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# Measuring microenterprise profits: Must we ask how the sausage is made? ☆

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## Abstract

A large share of the World's poor is self-employed. Accurate measurement of profits from microenterprises is therefore critical for studying poverty and inequality, measuring the returns to education, and evaluating the success of microfinance programs. However, a myriad of problems plague the measurement of profits. This paper reports on a variety of different experiments conducted to better understand the importance of some of these problems, and to draw recommendations for collecting profit data. In particular, we (i) examine how far we can reconcile self-reported profits and reports of revenue minus expenses through more detailed questions; (ii) examine recall errors in sales, and report on the results of experiments which randomly allocated account books to firms; and (iii) asked firms how much firms like theirs underreport sales in surveys like ours, and had research assistants observe the firms at random times 15–16 times during a month to provide measures for comparison. We conclude that firms underreport revenues by about 30%, that account diaries have significant impacts on both revenues and expenses, but not on profits, and that simply asking profits provides a more accurate measure of firm profits than detailed questions on revenues and expenses.

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## 1. Introduction

Otto von Bismarck famously remarked that people who like sausages and laws should not see how either of them is made. Economists may wish to say the same about profit data from microenterprises in developing countries. Self-employment and household enterprises are major sources of employment in

developing countries, with Vijverberg and Mead (2000) reporting that about one-half of the households sampled in the World Bank's Living Standards Measurement Surveys operate one or more non-farm enterprises. Self-employment is particularly important among the poor: as an example, Banerjee and Duflo (2007) note that 69% of the urban poor in Peru operate a non-agricultural business. Accurate measurement of profits from microenterprises is therefore critical for studying poverty and inequality, measuring the returns to education, evaluating the success of microfinance interventions, and many other important questions of interest. However, a myriad of potential problems plague the measurement of profits. The majority of microenterprises in developing countries do not keep financial records, making data collection generally reliant on recall. Money and goods are fungible between the business and the household. Inputs may be purchased in one period and sold in another, and production can be highly seasonal. And as with other income, individuals may be sensitive about revealing how much they earn, and concerned about the information being used for tax purposes.

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In this paper we go inside the sausage factory of profit reporting and conduct experiments to measure the importance of these various problems, and to draw recommendations on how to collect profit data. We use data from two panel surveys of microenterprises conducted in Sri Lanka between 2005 and 2007. In the baseline surveys firm owners were asked directly for their profits in the last month, and also to report revenue and expenses. The level of reported profits is substantially higher than the level of reported revenues minus expenses at both the mean and the median. Moreover, the correlation between reported profits and reported revenue minus expenses is only 0.2–0.3, and 30% of firms have negative revenue minus expenses. [Vijverberg \(1991\)](#) and [Daniels \(2001\)](#) report similar correlations in other countries. They conclude that net revenue, the sum of money from the business used by the household and money left after meeting business expenses and using some money in the household, may be the best single measure, but note that they have no rigid standard to compare this to.

We examine how far one can go towards reconciling the difference between profits and revenue–expenses through asking more detailed survey questions and through better matching of revenues with the expenses incurred to meet these revenues. Responses to questions related to use by the household of enterprise resources reduce the gap in the level of profits compared with revenue minus expenses. But even with these adjustments, the correlations between profits and revenues minus expenses remains in the 0.3 range. We use reported markups of sales over input costs to adjust for the mismatch in the timing of the purchase of inputs and sales resulting from those inputs. We find these corrections bring the levels of the two measures much closer to one another, and lead to a marked improvement in the correlations — to 0.61–0.73. The importance of matching revenues and expenses varies with characteristics of the enterprise, in a manner we discuss further in the body of the paper.

We next turn to the issue of recall error. We ask firms for sales data with different amounts of recall, and find firms understate revenues by about 10 to 15% with recall over four months compared to one month. However, there is little recall error in asking for annual sales compared to asking monthly sales at quarterly intervals. To correct for recall error we randomly allocated some firms ledger books, to keep diary records of firm revenue and expenses. Firms complied well with this over a one month period, but compliance fell over longer periods. The use of diaries led to significantly higher expenses and to higher revenues of similar magnitudes, suggesting that recall leads firms to underreport both revenue and expenses. However, the use of books did not have any sizeable or significant effect on reported profits, suggesting that profits are less affected by recall errors. The use of books does not improve the correlation between reported revenue minus expenses and reported profits.

