conceptually, this approach suggests that both high and low income earners have the same preferences, but that these demands are already satisfied for the rich but not for the poor. In contrast, we argue that the distribution of preferences is not uniform. Rather, the demand for roads differs conditional on the individual owning a vehicle, irrespective of whether the individual is rich or poor.\(^1\)

We test Hypothesis 1 using four operationalizations: ownership of motorcycles affecting preferences for roads, as well as homeownership shaping demand for electricity, sanitation, and police services. First, we examine the difference between owners and non-owners of motorcycles because the perceived value of owning vehicles depends on the existence of paved roads. Without the complementary public good, the ownership of a motorcycle *in itself* does not guarantee a sufficient degree of mobility. Therefore, we

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\(^1\)We account for any possible wealth effect by controlling for levels of income in the empirical analysis via welfare quintile of the individual, and nevertheless obtain statistically significant results for asset ownership. This suggests that asset ownership is not just a proxy for income and wealth.
expect more pronounced preferences for transportation infrastructure among motorcycle owners.

The argument that assets shape preferences across public goods can also be operationalized using home ownership. Because individuals that own their home — as opposed to renting a dwelling — are less mobile, we assume that homeowners are more invested in the public good supplies of their area precisely because they lack exit options. They have more to lose by the absence of complementary public goods. For example, property owners might highly value access to electricity services as the utility obtained from owning a house is negatively affected by the absence of electricity. Similarly, we expect the preferences of homeowners to exhibit a strong preference for attachment of their dwelling to the community’s sewer system or for sufficient protection by a community police presence. In contrast, renters experiencing the lack of these public goods can more easily move to different locations.

We subsequently test Hypothesis 1 using four operationalizations: ownership of motorcycles affecting preferences for roads, as well as homeownership shaping demand for electricity, sanitation, and police services.

**Past experience shaping current preferences** Our second hypothesis suggests that past experiences shape individuals’ current preferences. The lack of a particular public good in the past has a strong effect, typically resulting in the individual paying particular attention to this good being supplied by the government. For this reason, we hypothesize that

**Hypothesis 2** *Households exhibit strong preferences for provision of goods that they lacked in the past.*

We operationalize this hypothesis with references to past educational experience as a driver for public good preference. For example, if someone obtains secondary education,
personal experience likely tells her that education is not an under-provided public good. Conversely, the experience of missing education increases awareness of the lack of this particular public good. We expect to find that individuals unable to attend school are more likely to demand the provision of education.

An additional way to operationalize Hypothesis 2 focuses on the interaction of lack of schooling with other societal outcomes. For example, existing research shows that education might be inversely related to health outcomes. Grignon (2008) as well as Hollingsworth and Wildman (2003) show that returns of education on health diminish rapidly with increases in education. Altindag, Cannonier, and Mocan (2011) find no relationship between health and education amongst individuals having completed high school, but a positive impact for individuals with less schooling. In other words, the impact of an additional year of schooling on health is important during primary school but not during secondary education. Based on this research, we expect a higher preference for the supply of health and sanitation facilities from less-educated heads of household.

In sum, we test Hypothesis 2 using three different operationalizations: The lack of education in the past should lead to particularly strong demands on the government to provide education today while less-educated households should more likely demand health facilities and sanitation facilities than those with more education.

### Immediate Environment

Our final hypothesis suggests that the characteristics of an individual’s living location also affect preferences across public goods. We know from Tiebout (1956) that the uniqueness of a locality shapes individuals’ demand for public goods. Johnston, Swallow, and Bauer (2002) find that introducing spatial attributes into

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2We recognize that education is likely to be highly correlated with income. Therefore, there is the possibility that education is simply a proxy for wealth. As wealthier individuals can afford to educate their children privately, we might expect them to have lower demands for public education facilities. Our empirical strategy accounts for this with controls for the welfare quintile of the household to test if — when controlling for wealth — the level of education has an independent effect on the demand for public goods.
the decision-making process — including proximity of proposed public goods to existing
developed areas — affects policy choices. This echoes the findings by Murray et al. [1998]
who conclude that public goods should be provided to those most likely to use them, with
proximity being an important factor in usage. For these reasons, we argue that proximity
to available resources shapes the demand of complementary public goods.

