UCD GEARY INSTITUTE DISCUSSION PAPER SERIES

Heterogeneous interpretation of "household expenditure" in survey reports:

Evidence and implications of bias[*]

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Abstract

This paper addresses respondents' interpretation of the term "household expenditure" when answering survey questions. A sizeable minority of respondents do not attempt to include all transactions made by every household member, interpreting the question as eliciting individual consumption. This biases estimates of expenditure downward. Furthermore, this bias is predicted by respondent characteristics.

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1. Introduction

Results can only ever be as robust as the data that generate them. If a sizable unidirectional error afflicts a substantial proportion of observations, conclusions drawn from the data are open to question. This paper draws attention to such a bias in reports of household expenditure.

Much economic analysis relies on expenditure surveys. These data inform policy predictions (e.g. Bento, Goulder, Jacobsen and von Haefen, 2009; Hassett, Mathur, and Metcalf, 2009). They are used to test theory (e.g. Blundell, Pistaferri and Preston, 2008; Hurd and Rohwedder, 2003). Expenditure surveys are also a dominant measure of living standards (Meyer and Sullivan, 2003; Deaton and Grosh, 2000; Johnson and Shipp, 1999; Grosh and Glewwe, 1998; McGregor and Barooah, 1992; Deaton and Muellbauer, 1980).

Expenditure is often elicited by asking an individual respondent to report how much their household spent on a category of goods in a given period (e.g. World Bank, 2009; World Bank 2007; Deaton and Grosh, 2000). In a series of experiments testing the robustness of retrospective expenditure reports, Comerford, Delaney and Harmon (2009) found variation in the way that respondents interpret the words "you" and "your household". The current paper investigates the scope and scale of bias induced by the heterogeneous interpretation of "household expenditure" in survey response. To our knowledge, this is the first paper to examine this issue.

This paper demonstrates that:

1) The majority of respondents report the aggregate of expenditures made by each individual living in a household when asked to report their household expenditure, but a sizable majority do not.

2) Prompting these respondents to report the aggregate of expenditures made by each household member dramatically increases reported household expenditure. This indicates a substantial understatement in initial reports of household expenditure.

3) Interpretation of "household expenditure" differs across respondents and, within respondents, across expenditure domains.

These results imply that comparisons of expenditure across groups of individuals or commodities are likely to be biased.

2. Background, Theory and Hypotheses

It has been found that per capita willingness-to-pay is much lower when respondents are asked to report their households' willingness-to-pay than when they are asked to report their individual willingness-to-pay (Lindhjem & Navrud, 2009; Delaney & O'Toole, 2008; Delaney & O'Toole, 2006). One explanation for this discrepancy is that respondents have difficulty delineating their individual and their household budgets. This raises the concern that expenditure reports will be similarly afflicted.

The US' National Bureau of Labor Statistics' consumer expenditure survey (CEX, 2008) asks:

> What has been your and your household's average monthly expense for alcohol, including beer and wine at restaurants, bars and recreational events?

We propose the following model of response to this question: $C_{xi} = Y_{xi} + \delta_i h_{xi} + e_{xi}$.

Respondent i reports spending C_{xi} on good x. C_{xi} comprises household expenditure (Y_{xi}) and some reporting error (e_{xi}), which for the purpose of this paper we assume to be random[4]. The novel contribution of this paper is to suggest that C_{xi} also includes a non-random error term (h_{xi}), which stems from interpreting "your and your household's average monthly expense" to mean something less than the sum of the monthly expenses of each individual who forms that household. h_{xi} is non-random because it is necessarily negative and it is somewhat predicted by respondent characteristics (δ_i) and characteristics of the expenditure domain (x). Consider a household that contains a daughter who lives at home but pays for her own clothes and recreation. When asked to report household clothing expenditure, her father may not spontaneously consider her clothing expenditure. The probability that her clothing expenditure is ultimately included in the household expenditure report increases with the attention and conscientiousness her father gives to the task of survey response. There are domains, such as expenditure on utilities, in which household composition is less likely to pose problems for survey response.

This model yields the following hypotheses:

Hypothesis 1: A sizable proportion of respondents do not attempt to report the aggregate expenditure of all members of the household when asked for household expenditure. Necessarily, these reports are less than aggregate household expenditure.

Hypothesis 2: Less-than-aggregate household expenditure reports will understate aggregate household expenditure substantially.

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[4] Though see Fiscal Studies December 2009, vol. 30 issue 3 – 4 for a thorough discussion of, and experimental evidence for, systematic bias in expenditure reports

Hypothesis 3: The propensity to report aggregate household expenditure will differ across domains.

Hypothesis 4: The propensity to report aggregate household expenditure will be correlated with respondent characteristics.

