

Satisfaction Revealed: An Evaluation on Non-Response in the Afrobarometer Survey

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Satisfaction with democracy signifies an important indicator of democratic progress, yet has not been scrutinized for inaccuracy due to non-response. This paper evaluates the non-response bias for a satisfaction with democracy question in Round 3 of the Afrobarometer Survey. A causal model explains both the probability of satisfaction as well as the likelihood of response. A Heckman two step equation method identifies the presence of a strong selection bias. The results provide useful insights for the study of non-response as well as satisfaction with democracy in Sub-Saharan Africa. The Heckman corrected estimates of satisfaction are used to reevaluate a previous study of electoral quality and satisfaction with democracy.

Introduction

This paper investigates the accuracy of a measure of democratic progress in Sub-Saharan Africa. In countries which have recently transitioned to democracy, a variety of tools may be used to evaluate the success or failure of new democratic governments. These tools may include objective measures like growth rate of output and corruption indices. Subjective tools, such as survey results that report individuals' levels of satisfaction with democracy, may also be utilized to understand how successful democracy has been in the eyes of the citizenry. Thus, measures of satisfaction with democracy are frequently cited in the context of uncovering to what extent democracy delivers improved public goods to society.

The Afrobarometer survey measures the views of Africans in eighteen African countries on issues ranging from democratic governance to economic development.¹ The survey asks respondents to evaluate their satisfaction with democracy, to which they may choose one of five levels of satisfaction. A high number of respondents, ranging from seventeen to forty percent among the eighteen countries, do not choose a level of satisfaction, but instead answer "don't know." Although non-response is commonly seen in survey data, the high percentage of non-response is surprising here because satisfaction is a sentiment commonly considered as inherently known by an individual. Therefore, individuals who report a "don't know" answer choose not to report their actual level of satisfaction. Nevertheless, given that satisfaction is inherently known by each individual, a true level of satisfaction exists even when it is not explicitly seen in the data set.

In the case that non-response occurs systematically, and not at random, it may create a selection bias and skew the estimation of satisfaction. In this case, raw measures that do not correct for a selection bias may overestimate or underestimate the true level of satisfaction with democracy in a particular country. This truncated measure of satisfaction may not only misrepresent the true level of satisfaction, but may also be used to report faulty relationships between satisfaction with democracy and other variables. Constructing an accurate measure of satisfaction with democracy requires a two step process, which involves the generation of a theoretical model which explains both the response to the satisfaction question and the direction of the response in terms of the level of satisfaction itself.

Using pre-existing literature on non-response and satisfaction with democracy, a theoretical model may be developed to explain both whether an individual responds to the satisfaction question and the level of satisfaction they report in the event that they respond. The extant literature explores non-response with respect to economically oriented questions rather than political questions, like those regarding satisfaction with democracy. Notable among this literature, Berinsky develops a theoretical model which explains both the direction of response for economic policy questions and the level of non-response for these questions². The pre-existing research has addressed neither non-response for survey questions in Sub-Saharan Africa, nor overall non-response for questions about democracy.

Pre-existing literature has evaluated the determinants and explanatory power of satisfaction with democracy without reference to the possible non-response bias of the satisfac-

¹ Countries include: Benin, Botswana, Cape Verde, Ghana, Kenya, Lesotho, Madagascar, Malawi, Mali, Mozambique, Namibia, Nigeria, Senegal, South Africa, Tanzania, Uganda, Zambia, and Zimbabwe.

² Adam Berinsky, *Silent Voices: Political Opinion and Political Participation in America* (Princeton: Princeton University Press, 2004).

tion with democracy measure. By creating a measure of satisfaction that corrects for a non-response bias, results from this paper may be used to reevaluate pre-existing research on satisfaction with democracy. Alemika studies the impact of election fairness on satisfaction with democracy. She argues that individuals who report higher perceptions of election fairness will report higher levels of satisfaction with democracy.³ Using the corrected measure of satisfaction which corrects for the non-response bias, her study of election fairness and satisfaction may be verified or brought into question. Re-evaluation of her study, using both her methodology and data, indicates that she underestimates satisfaction across different levels of electoral quality. Nevertheless, the overall significance of her results holds.

The following sections of the paper present an analysis of non-response with respect to satisfaction with democracy in Sub-Saharan Africa. The Literature Review and Causal Theory sections include analysis of pertinent pre-existing literature and their relationship to this project. The research design and hypotheses describe how the Heckman selection model will be used to evaluate non-response and satisfaction. The Basic Results section compares the results of the different models, followed by the Analysis section which highlights results from the Heckman model. The Extensions section uses the Heckman results to re-evaluate the relationship between electoral fairness and satisfaction with democracy. The final section acknowledges the many difficulties inherent in selection models and this project.

Literature Review

Two separate bodies of literature address the topic of non-response to survey questions regarding satisfaction with democracy. A wide array of social science literature discusses the issue of non-response, while political science research focuses on the issue of satisfaction with democracy. The pre-existing research on non-response indicates a clear direction for the analysis of non-response in the Afrobarometer data, while the literature on satisfaction with democracy contains many controversies and possible directions for the analysis of this variable in the data.

Recent research explores various techniques to address the issue of non-response in survey data. Honaker and King address the issue of missing data through a discussion of multiple imputation techniques.⁴ The authors describe several methods which enable data analysis to account for missing data values. Listwise deletion constitutes the most common method for dealing with non-response. Respondents with a missing value for either an independent or dependent vari-

able are deleted from the data set. Listwise deletion requires the assumption that the missing data values are MCAR (Missing Completely at Random). Since this assumption may not always be applicable, Honaker and King develop a multiple imputation method that relies on the assumption that the missing data values are MAR (Missing at Random). MAR differs from MCAR in its flexibility. While MCAR requires that all missing data is missing at random, the MAR assumption concedes that missing data might not be completely missing at random. For MAR, missing data is assumed to be random even though it may not occur at random because the data needed to analyze the missing data is unavailable. The authors justify the MAR assumption as follows: "An MAR assumption can be wrong, but it would by definition be impossible to know on the basis of the data alone, and so all existing general purpose imputation models assume it." Here, the authors explain that in cases when the determinants of missingness cannot be found in the data alone, the MAR assumption must be utilized in order to address the issue of non-response. In the case of the Afrobarometer survey data, however, the determinants of non-response may be found within the survey data itself. Given the availability of this data, neither the MAR nor MCAR assumption is necessary to analyze non-response for satisfaction with democracy.

