Wife vs. Husband: Does It Matter Who Answers the Survey?

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Abstract

Information on household assets is often used to conduct empirical research and to guide public policy. When using these variables, practitioners assume that they are less susceptible to misreporting. To test this assumption, the current study employs data from poor households participating in Mexico's PROGRESA program. The same questions regarding household assets were asked of both the wife and the husband. The study finds the following: (1) There were major discrepancies in the information reported between the spouses. For example, there was disagreement among 24% of the couples as to the possession of a washing machine. (2) The latter result has consequences for identifying families living in poverty. For example, if husbands were to be asked, 10.1% of the households would be classified as non-poor, but classified as poor if wives were to be asked. (3) The discrepancies observed can be partially explained by women's bargaining power. In particular, if wives earned more income than their husbands, the discrepancies in the information reported decreased. These findings emerged as robust when applying a bounding strategy for omitted variable bias developed by Oster (2017), and when using an instrumental variable approach for measurement error following Lewbel (2012). Overall, these findings suggest that survey information on household assets is not free of misreporting, and that who answers the survey matters.

Keywords: Poverty Measurement, Household Survey, Gender.

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1 Introduction

Household surveys are one of the main instruments for conducting empirical research and making public policy decisions. Thus, understanding the quality of surveys is an issue of great importance. One of the variables commonly used is information on household assets. This information is used to target programs for the poor, generate multidimensional measures of poverty, and to test baseline differences in randomized controlled trials, among other uses. Most importantly, it is commonly assumed that such information on household assets is free of misreporting problems.

To examine the accuracy of survey data on assets, the current study examined a random sample of 960 couples participating in the social program, PROGRESA in Mexico.[1] Separately, both the wife and husband were asked questions about the possession of 18 assets. Upon analyzing their responses, discrepancies could be found in the information reported between spouses under every item. The extent of this mismatch ranged from 2.2% to 32.6%. For example, there was disagreement among 21.5% of the couples regarding the possession of a refrigerator.[2]

Following this, I analyzed the extent to which the mismatching observed was random or not. There are many hypotheses about the causes of misreporting in

[1] Mexico implemented the PROGRESA program in 1997, which transfers money to low-income families under the condition that they send their children to school.

[2] In particular, the husband reported having a refrigerator and the wife did not in 9.6% of the households surveyed. Similarly, the husband reported not having a refrigerator and the wife having one in 11.9% of households.

household surveys, which can be related to strategic behavior, cognitive process, social desirability, survey design, and interviewers' characteristics (Bound et al. 2011; Onwujekwe et al. 2006). Yet, bargaining power within the household can be another variable that explains the discrepancies observed. In particular, the spouse who contributes more income to the household has greater ownership and control over assets. Consequently, this can affect the use and perception of what the household assets are. In most of these households, the main contributor of household income is the male partner. Yet, when women are the main contributor to household income, this can affect the use and perception of household assets. The current research tested this hypothesis, showing that when wives earn more income than their husbands, this decreases a standardized index regarding differences in the assets reported by the couple by .22 standard deviations. It is possible that this result is a consequence of omitted variables and measurement error. Following the procedures proposed by Oster (2017) and Lewbel (2012), the current results were found to be robust to the aforementioned econometric problems. Finally, the paper analyzes the consequences of such disagreement to the information reported for the purposes of poverty classification. A key finding here is that who reports the information matters. For example, 10.1% of households would be classified as non-poor if the husband were to be asked, but classified as poor if the wife were asked.

This paper relates to a body of literature regarding the causes and consequences of discrepancies in the information reported by couples in household surveys. Bar-

dasi et al. (2011), using data from Tanzania, found that who responds to the survey can affect the information collected via surveys regarding labor participation. In particular, they found that responses by a proxy person rather than a self-report had no effect on reports of the female labor supply, but yielded substantially lower male employment rates. Using data from Malawi, Fisher et al. (2010) found that it is not sufficient to interview only one member of the household to obtain the household income. For example, in the latter study, estimates of the wife's income provided by both husband and wife were found to agree in only 6% of the households interviewed. Doss et al. (2018), using data from Ghana, Ecuador, and India, analyzed whether wives and husbands provide different responses to questions about the monetary value of their home. They found that wives tend to report lower values than husbands.

There are three main contributions of this paper. First, this paper adds to a growing literature about the causes of misreporting. In particular, bargaining power, as measured through contributions to household income, is used to predict problems in the data regarding assets. Second, this paper contributes to the literature showing discrepancies in the information on assets collected through household surveys. Finally, the paper presents evidence that who answers the survey matters for social programs targeting poverty.

In terms of public policy, Kilic and Moylan (2016) points out that for most countries, the information regarding assets is provided only by one household mem-

ber and is not available by gender ownership. It can be argued that if countries want to continue using assets information for empirical analysis and public policy decisions, it is first necessary to improve our current understanding of the ownership and control of assets within the household. Some important efforts in this regard are the Women's Empowerment in Agriculture Index (WEAI) and the Methodological Experiment on Measuring Asset Ownership from a Gender Perspective (MEXA).

The remainder of this paper is organized as follows. Section 2 reviews the related literature and Section 3 introduces the data. Section 4 describes the empirical strategy. Section 5 presents the results, and Section 6 concludes.