**Hypothesis 3** *Households will demand the types of public goods that are un-
available in the immediate physical proximity.*

We operationalize this hypothesis by examining how proximity to the nearest fresh water
source might affect the demand for water-related public goods. For example, it is reason-
able to expect that households living farther away from the nearest supply of drinking
water are more likely to demand wells and boreholes than those living close to a drink-
ing water supply. Similarly, the demand for pipe-borne water facilities is likely higher
amongst those that do not live in locations with such infrastructure.

In sum, our hypotheses set out to test whether theories developed in the context of in-
dustrialized economies are also applicable to developing countries. We test our arguments
with data on Nigeria since we expect that preferences across public goods are particularly
important in the context of new democracies: Preferences are more likely expressed right
after democratization, and expected to be more intensely felt due to changes in citizens’
expectations.

### 3 Data

**Description of survey** We analyze data from the 2006 National Core Welfare Indica-
tors Question Survey (CWIQ) conducted by the Nigerian National Bureau of Statistics.
The survey was administered *in-person* to 123,000 Nigerian households, preventing incon-

sistent and missing answers. In addition, financial backing of the World Bank funded the training of the interviewers in order to minimize interviewer bias.

The survey employed two-stage cluster sampling to obtain a representative picture of preferences across districts. Researchers first randomly selected ten Enumeration Areas in each district. Enumeration Areas were previously demarcated from an independent national census (similar to election districts in the United States). Then researchers randomly sampled ten housing units within each Enumeration Area. This resulted in 100 housing units per district, with all households in each housing unit interviewed in-person. There is a high degree of heterogeneity within clusters on the dependent variables (demand for public goods) as well as explanatory variables (i.e., asset distribution, educational attainment, etc.). This is also the case for most control variables, with few exceptions such as gender, where most respondents are male.

Properties of the resulting data  The resulting data has four characteristics that make it particularly well-suited for our purposes. First, prior work used the actual provision of public goods to proxy the underlying demand for particular public goods. However, collective action problems interfere with the translation of individual-level preferences and district-level spending. In contrast, our data includes direct measures of preferences across a wide range of public goods.

Second, the data allows addressing endogeneity concerns that might arise from the fact that current vehicle owners want roads to be improved, but the existence of roads might also incentivize citizens to buy vehicles. The data can partially address this issue by distinguishing between households that want roads to be improved versus those that want roads to be provided. This distinction allows careful coding of the dependent variable to only consider answers that roads to be provided (because they do not currently exist), partially interrupting the two-way causal arrow described above.
Third, the question wording corresponds closely to the difference between public and private goods. The survey asks “Which type of facility would you like provided or improved in this community?” Respondents can then pick any or all, or any combination of the following possible responses that indicate their preference for a particular public good: school facilities, health facilities, all-seasons roads, well/borehole water, piped borne water, transport facilities, sanitation facilities, police services, and electricity. This implies that the survey did not conceptualize types of public goods as competing — this is a meaningful assumption considering the non-rivalrous and non-exclusionary nature of public goods. As respondents did not face a penalty for choosing to demand many public goods, we expect to find that the overall level of demand for public goods is high. In this context, finding statistically significant differences in preferences for particular public goods between households with different characteristics is particularly challenging. This implies that statistically significant differences, if they exist, are substantively meaningful.