Several studies similarly find the determinants of non-response within the body of the survey itself. These studies utilize a Heckman two step equation model, which allows the authors to specify which independent variables should theoretically determine both the level and direction of response. For example, Berinsky and Tucker present an analysis of non-response for a survey question on market reform in post-Soviet Russia⁵. The authors develop a theoretical argument that identifies variables that predict both the level of response and the direction of response. Specifically, they address how liberal a respondent is on the issue of the economy. Non-response is described as a function of a respondent's economic well being, education, locality, and support for reform. From a background of the theory of public opinion formation, the authors claim a positive relationship between economic status and response. Wealthier individuals have access to politically relevant resources, such as education and money, and are therefore more capable of forming an opinion on the state of affairs. Berinsky and Tucker deem opinion formation of a nation's politics a summary judgment, requiring respondents to link their personal situation to the "world of politics." Impoverished respondents lack the politically relevant resources of money and education and are therefore less capable in linking their personal lives with the status of the

³ Ertanibi Alemika, "Quality of Elections, Satisfaction with Democracy, and Political Trust in Africa," *Afrobarometer Organization*, 2007.

⁴ James Honaker and Gary King, "What to do about Missing Values in Time Series Cross Section Data," Working Paper (2008): 5.

⁵ Adam Berinsky and Joshua Tucker, "'Don't knows' and Public Opinion towards Economic Reform: Evidence from Russia," *Communist and Post Communist Studies* 39 (2006): 73-99.

country. The authors also argue that respondents in urban areas have more access to politically relevant resources and are therefore more likely to answer survey questions regarding the nation's state of affairs.

In addition to the variables that capture a respondent's proximity to politically relevant resources, other variables may also determine the level of non-response. Berinsky argues that inclusion of demographic variables that may affect both satisfaction and response are essential in determining whether satisfaction level systematically matters for response⁶. If demographic variables such as age and gender are omitted, omitted variable bias may result. Resultantly, the analysis of non-response in the Afrobarometer survey requires the inclusion of age, gender, and urban location as demographic variables.

While Berinsky and Tucker analyze non-response in post-Soviet Russia, the analysis of non-response in Sub-Saharan Africa requires modifications to their model. While economic well being has wide variation in post-Soviet Russia, it has less variation in Sub-Saharan Africa. Other variables like media access and political participation may more closely link respondents with politically relevant resources than wealth status alone. Berinsky and Tucker use education as a proxy for access to political information; however, little variation is seen in the Afrobarometer for this variable. Other variables, such as media access, may serve as a proxy for a respondent's level of political information. Political participation may similarly serve as a proxy for a respondent's political efficacy. In cases of clientelism, political participation certainly increases a respondent's access and exposure to politically relevant resources, such as government jobs and handouts. As Berinsky and Tucker argue, linkage to politically relevant resources increases response. Therefore, media access and political participation have a theoretical link to higher levels of response.

While the pre-existing research on non-response indicates a clear direction for the analysis of non-response in the Afrobarometer survey, the separate body of literature on satisfaction with democracy contains many more divides.

Evaluation of the determinants of satisfaction with democracy is a topic of much controversy in comparative political science. The measure has been scrutinized on several grounds including its vagueness and the difficulty it may present for cross country analysis. Canache et al describes the three major uses of satisfaction measures across

countries⁷. They describe how satisfaction with democracy may indicate support for incumbent governments, support for a democratic system of government, and an individual's life satisfaction. Canache debunks the usefulness of satisfaction with democracy measures due to the difficulty in comparing cross country measures and the uncertainty regarding what this measure captures. The authors criticize satisfaction with democracy measures from nearly every angle, but fail to explore the issue of non-response and do not consider how it may lead to faulty interpretations of the survey results.

Several authors explore the possible determinants of satisfaction with democracy.⁸ Bratton and Mattes present the most comprehensive list of determinants for satisfaction with democracy, describing how satisfaction with democracy may be rooted in either instrumental or intrinsic rationales⁹. In the case of instrumental roots, satisfaction with democracy may increase with economic gains from democratic regimes. Respondents who support democracy on instrumental grounds may link government performance with satisfaction with democracy. For these respondents, satisfaction with democracy may translate to "satisfaction with this democratic regime." Resultantly, evaluation of government performance and economic well being serve as two determinants of satisfaction.

In addition to income, urban versus rural location may serve as another indicator of economic well being and thus serve as a key determinant of satisfaction with democracy in Sub-Saharan Africa. Sahn and Stifel identify the rural-urban gap with respect to standard of living across Sub-Saharan Africa¹⁰. The authors report higher levels of income and seven other indicators of living standards in urban versus rural locations. Given this discrepancy, urban areas are expected to be wealthier than rural areas. Urban respondents, therefore, are expected to be more satisfied with democracy than rural respondents. Instrumental support for democracy may also result in satisfaction levels that are dependent on the political orientation of the current regime. In the case that a respondent's favored party has power, this respondent may derive a greater level of satisfaction. Thus, political orientation marks a fourth determinant of satisfaction with democracy.

In the case of intrinsic roots, satisfaction with democracy may relate to the spread of democratic ideals like free elections and civil liberties. For intrinsic supporters of democracy, education may relate to satisfaction.

⁶ Adam Berinsky, "The Two Faces of Public Opinion," *American Journal of Political Science* Vol. 43, No. 4 (1999): 1209-1230.

⁷ Damarys Canache and Jeffery J. Mondak, "Knowledge Variables in Cross-National Social Inquiry," *Social Science Quarterly* Vol. 85, No. 3 (2004): 539-558.

⁸ See Wantchekon and Taylor (2007); Fernandez et al (2000); Cho (2004); and Evans and Rose (2006).

⁹ Michael Bratton and Robert Mattes, "Support for Democracy in Africa: Intrinsic or Instrumental," *British Journal of Political Science* Vol. 31, No. 3 (2001): 447-474.