Finally we examine whether firms deliberately underreport revenues. As in the corruption literature we ask firms about firms like theirs, with the expectation that firms will answer in large part based on their own behavior. The majority of firms think that revenues are underreported, with a median level of

underreporting of 20% in one sample and 30% in the other. We had research assistants observe firms in the second sample 15 to 16 times during a month and record transactions, and use this to estimate actual revenues for these firms. The reported revenues of firms are 31% lower than we estimate, confirming the level of underreporting suggested in the self-reports.

Putting the results of these various exercises together, we conclude that direct reports of profits, adjusted for household use of enterprise resources, are likely to be less noisy and at least as reliable as asking firms for all the details of the revenues and expenses. The reports one gets seem to give reasonable rankings across firms in terms of observed transactions, but are likely to understate the true profit levels.

The remainder of the paper is structured as follows. Section 2 describes the data and Section 3 calculates the correlations between profits and revenue minus expenses. Sections 4 and 5 adjust for unreported categories and for mismatching of revenue and expenses respectively. Section 6 examines recall errors, Section 7 describes our bookkeeping experiments. Section 8 considers deliberate misreporting and Section 9 asks how well reported profits reflect reality by comparison with wage data. Section 10 concludes.

## 2. Data

We use data from two panel surveys of Sri Lankan microenterprises, both designed by the authors and collected between 2005 and 2007. The two surveys use similar instruments; the firms in each sample differ in ways we describe, but all are very small scale enterprises. The first survey we use is the Sri Lanka Microenterprise Survey (SLMS), carried out in three Western and Southern districts of Sri Lanka: Kalutara, Galle and Matara.<sup>1</sup> The SLMS was designed to enable the authors to study returns to capital in microenterprises and the process of recovery of microenterprises from the December 2004 tsunami ([de Mel et al., 2007, 2008](#)). The baseline survey was carried out in April 2005, with firms then re-interviewed at three-monthly intervals, with data from eight waves used here. A door-to-door screening survey of households was used to identify enterprises with invested capital of 100,000 rupees (about US\$1000) or less, excluding investments in land and buildings. We chose 618 enterprises in retail trade and manufacturing operated by owners aged 22 to 65, and with no paid employees. The enterprises include common self-employment activities such as running small grocery stores, selling tea, food preparation (e.g. string hoppers), sewing clothes, making lace products, and coir production. They therefore cover a range of typical small-scale activities in many developing countries.

The second survey is the Kandy Microenterprise Survey (KMS), a specialized survey taken of retail trade firms in Kandy area for the purposes of a bookkeeping and monitoring experiment to be described below.<sup>2</sup> We choose 180 retail trade firms, intended to be similar in size to the retail firms

<sup>1</sup> Fieldwork was carried out by ACNielsen Lanka (Pvt) Ltd. See [de Mel et al. \(2007\)](#) for further details.

<sup>2</sup> Fieldwork was carried out by the Kandy Consulting Group.

Table 1  
Summary statistics

	KMS		SLMS	
	Mean	S.D.	Mean	S.D.
Percent Male	71.1		50.6	
Age	43.1	12.5	41.8	11.2
Years of schooling	10.4	2.4	9.3	2.9
Percent Married	85.6		81.3	
Age of business in years	6.0	7.0	10.8	10.6
Usual hours per week working in business	77.2	18.9	56.6	19.3
Percent that doesn't keep business records	85.6		73.3	
Percent registered with the D.S. office	30.6		7.9	
Percent registered with the Pradeshya Saba	60.0		12.1	
Percent registered with the Provincial Govt.	1.7		3.7	
Percent registered with the Central Govt	1.7		0.8	
Percent registered with the Business Chamber	0.0		0.6	
Percent unregistered with any entity	18.9		76.6	
Percent in retail trade	100.0		49.6	
Percent in manufacturing	0.0		50.4	
Baseline values				
Market value of inventories	24493	18000	12308	16982
Value of non-land capital stock owned	13154	13720	27447	28414
Total reported revenues — retail	28007	25028	15389	17612
Total reported revenues — manufacturing			7541	10550
Total reported profits — retail	5201	4302	4020	3266
Total reported profits — manufacturing			3390	3890
Percent not paying taxes (baseline)	92.8		96.1	
Sample Size	174		619	

Note: Baseline is July 2005 for KMS, March 2005 for SLMS.

surveyed in the SLMS. A baseline survey was carried out from August 22–26, 2005, collecting July data for these firms. August data was collected in the first 10 days of September, and September data was collected throughout the month for some firms, and in the first few days of October for others. Data for 174 firms was available for all three months.