Lastly, the survey addresses concerns over households deliberately misrepresenting their preferences. For example, Throsby and Withers (1986) argue that individuals have the incentive to understate their preferences with respect to public goods if the survey asks how much individuals would be willing to pay (via taxes) — individuals tend to free-ride on the presumed efforts of other citizens. Our data does not measure the ‘willingness-to-pay’ as a continuous variable; rather, we have discrete information on whether a household considers the perceived benefit of a public good as more or less worthy than its price. While this operationalization leads to a loss of information, it reduces the bias of answers affected by free-riding considerations. In the words of Schokkaert (1987), “In the choice between ‘yes’ and ‘no’ in a system of general fund financing, the respondent has no

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3We recognize that non-selection of a particular good might be either an expression of indifference or an instance of missing data. The inability to differentiate between these two possibilities might introduce bias in our analysis. However, as virtually every household answered every question on the 200-question in-person survey, it is unlikely that a missing response is the result of unintentionally overlooking the question.

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incentive to lie, since this reduces the probability that his personal preference will be followed, while, at the same time when a project would be executed, he has to pay the tax price, independent of his own answer.”

4 Method

Simultaneous estimation We begin by assuming that respondent \( j \) is willing to pay for project \( i \) if the perceived benefits of the project \( B_{ij} \) exceed the project’s tax price of \( t_{ij} \):

\[
B_{ij} > t_{ij}
\]

(1)

Furthermore, we hypothesize that household characteristics play a significant role in explaining variation in the perceived benefit of particular types of public goods. Hence

\[
B_{ij} = x'_j \beta_i + \epsilon_{ij}
\]

(2)

where \( x_j \) is a vector of characteristics of individual \( j \), \( \beta_i \) a vector of coefficients specific for project \( i \) and \( \epsilon_{ik} \) a random term, with a continuous logistic probability distribution \( F(\epsilon) \). We further assume that the perceived benefits \( B_{ij} \) are continuous, but the recorded preference for or against a particular type of public good is a categorical response variable.
For this reason, we assume that

\[ y_{ij}^* = \begin{cases} 1 & \text{if } B_{ij} > t_{ij} \\ 0 & \text{if } B_{ij} \leq t_{ij} \end{cases} \quad (3) \]

The binary nature of the dependent variable and the distributional assumptions noted above require logistic estimations of the following form:

\[ y_{ij} = \beta_1 + \beta_2 \times \alpha_h + \beta_3 \times \delta_h + \beta_4 \times \gamma_{h,d} + \epsilon \quad (4) \]

where \( y_h \) represents household preference for a particular type of public good, \( \alpha_h \) are the household characteristics affecting demand for the public good, \( \delta_h \) denote controls for the already existing supply of that public good, and \( \gamma_{h,d} \) are additional control variables.

Note that implementing Equation 4 implies estimating separate logistic regressions for each type of public good \( j \). However, as argued above, the preferences across a range of public goods are likely interdependent. For example, a household’s preferences for health services likely spill over into that household’s attitude towards schools. The relationship between a particular household characteristic and a particular public good cannot be estimated in isolation; simultaneous estimation is required to capture the interdependencies between household characteristics and preferences across different types of public goods.

In addition to conceptual considerations, the simultaneous equation approach accounts for the fact that the data on preferences comes from a single question where respondents choose from among many non-rank ordered choices.

For this reason, we estimate a multivariate probit model — a variation of the seem-
ingly unrelated regressions (SUR) approach — that analyzes the preferences for multiple goods simultaneously. While SUR approaches require continuous dependent variables, multivariate probit methods are appropriate for binary dependent variables, where the dependent variable allows for “M different choices at the same point in time” (Cappellari and Jenkins, 2007, p.279). The multivariate probit model takes this simplified form:

\[
\begin{align*}
y_{mj}^* &= \beta_m' X_{mj} + \epsilon_{mj}, m = 1, \ldots, M \\
y_{mj} &= 1 \text{ if } y_{mj}^* > 0 \text{ and } 0 \text{ otherwise}
\end{align*}
\]  

(5)

where \(y_{mj}\) represents the outcomes of respondents’ choosing any combination of M different public goods, at the same point in time. Multivariate probit simulates the multidimensional integrals of the likelihood function that would otherwise be difficult to compute (Arias and Cox, 1999). This provides the maximum simulated likelihood of respondents with certain personal characteristics preferring various public goods while accounting for their likely simultaneous preference for other public goods (see also Arendt and Holm, 2006; Freedman and Sekhon, 2010). The multivariate probit regressions are estimated with Huber-White standard errors to address potential heteroskedasticity.\(^4\)