¹⁰ David Sahn and David Stifel. "Urban-Rural Inequality in Living Standards in Africa," *Journal of African Economies* Vol. 12, No. 4 (2003): 564-597.

Respondents with higher levels of political information through schooling may be more capable to evaluate their democracy's progress to democratic ideals. Accordingly, education serves as the fifth determinant of satisfaction with democracy. It is not readily clear in which direction this relationship should run. In the case that education reveals the true successes of a democratic regime, education and satisfaction will be positively correlated. It may also be the case that education and access make a respondent closer to the regime and its failure. In the case that proximity to the regime exposes any non-democratic tendencies of the government, these variables will be negatively correlated with satisfaction.

Demographic variables such as age may also affect a respondent's level of satisfaction with democracy. Deaton describes how life satisfaction declines with age for both low and middle income countries¹¹. Deaton explains this relationship in the context of expectations. Elderly respondents who do not expect to live much longer may not look forward to eventual improvements. Younger respondents, on the other hand, have a longer horizon of life expectancy and may anticipate positive societal changes. Although the author discusses this relationship in reference to satisfaction with life, a similar logic may be applied to satisfaction with democracy. Therefore, satisfaction is expected to be inversely proportional to age.

The effect of gender on satisfaction with democracy and life satisfaction in general has not been addressed in the pre-existing literature. Given the lack of theoretical basis to assume that gender has a systematic effect on satisfaction, satisfaction is predicted to be gender neutral.

The literature on non-response has been largely devoted to the analysis of non-response with respect to questions of economic policies and reforms. No pre-existing research explores the possibility of non-response for political variables like satisfaction with democracy. Given the large body of literature on satisfaction with democracy, as described above, the possibility of a non-response bias may have important implications for the understanding of satisfaction with democracy. Given the availability of the Heckman model to analyze non-response, correction for a possible bias shall lead to a more accurate measurement of satisfaction with democracy and its true determinants.

Causal Theory

In *Silent Voices*, Adam Berinsky develops a causal model that predicts why a respondent may choose to answer a survey question or choose "don't know." He describes the

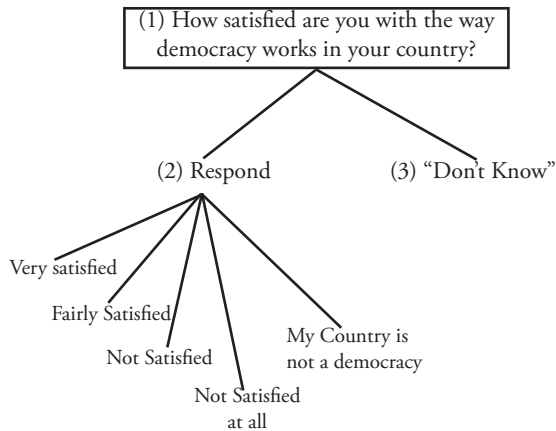
frequency of non-response as an increasing function of both cognitive and social complexity of the survey question.

In the Afrobarometer survey, both cognitive and social complexity of the satisfaction question drives certain individuals to not respond. Although the question seems intellectually simple at first glance, further analysis reveals the multifaceted nature of satisfaction with democracy that renders some ignorant of their own satisfaction. "Democracy" contains many political institutions that individuals may consider when formulating their response. A respondent may consider separately his or her level of satisfaction with the country's legislature, electoral institutions, local governments, and the office of the president. In order to respond, the individual must aggregate several levels of satisfaction with the multiple components of a democracy described above. The aggregation of these viewpoints presents a cognitive challenge to some individuals. Less educated respondents are expected to face more cognitive complexities, and are therefore expected to exhibit a higher likelihood of non-response. The individuals are unable to formulate a single level of satisfaction with democracy, and therefore choose the answer "don't know." "Don't know" represents their incapacity to average their levels of satisfaction with the different components of democracy. Alternatively, a "don't know" response may suggest apathy towards the survey question. Nevertheless, an average level of satisfaction exists for each "don't know" respondent and the Heckman model enables the identification of this value.

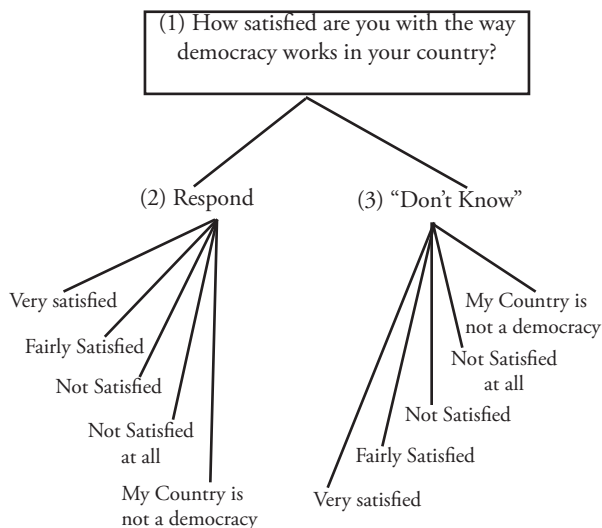
Non-response due to the social complexity of the satisfaction survey question relates to a respondent's contact with the world of politics. Connection with the political realm may result from interaction with government offices and politicians. Respondents also find personal identification with politics through media and participation in both community and politically oriented activities. Proximity to these politically relevant resources may be estimated by a group of variables in the Afrobarometer survey; these variables include media access, political participation, and community participation.

Given the background on the causal mechanisms of non-response, the Heckman model eliminates the bias from non-response and produces estimates of the true level of satisfaction in the Afrobarometer survey. The Afrobarometer attempts to capture the true level of satisfaction with democracy across twenty countries. When individuals are asked, "How satisfied are you with the way democracy works in your country?" they may behave in the following manner:

¹¹ Angus Deaton, "Income, Health, and Well being around the World: Evidence from the Gallup World Poll," *Journal of Economic Perspectives* Vol. 22, No.2 (Spring 2008): 53-72.