2 Why Do People Misreport Information?

Philipson and Malani (1999) point out that economists pay much more attention to the consumption of data than to the production of data. They propose that the data collection process can be analyzed as a principal-agent problem, whereby the investigator is the principal and the individuals who provide information are the agents. The problem is that the agents have preferences (i.e., does the respondent want to tell the truth?), and may experience problems pertaining to information accuracy (i.e., does the respondent know the truth?). This situation is the principal source of erroneous reporting.

Judge and Schechter (2009) proposed that Benford's law can be used as a tool to detect problems in survey data. The idea behind Benford's law is that, in large data sets, numbers with a first digit of 1 are observed more often than those starting with 2, which are, in turn, observed more often than those starting with 3, and so on.[3] Judge and Schechter (2009) analyzed data from nine commonly used datasets including the Matlab Health and Socioeconomics Survey from Bangladesh, PROGRESA data from Mexico, the Living Standards Measurement Survey from Peru, and the Agricultural Resource Management Survey from the United States, among others. Their principal finding is that the data from developing countries are of poor quality, while data from the United States are of better quality. They also found that female and male respondents provide data of similar quality.

However, recent evidence calls into question the quality of data collected through household surveys in the United States. For example, Meyer et al. (2018) examined three large used household surveys in the United States, finding underreport on participation on the food stamps program in the three surveys analyzed. Specifically, the underreport was found to be 23% with the Survey of Income and Program Participation, 35% with the American Community Survey, and 50% with the Current Population Survey. They also found misreporting to be associated with household characteristics (householder age, speaking poor English, and non-U.S. citizens). In addition, they uncovered other variables associated with misreporting

[3] In particular, Benford's law proposes that: P(First digit is d)= $log_{10}(1 + \frac{1}{d})$, where d goes from 1 to 9.

(being disabled, respondent's education level, and living in a rural area); yet, the effects were seen as mixed or inconclusive.

The potential reasons behind misreporting include incentives, cognitive process, social desirability, survey design, and interviewers (Bound et al. 2011; Onwujekwe et al. 2006). Regarding the first aspect, being given incentives to answer a survey matters. For example, if the survey will be used to assign respondents' participation in a social program, individuals may have incentives to underreport particular information. For its part, the cognitive process involves comprehension of the question, the effort involved in answering the survey, and recalling information, all of which are factors that will affect the quality of the data obtained. Social desirability refers to the phenomenon of giving socially desirable answers, whether they are true or not. The survey design can affect how individuals respond; for example, if the survey is short, individuals may be more focused on the answers compared to the case of very long surveys. Finally, interviewers themselves can affect the quality of information. For example, it is possible that in a survey of domestic violence, women would reveal more accurate information to a female than a male interviewer.

Some papers have found empirical evidence related to the aforementioned factors affecting the quality of the information obtained through surveys. For example, Martinelli and Parker (2009), using data from PROGRESA, find evidence that supports the social desirability hypothesis. In particular, they find overreporting

on household goods that may carry a certain social "status" (e.g., concrete floor, tap water, toilet). Kilic and Sohnesen (2017) present evidence regarding survey design. Using an experiment conducted in Malawi, they find that the size of the survey matters, as the same households answered the same questions differently depending on the length of the questionnaire. Finally, using data from Nigeria, Onwujekwe et al. (2006), found discrepancies in the socio-economic information obtained by different interviewers visiting the same home. In addition, they found the occurrence of different answers when the same interviewer interviewed household members twice.

3 Data

The main data source used in this paper is the Survey of Resilience and Social Mobility of participants in Mexico's PROGRESA program (rebranded as Oportunidades and then as PROSPERA).[4] The survey is composed of four parts, in the following order: (1) cognitive test, (2) psychological tests, (3) socioeconomic aspects, and (4) childhood. The questions pertaining to household assets fall under module (3). The question regarding the possession of assets is as follows: "Does your household own any of the following items?" The 18 items then referred to are as follows: television, photographic camera, music device, sofa, washing machine, gas stove, refrigerator, landline, bicycle, automobile, farm animals, other

[4]PROGRESA was the biggest social program in Mexico, providing assistance to more than six million families. This program offered cash transfers to families living in poverty on the condition that they send their school-age children to school.

land (apart from home), machinery or work equipment, apartment or room for rent, motorcycle, savings account, local business, and canoe or boat.

The sample design used the list of 5 million households enrolled in the program on May 2009. From these 5 million households, localities with fewer than 45 households were excluded. Thus, the list was reduced to 2.4 million households. From this list, a probabilistic survey of 1,960 households was selected: 850 households in rural and 1,110 in urban areas (Palomar, 2012). From these 1,960 households, 960 households were randomly selected to collect information about wives and husbands.[5] The survey was collected between October and December of 2010.[6]

The 18 assets are presented in Table 1. Columns 1 and 2 respectively show the percentage of husbands and wives reporting ownership of the assets. In general, there appear to be no major discrepancies between the information reported by the couples. For example, 63.2% of husbands and 65.5% of wives reported possession of a refrigerator inside the home. Column 3 tests for the same mean assets reported by wives and husbands. Among the 18 assets analyzed, statistically significant differences were found for six of them: bicycle, automobile, photographic camera,

[5] If the respondent was a widow, a single mother, or the husband worked outside the locality, that house was replaced with another from the selected sample of 1,960 households.