**Control variables** To facilitate comparisons across the different models presented below, we use the identical set of control variables, \(\gamma_{h,d}\). We include a dummy variable, indicating urban or rural household location, as the supply of public goods might differ across these two types of locations. We also control for the household’s welfare quintile to ensure that that owning specific assets has an effect on the demand for certain public goods independent of wealth. We include a dummy for gender to control for the possibility that women’s roles in the household warrant them to demand different types of public

\(^4\)We also estimate every model with standard errors clustered on the district level. The results are presented in the Online Appendix and are robust to this methodological change. In addition, the Online Appendix presents every model estimated with vanilla standard errors to examine whether standard and robust estimations have different outcomes. This is not the case, indicating that our models are specified correctly (Freedman, 2006).
goods than men. We use a continuous measure for age as younger heads of households might demand different public goods considering that they are at the beginning of their family’s life cycle. We also control for the marital status of the head of household as a household with husband, wife, and children is likely to have different demands than a household of a single man. We also include an indicator variable capturing whether the household owns their home or is renting.

Besides these control variables on the household level, $\gamma_h$, we also include two variables on the district level, $\gamma_d$: The total population, as well as the land size for each district, to account for possible scale effects as larger, more populous districts might be able to provide a different level of public goods than smaller districts. We also want to control for unobserved heterogeneity across the 774 districts in our sample. However, the inclusion of fixed effects into nonlinear regressions will introduce the so-called ‘incidental parameters problem’ (Lancaster, 2000): The coefficient estimates as well as standard errors will become increasingly biased the larger the number of dummies included (Greene, 2002, p.7). We construct a Chamberlain-Mundlak device to circumvent this problem. This represents a second-best approach for including quasi-fixed effects in a probit estimation. The approach involves including the mean of each independent variable by district in the analysis. This accounts for any intraclass correlation between observations within districts, as respondents within a district are more likely to have similar preferences than respondents between districts.

**Endogeneity** The presence of endogeneity might confound our analyses. While we argue that a household will demand roads to increase the utility of a motorcycle, it might be the case that the household only purchases a motorcycle once a road is available. This suggests that asset ownership could be endogenous to existing public goods.

In light of this possibility, we take two precautions. First, we control for the existing
stock of the type of public good. For example, when estimating the effect of owning a motorcycle on the preferences for road construction, we include indicators for whether a road construction project has been completed within the last five years. Conditioning the effect of owning a motorcycle on the preferences for roads on the stock of existing roads helps with addressing one direction of the potential endogeneity, i.e., the causal arrow from ‘because roads exist, I will buy a motorcycle.’

Obviously, the stock of roads created over the past five years might itself be the result of preferences by individuals that already owned a motorcycle at that point in time. We address the reverse arrow from ‘because I have a motorcycle, I will demand roads’ with careful coding of our dependent variable. Recall that we code only responses that demand a particular type of public good be provided, but exclude answers where respondents called for the public good to be improved. The improvement responses suggest that the roads already exist. Eliminating these responses tightens the empirical tests of the proposed causal mechanisms.

We recognize that this is an imperfect approach; nevertheless, we believe these precautions can eliminate much of the potential avenues through which endogeneity could operate.

5 Results

5.1 Asset ownership and public good preferences

Hypothesis suggests that households will demand those types of public goods that increase the utility of the assets they already own. We argue that the ownership of

\[5\text{Unfortunately, the survey does not provide information beyond the previous five years on the existing stock of a public good. This is obviously a concern, as the presence of a school, clinic, or road that is more than five years old is still likely to affect whether individuals demand provision of the good. In the absence of other information on the existence of public goods in a precise locality, we include quasi-district fixed effects using the Chamberlain-Mundlak devices described above.}\]
certain long-term assets require complementary public goods in order to provide utility to their owners. We offer four operationalizations of this hypothesis. First, we suggest that owners of motorcycles are more likely to demand roads to be built than non-owners. We also propose that homeowners prefer certain types of public goods more than renters. For this reason, the second through fourth operationalizations utilize data on sanitation facilities, police services, and electricity.