At node 1, a respondent must decide whether to answer the question. The process ends at node 3 if the respondent decides not to answer, but continues at node 2 if the respondent chooses to answer. In order to assess the true level of satisfaction in the sample, a level of satisfaction must be assigned to respondents who choose “Don’t Know.” This results in the following depiction:



In the case that an individual lands on node 2, several variables determine which end node he finishes the sequence on. Individuals who support the incumbent party and who offer a positive evaluation of government performance should report a higher level of satisfaction than would otherwise be the case. Wealthy, urban, and educated individuals may have a higher level of overall satisfaction, which may in turn lead them to report a higher level of satisfaction with democracy. As demonstrated above, survey respondents first choose whether or not to respond. Pre-existing research treats node 3 as the final node for a respondent who chooses “Don’t Know.” Through a two equation Heckman model, satisfaction levels may be observed for all respondents in the survey.

Hypotheses

Hypothesis testing using a probit model may be used to evaluate which variables have a significant effect on satisfaction with democracy. These hypotheses will test the proposition that each independent variable has no significant effect on satisfaction with democracy against the two sided alternative at the 95% level of confidence. For each β , we will reject the null hypothesis that a variable of interest has no effect on satisfaction if the p value is less than .05. The hypotheses will include the following:

Hypothesis 1: Demographic variables like gender, age, economic well being, education level and urban location will significantly affect a respondent’s level of satisfaction. β gender \neq 0, β age \neq 0, and β urban \neq 0, β education \neq 0, and β economic well being \neq 0.

Null Hypothesis: Demographic variables like gender, age, economic well being, education level, and urban location will not affect a respondent’s level of satisfaction. β gender=0, β age=0, β urban=0, β education=0, and β economic well being=0.

Hypothesis 2: Variables that measure a respondent’s evaluation of the current government, like political orientation and evaluation of government performance, will significantly affect a respondent’s level of satisfaction. β political orientation \neq 0 and β government performance \neq 0.

Null Hypothesis: Variables that measure a respondent’s evaluation of the current government, like political orientation and evaluation of government performance, will not affect a respondent’s level of satisfaction. β political orientation=0 and β government performance=0.

Given the above discussion of each of these variables, I expect satisfaction to increase with income, age, education, media access, legislative fragmentation, evaluation of government performance, and political orientation that favors the incumbent party. Gender is expected to have no affect on satisfaction.

Similarly, hypothesis testing will be used to identify which variables significantly affect non-response. These hypotheses will be tested in the same way as described for satisfaction:

Hypothesis 3: Demographic variables like gender, age, level of education, economic well being, and urban location will significantly affect the act of response. α gender \neq 0; α age \neq 0; α education \neq 0; \neq 0; α economic well being \neq 0; α urban \neq 0

Null Hypothesis: Demographic variables like gender, age, level of education, economic well being, and urban location will not affect response. α gender=0, α age=0; α education=0, α economic well being=0, and α urban=0.

Hypothesis 4: Variables that represent proximity to politically relevant resources like political participation, community participation, and media access will affect response. α political participation \neq 0; α community participation \neq 0; α media access \neq 0

Null Hypothesis: Variables that represent proximity to politically relevant resources like political participation, community participation, and media access will not affect response. α political participation=0; α community participation=0; α media access=0

Given the above discussion on the causal theory of non-response, I expect response to increase with education, age, media access, community participation, political participation, and urban location. Gender is expected to be insignificant.

Research Methodology

Constructing a measure of satisfaction with democracy that accounts for selection bias may be conducted using several different models. Since non-response is not expected to occur at random, a multiple imputation method as described by Honaker and King may not be appropriate. Instead, a model that allows for the specification of two separate equations, one for response and one for satisfaction, must be utilized. The Heckman model is the most appropriate model for this analysis due to the hypotheses described above for both satisfaction and non-response, since it creates a model with two separate equations, one for satisfaction and the other for non-response. Both equations must share common variables and feature one or more variables which are not present in the other equation. Both equations will feature probit regressions using maximum likelihood estimation techniques. Maximum likelihood estimation must be employed in this case due to the discrete nature of both response and satisfaction. Berinsky's *Silent Voices* similarly uses a Heckman model to analyze non-response in survey data.

For this model, the unit of analysis will be the individual (respondent). All observations are taken from a single point in time (2005) across eighteen countries in Sub-Saharan Africa. Although randomization is not employed in the selection of the countries, respondents within each country are randomly selected. Given that respondents come from eighteen separate countries, which are not randomly chosen, the model must account for the possible country specific effects. Since a Heckman probit model does not allow for fixed or random effects, a Heckman model designed for survey data was used. The Survey Heckman Model stratifies

the data set by country and lists the primary sampling unit as the region of the respondent.

The first part of this methodology requires precise estimation of the determinants of satisfaction with democracy for respondents who identified their level of satisfaction. This estimation constitutes the truncated measurement of satisfaction, since it excludes respondents who chose "Don't Know." The dependent variable, satisfaction, is measured through response to Question 47 of the Afrobarometer, which asks individuals to choose one of the following levels of satisfaction with democracy: "This country is not a democracy," "Not at all satisfied," "Not very satisfied," "Fairly satisfied," or "Very satisfied."

In order to fit this data to a Heckman model, the dependent variable must be either a continuous random variable or a Bernoulli random variable. Therefore, individuals have been grouped into two categories: "Satisfied" or "Not Satisfied." The "Satisfied" group includes individuals who chose "Very satisfied" or "Fairly satisfied", while the unsatisfied group contains those who chose "This country is not a democracy," "Not at all satisfied," or "Not very satisfied."

The independent variables for the satisfaction include (1) gender, (2) age, (3) education, (4) evaluation of government performance, (5) economic well being, (6) urban rural location, and (7) political orientation. Gender will be coded as 0 if male and 1 if female. Age will be coded as the actual age of the respondent. Education will take values between 0 and 4: 0 for "No formal schooling;" 1 for "Some primary schooling;" 2 for "Primary school completed;" 3 for "Some secondary school / high school;" 4 for "High school completed and above." Government performance may be calculated through factor analysis, utilizing ten separate indicators of a respondent's evaluation of how the government has performed on separate issues. These issues include managing the economy, creating jobs, keeping prices stable, narrowing gaps between rich and poor, reducing crime, improving basic health services, addressing educational needs, delivering household water, ensuring everyone has enough to eat, fighting corruption in government, and combating HIV/AIDS. Economic well being may be measured through factor analysis using a factor that measures living conditions. This factor includes highly correlated variables that assess a respondent's access to food, water, medicines, fuel, and cash income. Urban versus rural location will be coded as 1 for urban location and 2 for rural location. Political orientation may be measured through the response to the question, "If the election was held tomorrow, who would you vote for?" Political orientation shall be coded as 0 if the respondent does not support the current party in government and 1 if he does. Table 6 describes the coding for this variable with the exception of Mali due to the complex nature of Mali's multiparty system.