[6] A pilot study was conducted to validate the survey. Regarding the interviewers, each of them received an instructor's manual and training prior to the field survey. The survey involved 100 full-time interviewers who were organized into 25 brigades, with a field supervisor per brigade. The surveys were conducted in the households, with an average duration of two hours. The surveys applied to women were obtained on a single occasion. However, in the case of men, an extra field trip was made to some localities due to the fact that in the first field trip it was only possible to survey 15% of the spouses. (Palomar, 2012).

land, machinery, and savings. Interestingly, it can be observed that husbands reported a greater level of ownership for five of those six assets than wives did (with the exception of savings). Column 4 shows the percentage of cases containing disagreement in the information reported by the spouses. The disagreement ranges from 2.2% to 32.6%. For example, disagreement can be seen among 21.5% of the couples regarding the possession of a refrigerator; in particular, husbands reported having a refrigerator while their wives did not in 9.6% of the households (Column 5). In addition, husbands reported not having a refrigerator while their wives did report having one in 11.9% of the households (Column 6).

From a methodological perspective, the important question is whether the disagreement observed in the information reported by the spouses is random or not. Columns 3 and 4 in Table 1 appear to support the hypothesis that the discrepancies observed are not random. In particular, the current paper analyzes how bargaining power within the household can affect discrepancies in the information reported. Bargaining power is here measured according to each spouse's contribution to the household, based on the possibility that the spouse who contributes more income has greater ownership and control over assets. This ownership and control can affect the perception of what "household assets" are and, consequently, the spouses' responses when asked about these assets.

Table 2 shows that, on average, there are 2.62 items under which the information reported by the spouses does not match within the households. It is observed

that only in 14.2% of households does the information reported by the spouses completely coincide. In the rest of the homes, the disagreement in the reported information ranged from one item to a maximum of 12 items. Table 2 also presents information on the percentage of households where wives report earning more than husbands. The question regarding income was as follows: "In total, how much do you earn per month for your work or activities?" The response information indicates that wives reported contributing more income to the household than their husbands in 16% of homes.

Table 2 presents information regarding other variables applied as controls in the current study. As can be seen, in the case of age, husbands are typically older than wives, at an average of 48.7 and 44.8 years old, respectively. Regarding education, 64% percent of the husbands can read and write. This percentage is a little higher in the case of wives (68%). Regarding speaking an indigenous language, this was not observed to be an important difference (5% for both wives and husbands). Another variable included as a control was cohabiting,[7] given that the type of marital arrangement could possibly affect the exchange of information within the household. As shown in Table 2, 21% of couples in the surveyed households reported cohabiting.

With regard to the other variables previously identified concerning misreporting in household surveys, a possible concern in relation to incentives was that when participating in PROGRESA, spouses would have an incentive to under-

[7] Applied to those couples who declared not being in a legal marriage

report information so as to facilitate their continuation on the program. However, it is possible that this concern was partially mitigated by the way in which the questionnaire was designed and the information collected. The questionnaire used for the purposes of the current paper differed in many ways from the questionnaire used by the program. In particular, this questionnaire emphasizes questions related to psychological factors and social mobility. In addition, the information was collected in the name of a private university, rather than in the name of the PROGRESA program.

In the case of problems of "social desirability", these were partially controlled for using information regarding self-esteem. Individuals with higher self-esteem are expected to be less susceptible to being affected by "social desirability", and to report more accurate information. The self-esteem questions are based on Rosenberg (1965), which test was adapted for a Mexican context by Palomar (2012). Principal components were used to get a measurement of these variables. Then, these results were standardized to a mean of zero and a standard deviation of one. Table 2 presents the results for wives and husbands, with no significant differences, on average, occurring between spouses regarding self-esteem.

To control for the potential impact of cognitive processes on misreporting, a Raven test was applied. The Raven test is designed to measure non-verbal, abstract, and cognitive functioning. It includes a matrix of geometric designs, with one piece missing. The respondent chooses one diagram from a set of eight an-

swers. The Raven test used in this survey contained 12 questions and was adapted to the Mexican context by Palomar (2012).[8] The number of unanswered questions and percentage of correct answers to the Raven test were taken for the purposes of the current study. Table 2 presents information on non-responses in the Raven test for wives and husbands. On average, husbands did not answer 0.30 of the questions, and wives 0.20. The non-response number ranged from 0 to 12 questions from both wives and husbands. Regarding the percentage of correct answers to the Raven test, husbands responded correctly to 36% of the questions, on average, and wives to 34%.

Finally, I control for the occurrence of natural disasters. Individuals who suffer a natural disaster can be more aware of the assets they lost and have a better measure of them. The data used to measure natural disasters were drawn from the National Center for the Prevention of Disasters, where the information is classified by type of disaster (hydrometeorological, earthquakes, droughts, and others) for all municipalities in Mexico. As shown in Table 2, 15% of the households analyzed suffered some type of natural disaster in the 12 months before the survey.

[8]Before starting the Raven test, respondents conducted a practice exercise. This version had a 12-minute time limit, i.e. a time limit of one minute per each item.