As argued above, the preferences for roads are likely not independent from the preferences for other infrastructure demands such as sanitation facilities or electricity. It is therefore necessary to estimate the effect of various assets on multiple types of public goods simultaneously, accounting for the interdependency of the choices available to respondents. Table 1 presents the results of a single multivariate probit estimation with four equations.\(^6\)

Note the positive and statistically significant coefficients on motorcycle and dwelling ownership. These coefficients indicate that households owning these long-term assets are significantly more likely to state that complementary public goods — roads, sanitation, police services, and electricity — should be provided than households not owning those assets. For example, the odds of motorcycles owners demanding roads are about 9% higher \((e^{0.088} = 1.091)\) than the odds of households without motorcycles. Similarly, the odds of homeowners exhibiting preference for electricity infrastructure are 28% higher than renters.

\(^6\)For space considerations, tables presented in the article omit the set of control variables. The full tables are available in the Online Appendix.
5.2 Past experience shapes current preferences across public goods

Hypothesis 2 suggests that prior experience with public goods shapes current preferences regarding these goods. For example, fortunate individuals that have received higher levels of schooling are less likely to perceive a lack of education services when compared to a less privileged person. For this reason, we expect individuals without schooling to be more acutely aware of the lack of this particular public good.

We operationalize this hypothesis using three approaches. First, the lack of schooling should translate into higher demand for provision of school facilities. Furthermore, we expect that individuals without education are less likely to have lived in affluent circumstances. For this reason, these households are acutely aware of the lack of health and sanitation facilities, which should translate into stronger preferences for these public goods.

We are aware that an individual’s level of education in developing countries is strongly correlated with the affluence of the environment in which the individual grew up. Thus, we control for the welfare quintile of the respondents ensuring that the effect of higher income on the preferences for public goods is not mistakenly attributed to education. The models presented below use responses to whether school facilities or health facilities should be provided as the dependent variable. The main explanatory variable captures the head of household’s level of schooling.

We estimate the three operationalizations of Hypothesis 2 simultaneously to account for likely interdependencies of preferences. The results of the three-equation multivariate probit model are presented in Table 2. The positive and statistically significant coefficients indicate that households without schooling are more likely to prefer provision of school, health, or sanitation facilities than households whose head has some level of education.
5.3 Location and public good preferences

Hypothesis 3 suggests that proximity to resources matters in public good preference. We operationalize this hypothesis using data on households’ proximity to water sources. In particular, we expect stronger preferences for wells and boreholes and pipe-borne water from those households living farther away from a drinking water source. The dependent variables in the models reported below are household responses to the question of whether wells and boreholes or pipe-borne water should be provided. We measure the key explanatory variable as a dummy indicating whether the time to the household’s nearest drinking water source is more or less than 15 minutes.

We estimate these two models simultaneously because it is likely that respondents’ preferences are interdependent. The models’ estimation results are seen in Table 3. The positive and significant coefficients indicate that households farther away from their nearest source of drinking water are more likely to prefer provision of wells and boreholes or pipe-borne water than households closer to the water source. For example, the odds of households more than 15 minutes away from the nearest drinking water source demanding provision of water pipes are almost 14% higher than households with easier access to drinking water.

5.4 Robustness test: Simultaneous estimation of asset ownership, past experience, and location

So far, we have tested the effect of assets, past experience, and location on preferences for particular types of public goods. We have used separate estimations of multiple equation
models for each of category. We recognize that interdependency might exist not only among types of public goods that complement assets or among types of goods that are demanded due to prior experiences. Rather, it is reasonable to assume that the category effects on preferences for different public goods are also interdependent.