Table 1 provides summary statistics for both surveys. The firms in both surveys are quite similar in many respects, although more of the SLMS firms are operated by women. The firms have generally been in operation for some time, with a mean age of 6 years in Kandy and 10 years in the SLMS. Firm owners average 9 to 10 years of schooling, and there is near universal literacy and numeracy. However, few firms keep business records: 86% of firms in Kandy and 73% of firms in the SLMS keep no business records. Moreover, over 90% of firms in both surveys do not pay taxes, removing another potential source of business accounting information. Firms in Kandy are more likely to be registered with the local level administration (Pradeshiya Saba) or District Secretariat (D.S.), but this higher level of formalization still does not lead to more record keeping.

The lack of record keeping observed among these small firms suggests that reported profits may be subject to a range of different types of measurement error. The lack of record-keeping appears to be a general phenomenon among small

businesses in developing countries. For example, 22% of Mexican microenterprises with less than US\$1000 of non-land capital investment keep records, according to the 1998 ENAMIN survey.<sup>3</sup> Studies during the 1980s found only 17% of small industry owners kept records in Sierra Leone, and less than 10% in Jamaica and rural Bangladesh (Liedholm, 1991). It is therefore of general interest to determine what can be done to elicit reasonable information on profits from small firm owners.

### 3. Simple measures of profits

We motivate our initial two measures of business profits on the basis of the way these questions are asked in the Mexican National Microenterprise Survey (ENAMIN), one of the more comprehensive and regular microenterprise surveys carried out in developing countries.<sup>4</sup> The first measure of business profits is obtained by asking the firm owner for the revenue and expenses of the firm, and then calculating profits as the difference between reported revenue and reported expenses. We asked owners for the total revenues of the firm in the last month, and then for the total expenses in each of eleven categories (purchases of inventories; purchase of electricity, water, gas and fuel; interest paid; wages and salaries for employees; rent for machinery and equipment; rent for land and buildings; telephone or cellphone charges; taxes; maintenance and general repairs; traveling expenses; and other expenses).

The second measure asks owners directly for their profits, by means of the following question, illustrated here for the month of March: “What was the total income the business earned during the month of March after paying all expenses including the wages of employees, but not including any income you paid yourself. That is, what were the profits of your business during March?”

Table 2 reports the mean, standard deviation, median, and percentage of profits which are negative, for each of these two measures of profits for July and August in the KMS, and for the first and second rounds of the SLMS. For comparison with the KMS, we also separate the second round measurements in the SLMS into measures for retail trade and manufacturing firms. The foot of the table reports the Pearson and Spearman (rank-order) correlations between the two measures, along with a *p*-value for a test of independence. To reduce the influence of outliers on our results, we trim the top and bottom 1% of reported profits and the top and bottom 1 percent of reported revenue-expenses.

Table 2 shows that the observed correlation between directly reported profits and revenue-expenses is low, with Pearson correlations of 0.04–0.47.<sup>5</sup> These correlations are similar to those found in microenterprise surveys in other countries. For example, the ENAMIN survey in Mexico gives a Pearson correlation of 0.32 between profits and revenues-expenses for firms with less than US\$1000 in capital stock. Vijverberg

<sup>3</sup> See McKenzie and Woodruff (2006) for more details on this survey.

<sup>4</sup> Less detailed versions of the same questions are also asked in the World Bank's Living Standards Measurement Surveys (see Vijverberg, 1991 and Vijverberg and Mead, 2000).

<sup>5</sup> Note the correlations are lower for July in the KMS than for August. Both July and August data were asked at the start of September. We interpret the lower correlations in July as therefore arising from greater recall errors with two month compared to one month recall.