Heckman describes the general format of the model as follows.¹² The censored estimation of satisfaction includes only the respondents who answer the survey question and takes the following form: $E(Y_{li} | X_{li}, \text{sample selection rule}) = X_{li}\beta_1 + E(U_{li} | \text{sample selection rule})$. Assuming that error term, U has a bivariate normal, the sample selection may be corrected using the following two equation method:

$$Y_{li} = X_{li} B_1 + C \lambda_i + C(\lambda - \hat{\lambda}_i) + V_{li}$$

Where λ = Inverse Mill's ratio; $\lambda = \text{pdf}(Z_i) / (1 - \text{cdf}(Z_i))$
 X_1 is a vector that contains the variables predicted to affect satisfaction: x_1 =economic well being, x_2 =government performance x_3 =support for the government's leading political party x_4 =gender, x_5 =age, x_6 =education, and x_7 =urban location.

The Inverse Mill's ratio contains information from the selection equation, given that $\lambda = \text{pdf}(Z_i) / (1 - \text{cdf}(Z_i))$, $Z_i = X_{2i} B_2 / \sigma_{22}^{1/2}$. Here, X_2 is a vector of the independent variables that predict response.

The selection equation for the Heckman model uses "response" as the dependent variable and the following independent variables: (1) gender, (2) age, (3) rural versus urban location, (4) level of education, (5) economic well being, (6) media access (7) political participation, and (8) community participation. Gender, age, rural versus urban location, level of education, and economic well being shall be coded as described above for Equation I. Berinsky includes several of the variables listed above, although he does not include media access as a variable of interest.

Political participation may be estimated through factor analysis using a factor that includes three highly correlated variables (attending a community meeting, getting together with others to discuss an issue, and attending a demonstration or protest march). Community participation will be similarly measured using a factor that measures participation in religious and community organizations. Media access may also be measured as a factor using three variables which measure exposure to three types of media: radio, newspaper, and television.

Response to the satisfaction question will be coded as 0 for no response and 1 for a response. Given the binary response, a probit model with country level dummy variables (D_c) shall estimate response. This model assumes bivariate normal distribution of the error term, u_i .

$$z_i = w_i \alpha + u_i; P(Z=1) = \Phi(w_i \alpha)$$

$$\text{Equation II: } P(Z=1) = F[\alpha_0 + \alpha_1(\text{gender}) + \alpha_2(\text{age}) + \alpha_3(\text{education}) + \alpha_4(\text{economic well being}) + \alpha_5(\text{media}) + \alpha_6(\text{political participation})$$

$$+ \alpha_7(\text{community participation}) + \alpha_8(\text{urban}) + D_c]$$

The Heckman Model requires that both equations share a set of variables. The shared set of variables includes gender, age, education, economic well being, and urban versus rural location. The model also stipulates that each equation include one or more variables that the other does not. Only the satisfaction estimation includes political orientation and government performance, while only the response equation includes community participation, political participation, and media access.

Given that the above conditions are met, the Heckman model generates satisfaction estimates for those respondents who chose "Don't Know" in the original survey data. In order to generate these estimates, the model assumes that values of satisfaction (Y) are not observed unless Z exceeds a threshold. The truncated estimation of satisfaction in equation I violates the Gauss-Markov assumption that the independent variables (x_1, \dots, x_8) are not correlated with the error term, ε . Correction for this error requires estimation of the Inverse Mill's ratio, λ , where $\lambda = \text{pdf}(w_i \alpha) / \text{cdf}(w_i \alpha)$. The final equation of the Heckman model includes the estimates of the β parameters from Equation I as well as the inverse Mill's ratio, λ .

$$\text{Equation III: } E[Y_i | Z > 0] = E[\beta' x_i + \varepsilon_i | \alpha' w_i + u_i > 0] = \beta' x_i + \rho \sigma \lambda(Z \alpha)$$

Parameter values from Equation II replace α with $\alpha_1, \dots, \alpha_7$.

Upon estimation of Equations I and II it is possible to identify the significant determinants of both satisfaction and non-response. Equation III enables the construction of a non truncated estimation of satisfaction, which includes satisfaction levels for respondents who chose "don't know." The significance of the inverse Mill's ratio indicates the presence of selection bias. In addition to the value of this ratio, comparison of Heckman coefficients for the satisfaction equation and the coefficients from the truncated satisfaction equation also serves to indicate the severity of the selection bias. For example, in cases of severe selection bias, one or more variables that appear insignificant in the censored measure may become significant in the Heckman estimates. The level of significance for other variables may also differ between the two estimates. The following section describes the full results of the two equation Heckman model and compares the Heckman coefficients with the censored model.

Results

The two step Heckman model verifies several predictions

¹² James Heckman, "Selection Bias as a Specification Error," *Econometrica* Vol. 47, No. 1 (1979): 153-161.

discussed earlier. In order to analyze the results of the Heckman model, it is useful to explore the implications of the censored estimation of satisfaction with democracy. Table 3 presents the results from the censored probit regression for satisfaction. The results from the probit regression appear to validate several predictions from the previous sections. Individuals who support the leading political party in the current government are significantly more likely to report satisfaction with democracy. Similarly, the probability that an individual is satisfied increases significantly as one's ranking of the government's performance increases. As predicted, the likelihood of satisfaction significantly increases as economic well being increases. Additionally, age has a significant and positive relationship with the likelihood of satisfaction. Support for the government's party, ranking of government performance, and age are all significant at the 1% level. While the theoretical model predicted that education and urban location are positively related with the likelihood of satisfaction, the censored model contradicts these predictions. In fact, education was found to be significant, but negatively related with satisfaction. As a respondent's level of education increases, he is less likely to be satisfied with democracy. Thus, education is significant at the 5% level. Urban versus rural location appears insignificant in the censored model, but the direction of the relationship runs counter to the theoretical prediction. The theory predicts that urban residents are more likely to be satisfied, but this model of satisfaction finds that rural residents are more likely to be satisfied, albeit at an insignificant level. Additionally, while the theoretical model predicts that gender will not significantly affect satisfaction, the censored model indicates that women are significantly more likely to be satisfied with democracy than men. This result is significant at the 10% level.