We therefore estimate an eight-equation multivariate probit model to analyze the effect of assets, prior experience, and location on the preferences for multiple types of public goods simultaneously. This multivariate probit model includes multiple public goods as dependent variables — all seasons roads, police services, electrification, wells or boreholes, pipe-borne water, sanitation, school and health facilities — and estimates the factors affecting the preferences for these public goods simultaneously.\footnote{Note that the multivariate probit model does not allow for the same dependent variable to be used twice. However, we operationalized both Hypothesis 1 and Hypothesis 2 using the provision of sanitation facilities as a dependent variable. Consequently, we had to drop one of these operationalizations in this simultaneous equation approach. The article reports the model that includes sanitation facilities in the estimations for Hypothesis 1 but excludes them with respect to Hypothesis 2. We also estimated the corresponding model, including sanitation facilities in the Hypothesis 2 estimations and excluding them with respect to Hypothesis 1. The results are available in the Online Appendix and are consistent with those reported in the article.}

The results of this all-encompassing simultaneous equation model are shown in Table 4. All key explanatory variables — asset ownership, head of household education and proximity to water — show significance in relation to their respective public good dependent variable, even when accounting for interdependencies. These results provide strong evidence that preferences for public goods are shaped by the socio-economic characteristics of households.

\[\text{Table 4 about here.}\]

6 Conclusion

Preferences for public goods are not uniform across households. We explain how and why preferences for public goods vary across households, arguing that the distributional
consequences of particular public goods differ across citizens. Our argument connects individual-level attributes to the distributional consequences of specific public goods to show that individuals value particular public goods more than others in predictable ways.

We show that households are significantly more likely to demand the type of public good that (a) complements assets owned by the respective household, (b) resonates with their past experiences involving the lack of particular public goods, and (c) corresponds to their immediate living environment. These results are consistent across a wide range of public goods such as roads, health facilities, police services, electricity, education, water pipes, and wells.

Our research adds a new dimension to the analysis of public good provision. First, we show that citizens prefer specific, definable public goods that benefit them personally, rather than just a general level of public good provision. Second, we expand public good analysis methodologically by simultaneously estimating a wide variety of public goods choices based on multiple causal mechanisms. This method accounts for the fact that citizens may prefer many different types of public goods according to their own differing, but concurrent, characteristics.

The implications of our findings could inform future research in several ways. For example, many scholars have identified the collective action problems that heterogeneous groups face when putting forward demands towards the government. Our research points towards the use of household characteristics as a proxy for preferences. This would allow scholars to estimate the extent of the heterogeneity, and therefore the degree of collective action problems that citizens are likely to face in countries with a more heterogeneous distribution of preferences.

In addition, we point out that the type of public good — roads, education, health, electricity, water, etc. — matters as citizens’ preferences across these types of public goods differ. This insight could be incorporated into supply-side explanations that focus
on politicians' decision-making calculus to provide a particular type of public good. This would extend existing scholarship that primarily focuses on explaining the overall level of public goods provided, but not the type of public goods supplied. This could enhance both conceptual and empirical precision of models analyzing the provision of public goods.
References


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Table 1: Multivariate probit regression simultaneously testing four operationalizations of Hypothesis [1]. The results indicate that the type of asset owned affects preferences across public goods. * p<0.05. Standard errors in parentheses.
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Table 2: Multivariate probit regression *simultaneously* testing three operationalizations of Hypothesis 2. The results indicate that the level of education (that is, the lack thereof) affects preferences across public goods. * p<0.05. Standard errors in parentheses.
Table 3: Multivariate probit regressions *simultaneously* testing two operationalizations of Hypothesis 3. The results indicate that the lack of proximity to public goods increases citizens’ preferences for these public goods. * p<0.05. Standard errors in parentheses.

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Table 4: Multivariate probit regressions simultaneously testing the different operationalizations of Hypotheses 1, 2 and 3. The results indicate the assets owned by a household, the level of education, and the location of a household affects preferences across public goods. * p<0.05. Standard errors in parentheses.