4 Estimation Strategy

4.1 Identification Strategy

This study analyzed the effects of bargaining power within the household, measured by the contribution to household income, on the differences in assets reported by the surveyed wives and husbands. The following specification was used:

$$Y_{ijh} = \beta_0 + \beta_1 T + \beta_2 X + \theta_s + e_{ijh} \tag{1}$$

where Y_{ijh} is an index adding, at the level of the household (h), the number of assets when there was a disagreement in the information reported between the husband (i) and the wife (j).[9] T is a dummy variable that takes the value of one when the wife reported contributing more income to the household than the husband, and zero otherwise. X represents a group of controls, namely, age, literacy, speaking an indigenous language, cognitive test, and self-esteem of wife and husband, as well as cohabiting, living in a rural area, and living in a municipality affected by a natural disaster. In addition, fixed effects at the municipality level were included (θ_s), to control for the team that collected the survey in that specific area. Finally, e_{ijh} is an error term with a mean of zero. Standard errors are clustered at the municipality level. The coefficient of interest is β_1, representing the effect of women's bargaining power on disagreements in the answers regarding assets.

[9] In particular, the absolute value was taken when there was a disagreement between the information reported by the spouses. These values were added into an index and this index was standardized.

An important challenge for this specification was the possibility of omitted variable bias. Although every effort was made to control for the variables mentioned in the literature that may affect misreporting, it is possible there were some variables correlated with bargaining power that were not present on the data. If such variables correlated with the outcome of interest, then they would be in the error term, e, and their correlation with T would generate bias in the estimated impacts of the variables of interest. To check for the robustness of these results, the bounding approach proposed by Altonji et al. (2005) and refined by Oster (2017) was used.[10] Altonji et al. (2005) observed that a common approach to evaluating robustness to omitted variable bias is to include additional control variables on the right hand side of the regression. If such additions do not affect the coefficient of interest, then this coefficient can be considered unlikely to be biased. This strategy implicitly assumes that the selection on observables is informative about the selection on unobservables. Oster points out that it is not only necessary to add controls, but to observe the movements in the R-squared. Oster formalizes this idea, and provides conditions for bounds and identification. If the bounds exclude zero, then the results from the regressions can be considered to be robust to omitted variable bias.[11]

[10] A number of recent empirical studies use Oster's bounding methodology; see, for example, Nghiem et al. (2015), and Walther (2018).

[11] Following the notation in Oster, the full model has the form:

$$\text{Y} = \beta\ \text{T} + X_1 + X_2 + \epsilon.$$

where T is the variable of interest, X_1 contains the *observed* control variables multiplied by their coefficients, i.e., $X_1 = \sum_{j=1}^{J_o} X_j^o \gamma_j^o$, and X_2 contains all of the *unobserved* variables multiplied by their coefficients, i.e., $X_2 = \sum_{j=1}^{J_u} X_j^u \gamma_j^u$. Finally, ϵ is a random error that

Another problem with specification (1) is a potential problem of measurement error. Murray-Close and Heggeness (2018), using data from the USA, found that

represents the measurement error in Y, and is uncorrelated with X_1, X_2 and T. Oster suggests the following approach to account for omitted variable bias:

(1) Regress Y on T and report the parameter on T, denoted by β^0, and the R-squared coefficient, denoted by R^0.

(2) Regress Y on T and X_1, and report the parameter on T, denoted by $\tilde{\beta}$, and the R-squared coefficient, denoted by $\tilde{R}$.

(3) Define R_{max} as the overall R-squared of the model, that is, the R-squared that would be obtained from a regression of Y on both observables (T, X_1) and unobservables (X_2).

(4) Define δ to be a parameter that ensures equality $\frac{Cov(T,X_2)}{Var(X_2)} = \delta\frac{Cov(T,X_1)}{Var(X_1)}$. In other words, this relationship formalizes Altonji et al. (2005)'s idea that the magnitude and sign of the relationship between T and X_1 provides some information about the magnitude and sign of the relationship between T and X_2. For example, if $-1 \leq \delta \leq 1$, then the variable of interest (T) would be no more correlated with the unobservables (X_2) than it would be with observables (X_1). The case $0 \leq \delta \leq 1$ has a similar interpretation, with the additional assumption that the relationship between T and X_1 has the same sign as the relationship between T and X_2.

Oster shows that $\beta^* \approx \tilde{\beta} - \delta\frac{(\beta^0-\tilde{\beta})(R_{max}-\tilde{R})}{(\tilde{R}-R^0)}$ is a consistent estimator of the effect of T on Y, β. It should be noted that this is a close approximation to the consistent estimator and is used to present a particular intuition regarding the methodology. The complete approximation is presented in Oster (2017).

In order to estimate β^*, estimates of δ and R_{max} are required. Oster proposes assumptions for δ and R_{max} that allows one to determine whether β^* is different from zero. Oster proposes that $R_{max} = min\{1.3\tilde{R}, 1\}$, where the $\tilde{R}$ is as defined above. The cut-off value of 1.3 is derived from a sample of papers that have used randomized controlled trials and nonrandomized data, and were published in the *American Economic Review*, *Quarterly Journal of Economics*, *The Journal of Political Economy*, and *Econometrica* from 2008-2010. She determined that using this cut-off allowed 90% of the randomized and 50% of the nonrandomized results to continue being statistically significant. An alternative value for R_{max} is given by González and Miguel (2015), who uses $R_{max} = \tilde{R} + (\tilde{R} - R^0)$, where R^0 is the R-squared when regressing Y on T without controls. In addition to the R_{max} proposed above, the current papers sets a conservative $R_{max} = 1$.