Table 4 describes the results from the Heckman model. The results confirm the presence of a strong selection bias. The censored model described above underestimates satisfaction with democracy in the Afrobarometer. The selection bias is significant enough that the coefficients of several independent variables in the response equations change substantially. While the censored model suggests that urban versus rural location is not significant, the Heckman model confirms that rural location does indeed significantly increase the likelihood of satisfaction. Additionally, while the censored model indicates that education has significance at the 5% level, the Heckman results raise the level of significance to 1%. Gender remains significant at the 10% level, although the Heckman model reports a higher probability that this relationship may be due to random chance. The p-value increases from .053 in the censored model to .066 in the Heckman model. The coefficients for support for the government party, evaluation of government performance, and age remain positive and significant at the 1% level, which is consistent with the estimates from the truncated regression.

The Heckman model allows for the analysis of the determinants of satisfaction as well as response to the satisfaction question. Table 5 presents these results. As discussed above, the several variables including urban location, economic well being, media access, community participation, political participation, and level of education are predicted to significantly affect the likelihood of response. Gender is expected to be insignificant. The results from the Heckman model verify several of the predictions explained in the previous sections.

Rural residents are significantly less likely to respond than urban residents. Individuals with higher levels of community and political participation, as well as those with more media access and years of education, are more likely to respond than those without. Additionally, the likelihood of response increases significantly with age. These results are all significant at the 1% level of significance, and all lend support to the theoretical predictions that respondents with more access to politically relevant resources will respond with a higher frequency. While economic well being was also expected to be significantly related to response, the Heckman model contradicts this prediction. Economic well being shows to be insignificant. Gender also has no explanatory power for response, as predicted.

The rho value of -.41 is significantly different than zero, which verifies the presence of a selection bias. The negative value of the rho indicates that as the probability of response increases, satisfaction decreases. The profile of an individual who is likely to respond may be described as a highly educated, urban dweller who reports high levels of community and political involvement as well as access to media outlets. As an individual becomes more likely to respond, or to fit this profile, he or she becomes less likely to be satisfied with democracy. Further research may indicate the precise mechanism through which education, participation, and media increases the probability of response.

Analysis

A few results from the Heckman model stand out in their possible contributions to the literature. The insignificance of economic well being in the response equation and the negative relationship between urban location and satisfaction runs contrary to the theoretical predictions presented above.

While the theory predicts that economic well being will have a positive and significant relationship with response, the Heckman model lends no support to this proposition. Economic well being is insignificant with a negative coefficient for the response equation. Several lines of reasoning may explain this result. Economic well being was thought to increase response through its mechanism of increasing access to politically relevant resources, which help individuals form responses to survey questions. While

this may be the case in well developed countries like the United States, this explanation may have less credence in Sub-Saharan Africa for several reasons. Sub-Saharan Africa has less intra country variation in economic well being than the U.S. In the U.S. the poor constitutes a minority, while in Sub-Saharan Africa, the poor makes up the majority. While the poor minority in the U.S. may be excluded from the world of politics, this may not be the case for the poor majority in Sub-Saharan Africa. Given their strength in numbers, Africa's poor majority may be more capable of organizing itself into a politically relevant body than the poor minority of the U.S. This "strength in numbers" reasoning offers one explanation of why economic well being does not significantly increase response in the Afrobarometer results. Further research may explore the relationship between non-response and economic well being across countries at different levels of development.

The positive, significant relationship between *rural* location and satisfaction with democracy contradicts the intrinsic theory of democracy and raises several questions for future research. According to the intrinsic theory of democracy, as described by Bratton and Mattes respondents with better living standards will be more satisfied with democracy. Since respondents in urban locations have higher living standards than those in rural locations, the theory predicts that they will be more satisfied with democracy. The Heckman model finds that rural, rather than urban locations, increase the probability of satisfaction with democracy. Although this result contradicts the theory of intrinsic democracy, it may support emerging theories on pro-rural development policies enacted by new democracies in Sub-Saharan Africa. The insignificance of urban/rural location in the censored model constitutes a type II (false negative) error, which the Heckman model corrects, highlights the importance of accounting for non-response bias in survey questions that evaluate satisfaction with democracy.

Extensions

Alemika explores the relationship between electoral quality and satisfaction with democracy.¹³ She concludes that respondents who report high levels of election fairness also report high levels of satisfaction with democracy. The following section reconsiders her results using a three step process: (1) replication of her original model (2) evaluation of the relationship with satisfaction as a Bernoulli random variable and (3) evaluation of the relationship using the estimates of satisfaction from the Heckman model.

Alemika's original model uses listwise deletion of all respondents who choose "don't know" for either the

satisfaction with democracy question or the election fairness question. She also deletes respondents who claim, "My country is not a democracy" in response to the satisfaction with democracy question. Table 9 displays the results from her analysis, while Table 10 exhibits an identical reproduction of these results. Reproducing these results requires listwise deletion of respondents who chose "do not understand the question" or "don't know" for either question. Respondents with a missing answer for either question were also excluded, as well as those who chose "my country is not a democracy" for the satisfaction question. Altogether, this results in the deletion of 24% of the survey respondents (5,818 individuals). Alemika uses a Chi Squared Test to measure the relationship between satisfaction with democracy and electoral fairness and finds the relationship to be significant at the 1% level. The results for this test using her data and methodology are reported in Table 10.

The second step of the analysis requires using Alemika's measurement of electoral fairness with the measurement of satisfaction as a Bernoulli random variable. As described in previous sections, the satisfaction with democracy question takes five possible values in the original data set, but has been grouped into two categories (satisfied and not satisfied) for the purpose of conducting the Heckman model. The "Satisfied" group includes respondents who claim to be "very satisfied" or "fairly satisfied" with democracy, while "Not Satisfied" group includes individuals who are "Not at all satisfied," "Not very satisfied," or who state "My country is not a democracy." Table 11 presents the results from the Chi squared test for electoral fairness and satisfaction with democracy as a binomial random variable. Additionally, Table 11 includes the respondents who answered "don't know" for the electoral fairness question. Despite the modifications of the satisfaction variable and inclusion of the "don't knows" for the electoral fairness question, the results remain consistent with Alemika's original findings.