3. Empirics

3.1 Method and participants:

612 respondents, recruited at bus and train stations and on a university campus in Dublin, were asked to report their household expenditure on "food for consumption at home"; "alcohol"; and "on all things" in a self-completion questionnaire. The question format was taken from the Survey of Health Aging and Retirement in Europe (SHARE, 2004). For example:

> Thinking about the last 12 months: about how much did your household
> spend in a typical month on [*expenditure domain e.g. alcohol*]?

Having responded, respondents were asked to clarify whether the reported amount is "what you individually spent?" or "what you and other members of your household spent?"

The relevant sample includes those respondents who live in a household with their partner (n = 230). We drop responses that do not include information on household composition, age and gender. The resultant sample, henceforth Sample One, comprises 212 responses.

Sample Two comprises 268 households recruited to a webpanel by random postal shot. The wording for the expenditure question asked of Sample Two is an amalgam of the question from SHARE (2004) and the CEX (2008):

> Thinking about the last 12 months: what has been your and your household's average monthly expense for alcohol, including beer and wine at restaurants, bars and recreational events?

The clarification question asked:

> Did you attempt to include all alcohol purchased by each individual member of your household, even when you were not with them?

Respondents who answered "no" were asked to revise their estimate.

3.2 Results:

Hypothesis 1: A sizable proportion of respondents do not attempt to report the aggregate expenditure of all members of the household when asked for household expenditure.

Of the 212 respondents in Sample One, 47 (22%) reported their individual expenditure when asked for their household expenditure. Nineteen (10%) clarified that the "household expenditure" they reported on food was, in fact, their individual expenditure. 36 (17%) clarified that they reported their individual expenditure on alcohol; and 25 (11%) clarified that they reported their individual expenditure on all things.

Sample Two was asked "did you attempt to include all alcohol purchases made by all members of your household"? 44 of the 268 (16%) respondents in sample two reported that they did not. These results confirm that a sizable minority of respondents interprets "household expenditure" less comprehensively than does the majority.

Hypothesis 2: Less-than-aggregate household expenditure reports will be substantially smaller than aggregate household expenditure reports.

Any respondent in Sample Two who did not attempt to report household alcohol expenditure comprehensively revised the initial report so as to include expenditure by all members of the household. On average, the revised report is over 60 percent higher than the initial report ($M_{initial}$ = €124; $M_{revised}$ = €201; t(44) = 5.22; p < 0.001)

Hypothesis 3: The propensity to report aggregate household expenditure will differ across domains.

15 percent of respondents in Sample One report their household expenditure in one domain but their individual expenditure in another. This inconsistency is not due to question wording because that was identical across the three domains. Respondents are most likely to include spending by other household members when reporting food expenditure.

Table 1: The percentage of respondents who did not attempt to report the aggregate domain-specific expenditure of all household members when reporting domain-specific household expenditure

Sample	Food	Alcohol	On all things
One	10%	17%	14%
Two		16%	

Hypothesis 4: Respondent characteristics will be correlated with the propensity to report aggregate household expenditure.

Table 2 presents characteristics of respondents which predict reporting individual expenditure when household expenditure is sought. On the evidence of respondents in

Sample One, female respondents are more likely to report their individual expenditure.

Table 2: Results of a probit regression illustrating the marginal effect of respondent characteristics on reporting individual expenditure when asked for household expenditure

	Food	*Alcohol*	*On all things*
Female	0.094**	0.071	0.181***
	(0.041)	(0.053)	(0.053)
18 – 24	Base	Base	Base
25 – 29	0.077	-0.036	0.051
	(0.11)	(0.09)	(0.107)
30 – 40	-0.092	0.076	0.018
	(0.069)	(0.1)	(0.087)
41 – 54	0.025	-0.017	0.085
	(0.084)	(0.096)	(0.117)
55 – 65	0.089	0.01	-0.012
	(0.123)	(0.111)	(0.103)
66+	0.073	0.029	0.068
	(0.13)	(0.128)	(0.135)
Any children in household	0.043	0.04	-0.048
	(0.042)	(0.055)	(0.053)
Number of observations	198	209	173

* $p < 10\%$; ** $p < 5\%$; *** $p < 1\%$

4. Conclusions

This paper has demonstrated a sizeable response bias that afflicts a substantial and non-random minority of respondents. The scale of this bias will depend on respondent characteristics and characteristics of the expenditure domain. We recommend that:

1) Those working with expenditure data are cognisant that household expenditure may be underreported.

2) Survey designers include a question that clarifies the household unit as a matter of course so that the error can be somewhat controlled for

3) Further research is conducted to test whether diary methods also exhibit reporting bias that varies with household composition.

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