After determining the value of R_{max}, Oster suggests that β^* be calculated for all the following ranges of δ: $0 \leq \delta \leq 1$. In addition, the current paper presents the results for δ: $-1 \leq \delta \leq 0$. This allows for the construction of the set: [$\tilde{\beta}$, β^*]. If this set excludes zero, the results from the controlled regressions can be considered to be robust to omitted variable bias. In other words, the results indicate that $\beta^* \neq 0$.

social norms can influence survey reports regarding income. They found that when wives earn more than their husbands (a "violation" of the social norm), the spouses inflate the husbands' income and deflate the wives' earnings. In particular, the authors saw the gap between a husband's surveyed and administrative earnings to be 2.9 percentages points higher, while the gap between a wife's surveyed and administrative earnings was 1.5 percentage points lower.

In this paper, the variable used to measure bargaining power is a dummy variable that takes the value of one when the wife earns more than the husband. Being a dummy variable, this partially minimizes measurement error problems like the one indicated above. Nevertheless, an instrumental variable was used to check the robustness of the results. Finding an appropriate instrument is often difficult in practice. One way of dealing with this problem has been proposed by Lewbel (2012), who suggests an instrumental variable called identification through heteroscedasticity. In particular, he proposes the exploitation of the correlation between exogenous variables and the heteroscedasticity of model disturbances in order to achieve identification without imposing any exclusion restrictions.[12] Following Lewbel, the following model was obtained:

$$T = \gamma_0 + \gamma_1 X + \xi_{ijh} \tag{2}$$

Where the variable T represents the potential endogenous variable. X are

[12] A number of recent empirical studies use the Lewbel method as an alternative to the standard instrumental variable approach; see, for example, Emran and Hou (2013), Chowdhury et al. (2014), and Deuflhard et al. (2018).

controls, as defined in equation (1), and ξ_{ijh} is the error term. The heteroscedasticity-based identification strategy assumes the existence of heteroscedasticity in ξ_{ijh}. In particular, it is assumed that: $cov(X,\xi^2_{ijh}) \neq 0$. Lewbel suggests using $[X - E(X)]\hat{\xi_{ist}}$ as an instrument for T in estimating (1), where $\hat{\xi_{ijh}}$ denotes the predicted residuals obtained by estimating equation (2). Finally, Lewbel points out that the condition, $cov(X,\xi^2_{ijh}) \neq 0$, needs only hold for a subset, Z, of the vector X. More detailed explanations can be found in Lewbel (2012).

5 Results

5.1 Principal Results

Table 3 column 1 presents the effects of bargaining power (where wives earn more income than their husbands) on differences in the assets reported by the spouses. Age, literacy, and speaking an indigenous language were controlled for, for both wives and husbands, as was cohabiting, living in a rural area, and municipality fixed effects. The results show that when wives earn more income than their husbands, this decreases a standardized index regarding differences in the assets reported by the couple by .22 standard deviations. This result reflects that when wives contribute more income to the household than their husbands, they have greater control over the use of assets, and there is a greater coincidence with the information reported by their husbands.

As previously stated, other variables identified in the literature as potentially affecting the way individuals report information were also controlled for. Column 2 incorporates the variables measuring the respondents' cognitive process using a Raven test. More specifically, this includes the number of unanswered questions and percentage of correct answers to the Raven test. While no evidence was found that the variables related to the cognitive process explained disagreement in the information reported, the coefficient associated with bargaining power remained statistically significant. Column 3 incorporates information regarding the self-esteem of wives and husbands. The coefficient associated with bargaining power here also remained statistically significant. In addition, it can be observed that husbands' self-esteem, but not wives', decreases the index of differences in assets reported by the couple by 0.09 standard deviations. This result seems to be in line with the hypothesis that the information reported by individuals is affected by "social desirability" and that people with greater self-esteem will be less vulnerable to this situation. However, this result was found only among husbands, not wives. Column 4 includes a variable measuring the occurrence of a natural disaster during the 12 months before the interview. It is expected that the individuals affected by a natural disaster are more aware of the assets they lost. It was here found that when a couple suffered a natural disaster, the index regarding differences in asset reporting decreased by 0.24 standard deviations. Nevertheless, the incorporation of this variable did not affect the statistical significance and value of the coefficient associated with bargaining power.

5.2 Robustness Checks

Table 4 presents evidence that the results regarding bargaining power and its effects on the index of differences in asset reporting were robust to the inclusion of variables such as self-esteem, cognitive process, and natural disasters. Yet, a potential problem was the lack of income information for all couples given the cases where one or both spouses did not report their income. In particular, it was only possible to generate the bargaining power index for 82% of the couples. An attempt was made to check whether the cases containing no information were random or not. A variable was defined taking the value of 1 if at least one of the spouses did not report the income, and 0 otherwise (when I have information regarding income for both spouses). Table 4 presents these results, with age, literacy, and speaking an indigenous language used as controls for both wives and husbands, as well as cohabiting and living in a rural area. The results show wives' ability to read and write (-.06) and living in a rural area (-.19) to be important predictors of income non-response by at least one of the spouses. While these variables were controlled for when analyzing the effect of bargaining power on the index of difference in asset reporting, this situation nonetheless opens up the possibility of there being other variables that affected the generation of the variable regarding bargaining power, and that the results could be biased as a consequence of omitted variables.