Table 2  
Reported profits vs. reported revenue minus expenses

		KMS			SLMS		
		July	Aug	Round 1	Round 2	Retail	Manufacturing
Reported Profits	Mean	4832	4796	3357	4433		5257
	S.D.	3473	2967	2534	3772	4095	3212
	Median	3750	4000	3000	3475	4000	2650
	% negative	0	0	0	0	0	0
Reported Revenue Minus Expenses	Mean	755	2807	1174	2150	3017	1271
	S.D.	10217	9345	7368	6730	7631	5548
	Median	0	3009	1000	1750	2623	1425
	% negative	48	31	29	26	27	26
Correlations:	Pearson	0.043	0.141	0.286	0.388	0.468	0.202
	Spearman	-0.022	0.095	0.329	0.431	0.450	0.416
	<i>p</i> -value	0.777	0.224	0.000	0.000	0.000	0.000

Note: SLMS retail and manufacturing breakdown is for round 2. All data trimmed at 1/99% by profits and by revenue–expenses.

(1991) finds a correlation between revenue–expenses and reported earnings between 0.14 and 0.39 in Côte d'Ivoire and negative and close to zero in Ghana, and Daniels (2001) reports a correlation of 0.24 between these measures in Zimbabwean microenterprises.

Secondly, we see that mean and median reported profits are roughly twice as large as the mean and median reported revenue–expenses, while the standard deviation of revenue–expenses is three times larger than that of profits. Mean profits are about 4500–5000 rupees/month, while the mean of revenues–expenses ranges from just under 1000 to just over 3000. Finally, no entrepreneur reports that his or her profits are negative, whereas over a quarter of firms have negative reported revenue–expenses. Again these findings mirror results obtained in other countries. Vijverberg (1991) finds average revenue–expenses to be negative in three out of four industries studied in

Côte d'Ivoire and Ghana, with large standard deviations; Vijverberg and Mead (2000) report 20% of enterprises have negative revenue–expenses in household surveys in Ecuador and Pakistan, and Daniels (2001) reports 37% of firms have negative revenue–expenses in Zimbabwe.

The large differences in levels between these two measures of profits and their weak correlation begs the questions of “which measure is more accurate?” and of “what causes differences between the two measures?”. The remainder of the paper serves to help answer these questions.

#### 4. Adjusting for unreported categories

The first explanation we consider for the difference between reported revenue–expenses and reported profits is that there are categories of expenses or forms of profit which are not captured in

Table 3  
Adjusting for unreported categories

		KMS		SLMS		
		July	Aug	Round 2	Retail	Manufacturing
<i>Percentage of firms reporting that:</i>						
Goods used for home consumption		75.9	90.8	39.2	63.5	14.7
Firm inputs given as gifts but reported as a business expense		2.9	2.3	2.3	2.3	2.3
Firm owners pay themselves a salary but fail to include this as profits:		2.9	2.3	1.2	0.7	1.7
Business revenue is used to pay household expenses, but is not counted as profit		37.4	50.6	13.7	13.3	14.1
<i>Adjusting Expenses and Profits</i>						
Adjusted Profits	Mean	6214	5797	4981	5752	4199
	S.D.	4608	3183	4278	4471	3929
	Median	5000	5000	4000	4810	3000
	% negative	0	0	0	0	0
Adjusted Revenue Minus Expenses	Mean	3409	5805	3440	4976	1883
	S.D.	10429	10256	8569	9290	7470
	Median	2500	5640	2255	3825	1615
	% negative	34	25	23	21	25
Correlations:	Pearson	0.065	0.154	0.362	0.457	0.174
	Spearman	0.088	0.174	0.468	0.507	0.411
	<i>p</i> -value	0.266	0.025	0.000	0.000	0.000

Notes: Adjusted profits refers to reported profits adjusted for wages paid to the owner and not included in the reported profits. Adjusted revenues–expenses refers to revenues and expenses adjusted for each of the four items shown on the table. Adjustments were not asked in SLMS round 1.

SLMS retail and manufacturing breakdown is for round 2.

All data trimmed at 1/99% by profits and revenue–expenses.

the basic questions above. After the first round of the SLMS we re-interviewed a subset of firms with large differences between reported revenue minus expenses and reported profits, and asked them to explain the difference between the two measures. These interviews revealed four unreported categories:

- i) Business goods and materials used for home consumption, but recorded as business expenses
- ii) Firm inputs which were given as gifts by non-household members, but which were recorded as business expenses.
- iii) Firm owners who paid themselves a salary, but failed to include this when reporting profits (despite the profits question explicitly including this).
- iv) Business revenues used to pay for household expenses, but not included as profits (unreported drawings).