The final step involves the use of the Heckman estimates of satisfaction, which will reverse Alemika's technique of listwise deletion for the respondents who answered "don't know" for the satisfaction question. Since the Heckman estimates of satisfaction for these "don't know" respondents appears as a continuous random variable between zero and one, they have been recoded to fit the probit format for an analysis of a discrete random variable. Specifically, values greater than .5 have been recoded to one, while those less than .5 have been recoded to zero.

Table 12 presents the results from the Chi Squared

¹³ Alemika, 2007.

test using Heckman corrected measure of satisfaction. In an effort to isolate the specific affect of the non-response bias from the satisfaction question, tables 11 and 12 differ only in their treatment of “don’t knows” for the satisfaction question. Table 11 includes “don’t know” for the electoral question, and excludes “don’t know” for the satisfaction question. Table 12 includes “don’t know” for both.

As can be seen from Table 12, using the Heckman corrected estimates for satisfaction yields different results from Alemika’s original findings, particularly for those individuals who rank election fairness poorly. Alemika maintains that the respondents who rank electoral quality poorly will have low levels of satisfaction with democracy. Alemika reports that 81.3% of the respondents who consider the past national election as “Not free and fair” are not satisfied with democracy. Using the Heckman estimates of satisfaction, this value drops to 78%. A similar trend is seen with respondents who rank electoral quality in the second to lowest category, “Free and Fair, but with major problems.” For this category, Alemika claims that 64% of these respondents are not satisfied with democracy. This value drops to 61% when using the Heckman estimates as shown in Table 12. Therefore, for the two lowest ratings of electoral quality, Alemika overestimates the percentage of respondents who are not satisfied with democracy. The Heckman results verify that 22% of individuals who rank electoral quality the poorest are nevertheless satisfied with democracy. This value jumps to 39% for those who qualify the past election as “Free and Fair, but with Major Problems.” In both cases, Alemika underestimates the number of respondents who rank electoral quality poorly, but are nevertheless satisfied with democracy by 3%. Table 13 presents the percentage change for the number of individuals in the “Satisfied” group after the Heckman estimate of satisfaction has been employed. For each level of electoral quality, Alemika underestimates the number of satisfied individuals. Despite these differences, the overall significance of her Chi Squared test still holds even at the 1% level.

In her analysis of election fairness and satisfaction with democracy, Alemika employs an implicit assumption, which allows her to delete the 24% of respondents who chose “Don’t know” for either question. She assumes that the missing values for these questions are missing at random. This assumption has been negated by the Heckman model described above, which verifies that non-response to the satisfaction question occurs systematically, rather than randomly in the survey data. Given this information, an analysis of satisfaction with democracy with respect to another variable in the data set must use the Heckman corrected estimates of satisfaction or risk the possibility of non-response bias. While Alemika’s results still hold when she excludes nearly one fourth of the survey respondents, inclusion of these individuals in her analysis lends more credibility and confidence to her results.

Conclusions

The goal of this paper was to evaluate the presence of a non-response bias in a satisfaction with democracy question. The Heckman corrected model for satisfaction identified a non-response bias and comparison with pre-existing studies indicated the importance of correcting for non-response in survey data. While some authors have criticized measures of satisfaction with democracy, they have not proposed solutions to improve the measure. This study scrutinizes the raw measure of satisfaction with democracy and improves upon it via an analysis of the non-response bias inherent in a particular survey question. While other authors identify a non-response bias in questions regarding economic policy, this paper successfully identifies a non-response bias for a politically oriented survey question. Using data from Sub-Saharan Africa marks an important step in expanding the evaluation of non-response to surveys in less developed and recently transitioned countries.

Future research may improve the study of non-response and satisfaction with democracy by developing a Heckman model for an ordered probit survey question. Such a development would mark a monumental achievement for the study of non-response for survey questions, which often appear in an ordered probit format. This development will also allow for better comparison with pre-existing studies on satisfaction with democracy. Additionally, further research may integrate satisfaction with democracy questions from other surveys such as the Latinobarometer and the Eurobarometer. Inclusion of other regions in the analysis of non-response allows for the identification of regional specific effects and offers a larger sample from which to analyze non-response bias.

Appendix

Table 1: Non-response by Country

Country	Percentage "Don't Know"
Benin	15.86
Botswana	8.08
Cape Verde	12.34
Ghana	14.2
Kenya	15.88
Lesotho	14.52
Madagascar	33.78
Malawi	4.25
Mali	3.86
Mozambique	16.11
Namibia	7.42
Nigeria	3.09
Senegal	14.17
South Africa	5.46
Tanzania	58.21
Uganda	26.54
Zambia	20.08
Zimbabwe	26.91

Table 2: Summary Statistics for Independent Variables

Variable	Number Observations	Minimum	Maximum	Mean	Std. Dev.
Gender (Female=2)	21,222	1	2	1.4721	.4992
Urban Rural (Rural=2)	21,222	1	2	1.588	.4922
Age	21,029	18	130	36	14.6
Education	21,222	0	2	1.3253	.7561
Political Orientation (Support for Government=1)	25,397	0	1	.4674	.4989

Table 3: Summary Statistics for Dependent Variable-Satisfaction

Level of Satisfaction	Percent	Count
Not Satisfied	45.61	9,708
Satisfied	54.39	11,579

Table 4: Summary Statistics for Dependent Variable- Response

Response	Percent	Count
Yes	83.8%	21,295
No	16.2%	4,102

Table 5: Factor Analysis Results

Factor Name	Eigenvalue	Difference	Proportion	Cumulative	Number of Observations
Media Access	1.06486	1.14321	1.4054	1.4054	25,044
Community Participation	0.9657	0.9989	1.60	1.60	24,803
Political Participation	1.10218	1.12004	1.3050	1.3050	24,530
Economic Well being	2.13405	2.05051	1.2229	1.2229	24,884
Government Performance	4.32	3.76	0.9886	0.9886	19,909