To address the problem of omitted variables, a bounding methodology was implemented following Oster (2017). The results are presented in Table 5. Panel A presents the results under the assumption that $0 \leq \delta \leq 1$, i.e., assuming that

the relationship between the variable of interest (bargaining power) and the (aggregated) controls has the same sign as the relationship between the variable of interest and the (aggregated) unobservables. Column 1 estimates bounds using the value of the $R_{max} = 0.31$ proposed by Oster (2017), yielding a very tight bounds estimate of [-0.248, -0.228]. Bounds were also estimated using the $R_{max} = 0.48$ proposed by González and Miguel (2015) in Column 2. The bounding estimated here is: [-0.304, -0.228]. To further check the robustness of the results, the extreme value of $R_{max} = 1$ was taken, yielding a bounding estimate of [-0.700, -0.228] in Column 3. Panel B presents the results when $-1 \leq \delta \leq 0$. The case of $-1 \leq \delta \leq 0$ assumes that the relationship between the variable of interest and the (aggregated) controls has a different sign than the relationship between the variable of interest and the (aggregated) unobservables. Using the $R_{max} = 0.31$ proposed by Oster, the bounding estimated is: [-0.228, -0.209]. Using the $R_{max} = 0.48$ proposed by Gonzalez and Miguel, the bounding is: [-0.228, -0.175]. Finally, using a conservative $R_{max} = 1$, the bound is: [-0.228, -0.100]. To sum up, the effect of bargaining power emerged as robust to omitted variable bias when applying Oster's methodology.

However, although the results appeared to be robust as such, there may have been a problem of measurement error. That is, it is possible that individuals misreported their income, which could affect the variable that measures bargaining power. To overcome this situation, a strategy of instrumental variables was employed. Table 6 presents the results using an instrumental variable constructed

through heteroscedasticity, following Lewbel (2012). Using this strategy the results observed using fixed effects and a bounding methodology were maintained. Nevertheless, a small increase could be observed in the effect of bargaining power on the index of difference in assets reporting.[13]

Another aspect considered was the extent to which the observed results changed by the type of asset analyzed. One possibility is that individuals within the household can exclude others from using small assets, but not large assets. If this is true, it may be expected that bargaining power predicts disagreements on bigger assets and not on small ones. There are two limitations to proving this possibility: (1) the exact size of the assets was unknown, and (2) it is debatable what size may absolutely be considered large or small. Considering these limitations, the following were classified as large assets: sofa, washing machine, gas stove, refrigerator, bicycle, automobile, farm animals, land (apart from home), machinery or work equipment, apartment or room for rent, motorcycle, local business, and canoe or boat; as small assets: television, photographic camera, music device, and landline. These results are presented in Table 7. It can here be observed that the coefficient associated with bargaining power has an effect on large assets, but not on small ones.

Another possibility is that husbands report productive assets more than wives

[13]The first-stage regression and test for heteroscedasticity were estimated using a Breush-Pagan test. Heteroscedasticity is the principal assumption based on which this instrumental variable is implemented. According to this test, (chi^2 = 160, p-value=0.00), and a strong evidence emerged for heteroscedasticity.

due to the high probability that they are more familiarized with them. Thus, it was not expected that wives' bargaining power would affect such productive assets. However, it could be expected that their bargaining power would affect the non-productive assets. Since the survey itself does not provide information about whether these assets were used for productive purposes or not, the following were assumed to be productive assets: machinery or work equipment, farm animals, local business, apartment or room for rent, other land (apart from home), and savings; as non-productive goods: television, photographic camera, music device, sofa, washing machine, gas stove, refrigerator, landline, bicycle, automobile, motorcycle, and canoe or boat. These results are presented in Table 7. Column 3 represents the productive assets and Column 4 the non-productive assets. The results here show that bargaining power impacts the index of non-productive assets, but not the productive ones.

5.3 Effects of Disagreements of Information on Classification of Households in Poverty

One of the principal uses of information about assets is the generation of proxy means tests by which to identify families living in the condition of poverty. Do the differences in the information reported between spouses have consequences for poverty identification? To answer this question, the Simple Poverty Scorecard Poverty-Assessment Tool (Scorecard) was used. This is an index developed by Schreiner (2017) and used by Innovations for Poverty Action (IPA) to identify

families in poverty. It has been developed for more than 45 countries. This measure was employed because it is transparent in the sense that the variables used for its construction have been made public (Schreiner, 2017). The index uses 11 socioeconomic indicators[14] to estimate the likelihood of a household having a consumption below a given poverty line.

From the data, it is possible to recover six out of the socioeconomic indicators proposed by the Scorecard[15]. Regarding the other five items, the results were presented for two cases: (1) the value of zero (not having the item) was assigned for both the wife and husband, increasing the probability of the households being classified as poor; and (2) a maximum value per item for both wife and husband was assigned, decreasing the probability of the households being classified as poor. Then, the effectiveness of this measure in targeting families living in poverty was measured.[16] Table 8, Panel A presents the results for case (1). The results show differences in the targeting depending on who answers the survey. For example, in 10.1% of the cases the household will be classified as non-poor if the questions are asked of the husband, but as poor if asked of the wife. In a similar way, in 8.1% of the cases a household will be classified as poor if questions are posed to

[14]The items referenced are: number of household members aged 17 or younger, education level of male head of household, flooring material, availability of a kitchen sink for washing dishes, gas stove or microwave, piped water, washing machine, number of fans, car, computer, and mobile phone.

[15]For the purposes of the current study, the items referenced were household members aged 12 or younger, education by the male head/ spouse, flooring material, microwave, washing machine, and owning a car.