We then included these questions in the KMS and in the second round onwards of the SLMS. The top panel of Table 3 reports the percentage of firms that report having expenses or profits in each category. The major unreported categories reflect fungibility of resources between the business and the household. This is particularly the case in retail firms, where a majority of firms use goods from the business for home consumption, but include these as business expenses. The tendency to “dip into the till” and use business revenues to pay for household expenses is greater in the Kandy firms, but still occurs in one in six firms in the SLMS. In contrast, inputs received as gifts and owner salaries not included in profits were not very common.

In the SLMS survey, we find that certain types of owners are more likely to use inputs for home consumption or be given inputs. Within the retail sector, owners with 10 or fewer years of schooling (63% vs. 59%); owners who are male (65% vs. 55%) and owners who reported in the baseline survey that they kept written business records (63% vs. 59%) are all more likely to report these adjustments. Among enterprises in manufacturing and services, home use of inputs is less common where the owner is over 40 years of age (11% vs. 17%), where baseline capital stock exceeded the median level (15% vs. 12%), when the owner kept books in the baseline survey (18% vs. 10%) and where the owner is female (20% vs. 6%). In the retail sector, we also find that males (12% vs. 8%) and those who kept books at the time of the baseline survey (11 vs. 8%) are more likely to say that they take cash from the business to pay for household expenditures. The fact that those keeping books are more likely to report these behaviors may suggest that mixing of household and business affairs increases the value of keeping books, or that those keeping books are more likely to recall these behaviors. We present evidence supporting the latter in Section 7 below.

The need to include separate questions on home consumption of business goods has been noted in previous literature. However, as our baseline questionnaire, based on the Mexican ENAMIN illustrates, this is not always followed in practice. Alderman (1993, p. 198) notes that “net profits could very well be negative if the household is eating up the business’s profits”. The bottom panel of Table 3 examines how much difference adjusting revenue–expenses and profits for these underreported categories makes. The data shown as “adjusted profits” have the salary paid

to the owner and the unreported drawings added back to profits. Adjusted revenue–expenses accounts for these adjustments, and also adds the cost of donated inputs and subtracts the cost of inputs used for home consumption from expenses.<sup>6</sup> These last two adjustments do decrease business expenses, thereby raising the level of revenue–expenses. In the KMS August round these adjustments raise revenue–expenses from a mean (median) of 2807 (3009) to 5805 (5640), almost doubling the level. Making these adjustments also increases the mean and median of the second round SLMS revenue–expenses by 50%. However, the change in the number of firms reporting negative revenue–expenses is much more modest: from 31 to 25% in the KMS August round and 26 to 23% in the SLMS round 2.

These adjustments act to close the gap between the level of revenue–expenses and the level of reported profits. However, these adjustments have only a slight effect on the correlation between the two measures. The Pearson (Spearman) correlation changes from 0.141 (0.095) to 0.154 (0.174) in the KMS August round, and from 0.388 (0.431) to 0.362 (0.468) for the retail firms in the second round of the SLMS. Manufacturing firms show less change from these adjustments, reflecting the fact that fewer households owning manufacturing firms consume goods they have produced.

## 5. Mismatching input purchases and sales

A second major source of discrepancy between reported revenue–expenses and reported profits can lie in the timing of transactions. Firms report the amount of cash revenue received and cash expenses incurred during a month. However, inputs purchased in one month may not be sold until another month. As Samphantharak and Townsend (2006) note, this problem becomes more acute the higher the frequency at which data are collected or the shorter the recall period asked. However, the longer the recall period, the more concerned one is about recall errors. Collecting information over high frequency periods and aggregating up to get profits over longer intervals is usually not an option, since it involves considerable additional expense to revisit the firms at regular intervals. When there are strong seasonal patterns, there is a risk of a non-trivial mismatch problem at any frequency under a year. Moreover, when high frequency surveys are administered, the reason for doing so may be for considering the effects of policy interventions for which short-term post-intervention effects are the object of interest (as was the case in our survey, see de Mel et al., 2007).<sup>7</sup>

We asked firms how much of the inventories and raw materials purchased during a month remained unsold (and not spoiled or damaged) at the end of the month. For the average retail firm, about 80% of the inventories purchased during a month are sold before the end of the month, with the firm at the 75th percentile

<sup>6</sup> A referee correctly points out that the households might use the goods as a last resort, when they cannot be sold. The question asks for the “value of business goods and materials” rather than the cost of the goods, but the value could nevertheless be overstated in the case of goods which have gone unsold.