Table 6: Political Orientation Variable

Country	Party Name	Code	Percentage Support
1-Benin	Kerekou	126	16.44%
2-Botswana	BDP	142	53.00%
3-Cape Verde	PAICV	166	23.81%
4-Ghana	NPP	182	51.55%
5-Kenya	NARC	201	40.06%
6-Lesotho	LCD	222	66.67%
7-Madagascar	TIM	240	36%
8-Malawi	DPP, UDF	261, 270	58.83%
9-Mali	NA	NA	NA
10-Mozambique	Frelimo	300	79.55%
11-Namibia	SWAPO	320	68.50%
12-Nigeria	PDP	340	35.46%
13-Senegal	PDS	360	51.58%
14-South Africa	ANC	102	56.92%
15-Tanzania	CCM	380	82.98%
16-Uganda	NRM	512	59.42%
17-Zambia	MMD	422	26.17%
18-Zimbabwe	ZANU-PF	440	21.47%

Table 7: Satisfaction with Democracy-Truncated Model versus Heckman Model¹⁴

Variable	Satisfaction (Truncated)	Satisfaction (Heckman Model)
Age	.0229*** (.0050)	.004*** (.001)
Gender (Male=1, Female=2)	-.0826* (.0438)	-.0810* (.0436)
Education	-.0626** (.0288)	-.1321*** (.0310)
Urban/Rural (Urban=1, Rural=2)	.03682 (.0454)	.0800* (.0439)
Government Support (Support=1)	.4579*** (.0503)	.4476*** (.0502)
Government Performance	.5604*** (.0235)	.5491*** (.0261)
Economic Well Being (Poor approaches 1)	-.1083*** (.0224)	-.0942*** (.0229)
Overall Significance	F(7, 178)= 127.9***	F(10, 175)= 64.4***
Number of Observations	14,338	16,641
Number of Strata=18; Number of Primary Sampling Units=202		

¹⁴ Estimation Procedure: Probit Survey function versus Heckman Probit Survey function using STATA 8. Strata set as Country and Primary Sampling Unit (PSU) set as Region. * indicates $p < .1$, ** indicates $p < .05$, and *** indicates $p < .001$.

Table 8: Satisfaction with Democracy and Non-response-Heckman Model¹⁵

Variable	Satisfaction (Heckman Model)	Response
Age	.004*** (.001)	-
Gender (Male=1, Female=2)	-.0810* (.0436)	.0335 (.0444)
Education	-.1321*** (.0310)	.2946*** (.0290)
Urban/Rural (Urban=1, Rural=2)	.0800* (.0439)	-.1452*** (.0462)
Government Support (Support=1)	.4476*** (.0502)	-
Political Participation	-	.0991*** (.0233)
Community Participation	-	.1467*** (.0233)
Media Access	-	.4943*** (.0279)
Government Performance	.5491*** (.0261)	-
Economic Well being	-.0942*** (.0229)	-.0314 (.0232)
Rho Statistic: -.4054268; 95% Confidence interval: (-.5881- -.1835) Number of Strata=18; Number of Primary Sampling Units=202 F(10, 175)=64.41***		

Table 9: Results from Alemika (2007)

Table 6: Quality of Elections and Satisfaction with Democracy

Democratic satisfaction and dissatisfaction	Quality of the last national election			
	Not free and fair	Free and fair with major problems	Free and fair, but with minor problems	Completely free and fair
Not at all satisfied	47.9	24.0	11.1	10.0
Not very satisfied	33.4	40.2	28.0	17.4
Fairly satisfied	12.3	27.4	47.5	35.3
Very satisfied	6.4	8.3	13.4	37.3
No. of respondents	2838	2875	5527	8339
$\chi^2 = 4826.1$, $df = 9$, $Sig. < .001$. Kendall's tau-b = .369; $Sig. = .001$				

Table 10: Results using Alemika's Data and Method

Democratic Satisfaction and Dissatisfaction	QUALITY OF LAST NATIONAL ELECTION			
	Not Free and Fair	Free and fair with major problems	Free and Fair, but with minor problems	Completely Free and Fair
Not at all satisfied	47.92	24.03	11.05	10.04
Not very satisfied	33.37	40.24	27.99	17.35
Fairly Satisfied	12.33	27.41	47.51	35.28
Very Satisfied	6.38	8.31	13.44	37.33
Number of Respondents	2838	2875	5527	8339
Pearson Chi Squared=4.8e+03 df=9 Significance<.001				

¹⁵ Estimation Procedure: Heckman Probit Survey function using STATA 8. Strata set as Country and Primary Sampling Unit (PSU) set as Region. * indicates $p < .1$, ** indicates $p < .05$, and *** indicates $p < .001$.

Table 11: Electoral Quality and the Censored Measure of Satisfaction

Satisfaction	Quality of Last National Elections				
	Not free and fair	Free and fair with major problems	Free and fair, but with minor problems	Completely free and fair	Don't Know/ Missing/Don't Understand the question
Not Satisfied	82.2%	64.9%	39.7%	28.2%	56.0%
Satisfied	17.8%	35.1%	60.3%	71.8%	44.0%
Totals	100.0%	100.0%	100.0%	100.0%	100.0%
No. Respondents	2986	2928	5584	8431	1358
Pearson Chi2=3.2e+03					

Table 12: Electoral Quality and the Heckman Corrected Measure of Satisfaction

Satisfaction	Quality of Last National Elections				
	Not free and fair	Free and fair with major problems	Free and fair, but with minor problems	Completely free and fair	Don't Know/ Missing/Don't Understand the question
Not Satisfied	78.0%	61.3%	37.1%	25.0%	37.0%
Satisfied	22.0%	38.7%	62.9%	75.0%	63.0%
Totals	100.0%	100.0%	100.0%	100.0%	100.0%
No. Respondents	3326	3280	6271	10140	2380
Pearson Chi2=3.6e-3					

Table 13: Change in Satisfaction after Heckman Correction

	Electoral Quality			
	Not free and fair	Free and fair with major problems	Free and fair, but with minor problems	Completely free and fair
Satisfied (% Change)	+3.4%	+3.0%	+2.0%	+2.4%

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