[16]The Scorecard ranges from 0 points (higher probability of being poor) to 100 (lower probability of being poor). It was assumed that a family is considered poor when it has a score of 34 or less.

the husband, but as a non-poor if posed to the wife. Panel B presents the results for case (2). Here, it can be seen that 3.7% of households will be classified as non-poor if the questions are directed to the husband, but as poor if directed to the wife. In addition, in 4.0% of cases a household will be classified as poor if the questions are asked of the husband, but as non-poor if asked of the wife.[17]

6 Summary and Concluding Remarks

This paper analyzes the reliability of survey information regarding household assets. A unique data set is used, with the same questions posed to both husbands and wives participating in the Mexican social program, PROGRESA. The analysis revealed key discrepancies in the information reported between the spouses.

There are many reasons why misreporting may occur when collecting survey data: (1) individuals may have incentives to underreport particular information (incentives); (2) the interviewers collected information using different criteria (interviewers hypothesis); (3) individuals report information that they consider to be socially desirable (social desirable); (4) the size of the survey can affect how individuals report the information (survey design); and (5) some individuals simply respond carelessly (cognitive hypothesis). Specifically in the case of household

[17] It should be noted that this was an adaptation of the Scorecard Poverty-Assessment Tool (Scorecard). The results presented here act as a point of reference to illustrate how the information reported by spouses may affect the classification of households with regard to poverty; this, however, does not reflect the accuracy of the Scorecard.

assets, the current research posits that bargaining power within the household can affect the answers provided by a couple when answering a survey. Bargaining power was here measured using the income contribution to the household of each of the spouses. This contribution can arguably affect the use and ownership of assets within the household and, consequently, the partners' perceptions of what can be considered as household assets. The results show that when wives earn more income than their husbands, the discrepancies in the information regarding assets decrease. Using a bounding methodology proposed by Oster (2017), this finding was found to be robust to a problem of omitted variable bias. In addition, using an instrumental variable approach following Lewbel (2012), the result was robust to a potential problem of measurement error.

The key implications of this paper point to the need for practitioners to be careful when using data regarding household assets. For example, when using data to identify individuals living in poverty, policy makers recognize that individuals have incentives to underreport their income. As a consequence, they use variables such as the possession of assets to proxy households' real income, assuming that these variables are less susceptible to misreporting. Yet, this paper presents evidence that contradicts this assumption.

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7 Appendix

Table 1: Assets' Descriptive Statistics

	Husband's report possession of (%): (1)	Wife's report possession of (%): (2)	P-Value (3)	Percentage that do not match (%) (4)	Husband: Yes Wife: No (5)	Husband: No Wife: Yes (6)
Music device	59.6	57.8	0.363	32.6	17.2	15.4
Bicycle	42.6	36.9	0.001***	30.1	18.0	12.1
Farm animals	30.0	30.3	0.848	25.8	12.8	13.0
Washing machine	42.4	43.3	0.596	24.0	11.6	12.4
Gas stove	19.9	22.0	0.220	22.8	10.4	12.4
Refrigerator	63.2	65.5	0.123	21.5	9.6	11.9
Sofa	23.7	23.5	0.941	19.3	9.7	9.6
Landline	15.8	17.1	0.259	14.0	6.3	7.7
Automobile	18.9	15.9	0.013**	13.5	8.2	5.3
Photographic camera	8.5	6.5	0.061*	10.9	6.4	4.5
Other land (apart from home)	8.1	6.0	0.056*	10.5	6.3	4.2
Television	91.2	90.7	0.578	8.5	4.5	4.0
Machinery or work equipment	5.6	3.2	0.006***	7.5	5.0	2.5
House, apartment or room to rent	4.4	3.6	0.325	7.0	3.9	3.1
Motorcycle	4.9	5.4	0.500	5.8	2.6	3.2
Savings	1.8	3.6	0.011**	4.8	1.5	3.3
Local business	2.6	2.9	0.612	3.7	1.7	2.0
Canoe or boat	1.9	1.7	0.513	2.2	1.3	0.9

Source: Survey of Resilience and Social Mobility (Progresa-Oportunidades Program).* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2: Summary Statistics

	N	Mean	SD	Min	Max
Number of assets with mismatch	957	2.62	1.98	0	12
Wives earn more than husbands: 1 Yes 0 No	788	0.16	0.37	0	1
Age of husband	957	48.71	13.03	19	107
Age of wife	954	44.81	12.19	19	99
Can read and write (husband): 1 Yes 0 No	956	0.64	0.48	0	1
Can read and write (wife): 1 Yes 0 No	956	0.68	0.47	0	1
Speak some indigenous language (husband): 1 Yes 0 No	952	0.05	0.21	0	1
Speak some indigenous language (wife): 1 Yes 0 No	954	0.05	0.21	0	1
Free union: 1 Yes 0 No	954	0.21	0.41	0	1
Rural:1 Yes 0 No	957	0.48	0.50	0	1
Self-esteem (husband)	930	0.01	1.01	-4.57	0.95
Self-esteem (wife)	946	-0.01	0.99	-4.26	0.95
Unanswered questions to Raven test (husband)	957	0.30	1.50	0	12
Unanswered questions to Raven test (wife)	957	0.20	1.28	0	12
Percentage of correct answers to the Raven test (husband)	957	0.36	0.24	0.00	1.00
Percentage of correct answers to the Raven test (wife)	957	0.34	0.24	0.00	1.00
Suffered a natural disaster in 2010: 1 Yes 0 No	957	0.15	0.36	0	1