<sup>7</sup> Short-term impacts are also likely to be of interest for microfinance innovations, since borrowers typically have to start repaying loans within the first month of receiving the loan.

selling between 87% and 97%, and the firm at the 25th percentile selling between 67 and 73%. Manufacturing firms have less rapid turnover, with the median firm selling only 65% of the month's raw material purchases before the end of the month.

In the KMS we randomly divided firms into three groups of 60 firms each. One group had monthly data for September collected in early October. The other two groups were given simple record books for keeping track of sales and expenses. We interviewed one of these two groups every week, and the other group every two days during September. The data collected during this exercise can be used to examine how frequently retail trade firms turn over inventories. On average, 97% of firms purchased something as inventories within each two day period (and 99% within each week). Much of what was purchased was sold very quickly, with the median firm selling 59% of input purchases within two days and 67% within a week of purchase. Nevertheless, there is substantial variation across firms in the turnover of inventories, suggesting that the correlation between revenue–expenses and reported profits may be affected by differences across firms in the timing of transactions.

In the January 2007 wave of the SLMS, we asked firms how much they typically markup inputs in setting the price of the goods they sell. Specifically, we asked: “Consider the most important item which you [sell]. If you buy Rs. 1000 worth of raw materials how much revenue will you receive from the final products that you [sell] with these raw materials on average?”<sup>8</sup>

We then asked the percentage of sales this item represents. The average markup on the most important item sold for all firms in the sample is 66%. Manufacturers report somewhat higher markups, 83% compared with 47% for retailers. We can use the reported markup for each firm to estimate the purchases of raw materials which correspond to the revenues in the given month. Specifically, dividing revenues by the response to this question yields the inputs associated the reference month's revenues. We calculate adjusted revenues minus expenses by replacing the inputs purchased during the reference month with the inputs used to produce the revenues reported in the reference month. Table 4A shows the results of this exercise using the data from round 8 of the SLMS survey, and data from rounds 2 through 8. We show on Table 4A both the reported profits and the adjusted revenues minus expenses, as calculated in Table 3.

Adjusting for the timing of expenses and revenues using the estimated markups significantly increases the correlation between reported profits and revenues–expenses. For the round 8 data, the Pearson (Spearman) correlation between adjusted profits and adjusted revenues–expenses is 0.36 (0.54). The correlation increases to 0.67 (0.72 for Spearman) when we use the markups to adjust revenues–expenses for timing issues. The correlations are slightly lower when we use rounds 2–8, perhaps because the markups have some seasonal component. The percentage of firms with negative profits is also much lower once we account for the mismatch in the timing of purchases and sales. Only 9% of firms now have negative profits, com-

<sup>8</sup> For manufacturers, the question was worded in terms of good manufactured rather than sold.

Table 4A  
Adjustments Using Markups

		SLMS			
		round 8	rounds 2–8	retail	manufacturing
Adjusted Profits	Mean	7346	6370	8508	6238
	S.D.	5956	5503	6044	5663
	Median	6000	5000	7000	5000
	% negative	0	0	0	0
Adjusted Revenue Minus Expenses	Mean	5368	4582	7431	3401
	S.D.	16143	13412	20967	9110
	Median	3700	2850	5775	2100
	% negative	21	23	21	20
Markup-Adjusted Revenue Minus Expenses	Mean	5543	4935	7227	3938
	S.D.	6213	5847	6859	5039
	Median	4000	3127	5540	2188
	% negative	9	8	8	9
Correlations: Adjusted Profits vs. Adjusted Rev–Exp	Pearson	0.362	0.332	0.363	0.384
	Spearman	0.542	0.519	0.538	0.515
	<i>p</i> -value	0.000	0.000	0.000	0.000
Correlations: Markup Adjusted Profits vs. Markup Adjusted	Pearson	0.672	0.652	0.609	0.733
	Spearman	0.718	0.694	0.677	0.726
	<i>p</i> -value	0.000	0.000	0.000	0.000

SLMS retail and manufacturing breakdown is for round 8. All data trimmed at 1/99% by profits and revenues–expenses.

pared with 21% before adjusting for timing mismatches. Timing mismatches thus appear to be a major reason firms show negative revenues–expenses in high frequency data.<sup>9</sup>