Source: Survey of Resilience and Social Mobility (Progresa-Oportunidades Program)

Table 3: OLS Estimates: Effects of Wives' Bargaining Power on the Index of Differences in Assets

	(1)	(2)	(3)	(4)
Dependent variable: Number of assets with mismatch (standardized)				
Wives earn more than husbands: 1 Yes 0 No	-0.228**	-0.224**	-0.228**	-0.228**
	(0.100)	(0.102)	(0.108)	(0.108)
Husband's Raven unanswered questions to the Raven test (standardized)		0.018	0.019	0.019
		(0.039)	(0.042)	(0.042)
Husband's percentage of correct answers to the Raven test (standardized)		0.032	0.027	0.027
		(0.046)	(0.047)	(0.047)
Wife's Raven unanswered questions to the Raven test (standardized)		-0.036	-0.030	-0.030
		(0.040)	(0.038)	(0.038)
Wife's percentage of correct answers to the Raven test (standardized)		-0.000	0.003	0.003
		(0.042)	(0.043)	(0.043)
Self-esteem (husband)			-0.095**	-0.095**
			(0.043)	(0.043)
Self-esteem (wife)			0.032	0.032
			(0.036)	(0.036)
Suffered a natural disaster in 2010: 1 Yes 0 No				-0.249***
				(0.087)
Other controls	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes
R^2	0.23	0.23	0.24	0.24
Observations	774	774	746	746

Other controls are age, ability to read and write, and speaking an indigenous language. Also, living in free union and living in a rural area.
Note: Clustered standard errors displayed in parenthesis at the municipality level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Predictors of Income Non-response by at least One of the Spouses

Dependent variable: income non-response by at least one of the spouses	
Age of husband	0.000
	(0.002)
Age of wife	-0.001
	(0.002)
Can read and write (husband): 1 Yes 0 No	-0.018
	(0.033)
Can read and write (wife): 1 Yes 0 No	-0.059**
	(0.029)
Speak some indigenous language (husband): 1 Yes 0 No	-0.002
	(0.055)
Speak some indigenous language (wife): 1 Yes 0 No	-0.020
	(0.062)
Free union: 1 Yes 0 No	0.014
	(0.032)
Rural:1 Yes 0 No	-0.193**
	(0.080)
Municipality FE	Yes
R^2	0.12
Observations	942

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Bounding Methodology: Effects of Wives' Bargaining Power on the Index of Differences in Assets

	(1)	(2)	(3)
	Oster	Gonzalez and Miguel	Maximum
	($R_{max} = 0.31$)	($R_{max} = 0.48$)	($R_{max} = 1$)
	Panel A :	$0 \leq \delta \leq 1$	
Wives earn more than husbands: 1 Yes 0 No	[-0.248, -0.228]	[-0.304,-0.228]	[-0.700, -0.228]
	Panel B :	$-1 \leq \delta \leq 0$	
Wives earn more than husbands: 1 Yes 0 No	[-0.228, -0.209]	[-0.228, -0.175]	[-0.228, -0.100]

Note: Intervals in brackets are the bounds. Other controls include for the wife and the husband: age, can read and write, speaking an indigenous language, Raven test questions, and self-esteem. In addition: free union, living in a municipality suffering a natural disaster in 2010, rural, and municipality fixed effects.

Table 6: Lewbel's Instrumental Variables: Effects of Wives' Bargaining Power on the Index of Differences in Assets

	Index of Differences in Assets
Wives earn more than husbands: 1 Yes 0 No	-0.251**
	(0.107)
Other controls	Yes
Municipality FE	Yes
R^2	0.24
Observations	746
F-statistic first stage	268

Other controls include for the wife and the husband: age, can read and write, speaking an indigenous language, Raven test questions, and self-esteem. In addition: free union, living in a municipality suffering a natural disaster in 2010, and living in a rural area. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Effects of Wives' Bargaining Power on the Index of Differences in Assets by Type

	(1) Large Assets	(2) Small Assets	(3) Productive Assets	(4) Non-Productive Assets
Wives earn more than husbands: 1 Yes 0 No	-0.214**	-0.176	-0.036	-0.251**
	(0.103)	(0.115)	(0.097)	(0.124)
Other Controls	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes
R^2	0.24	0.18	0.23	0.22
Observations	746	746	746	746

Note: Other controls include for the wife and the husband: age, can read and write, speaking an indigenous language, Raven test questions, and self-esteem. In addition: free union, living in a municipality suffering a natural disaster in 2010, and living in a rural area. Clustered standard errors displayed in parenthesis at the municipality level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Classification of Poverty Based on Who Answer the Survey: Wife vs. Husband

Panel A

		Wife	
		Poor	Non-poor
Husband	Poor	9.7%	8.1%
	Non-poor	10.1%	72.1%

Panel B

		Wife	
		Poor	Non-poor
Husband	Poor	88.1%	4.0%
	Non-poor	3.7%	4.2%

The classification of poverty is estimated using the Simple Poverty Scorecard Poverty- Assessment Tool (Scorecard). The index uses 11 socioeconomic indicators. It is possible to recover 6 out of the socioeconomic indicators. Regarding the other indicators, Panel A assumes value of zero (not having the item) for the wife and for the husband and Panel B assumes the maximum value per item for the wife and for the husband.