Table 4A reports data from round 8 of our survey, using information on the markup of the firm's main product. We also gathered markup data in round 7. In both rounds, we asked about markups on two goods: those representing the highest and second highest percentage of sales. The results using the round 7 data and the results using the average of the markups of the two main products (weighted by the percentage of sales represented by each product in round 8) are similar to those reported on Table 4A. For retailers, there is a very high correlation between the markups in the two periods (0.78) and the markups of the two goods (0.80, on average). For manufacturers, these correlations are much lower. The correlation in the markup across periods for the manufacturers is 0.28, and the correlation across the two most important goods is 0.25, on average. The lower correlations may be caused by changes in the mix of products sold by a manufacturer or by the seasonality of pricing. The data suggest that asking for markups which are

<sup>9</sup> The few surveys which collect revenue and expenses on an annual basis also show some firms with negative revenue–expenses. Vijverberg and Mead (2000) report 14.9% of firms have negative annual revenue–expenses in Vietnam, while the Indonesian Family Life Survey round 3 shows 7.5% with negative revenue–expenses. Some of these negative profits are likely genuine, but other explanations for negative profits include recall errors, which are greater over longer time horizons, and underreporting of revenues, which we address in Section 8.

specific to the survey reference period is important in the case of manufacturers.

The increase in the correlation of profits and revenues–expenses does not vary significantly by characteristics of the owner or firm. We find similar changes in the correlation among males and females, among young and older owners, and among those with higher and lower levels of schooling. We do find somewhat less benefit of matching sales and expenses among firms which kept books at the time of the baseline survey, for whom the correlation increases from 0.32 to 0.52. However, Table 4B shows that the markup adjustment is most important for firms whose inventories turn over slowly — that is, those with a greater mismatch in the timing of revenues associated with expenses. The median firm in our sample reports that 67% of the inputs purchased in the reference month were sold as final goods before the end of the month. For retailers, the median percentage of inputs sold is 74%; for manufacturers, 65%. Table 4B shows that the Pearson (Spearman) correlation between adjusted profits and adjusted revenues minus expenses is 0.70 (0.77) for firms selling 75% or more of purchased inputs in the same month (40% of the sample). Adjusting for markups makes little difference for these firms. The Pearson and Spearman correlations are nearly identical, 0.70 and 0.74, respectively. The table reveals a very different story for firms with a slower turnover in inventory. Among firms with selling 60% or less of the month’s input purchases in the month (also 40% of the sample), the Pearson correlation between adjusted profits and adjusted revenues–expenses is only 0.14. Using markups to adjust for timing increases this correlation to 0.66, or nearly the same level obtained by either method for firms with fast turnover of inventories. Thus, Table 4B helps isolate the circumstances under which using markups provides a significant increase in the matching of reported revenues, expenses and profits.

Ideally, we would always have monthly data on revenues, expenses, and inventory levels which would allow for a more exact correction of the timing mismatches. But gathering data every month is expensive, both for the researcher and for the respondent. We experimented with two ways of asking more directly for the input purchases associated with the current month’s sales within the context of the quarterly SLMS survey. Both of these alternative methods increased the correlation

between profits and revenues–expenses, but not by as much as the markup method we have just discussed. The first alternative was to ask the rupee amount of inputs purchased in the reference month and used to produce goods sold in that same month, and then to ask for the rupee amount of inputs purchased in prior months which were used to produce goods sold in the reference month. For example, in the January 2007 survey, we asked for inputs purchased in December which were sold in December, and for inputs purchased prior to December which were used in goods sold in December. Added together, these represent the inputs associated with the reference month’s sales — that is, the cost of goods sold for the reference month. When we use these in place of the inputs purchased during the reference month, we find the correlation between profits and adjusted revenues minus expenses increases from around 0.26 to around 0.48 among manufacturers, and from 0.35 to 0.41 among retailers.<sup>10</sup>

We also attempted to obtain estimates of the level of inventories held as raw materials or finished goods at the end of each calendar month. In the January, 2007 survey, we asked firms their level of inventories at the end of November and the end of December. We also asked firms what the level of inventories they expected to have at the end of January. We can calculate December’s cost of goods sold by subtracting the change in inventories during the month from the purchase of inputs in the month. That is, if the firm purchased 100 rupees of inputs in December, and inventories increased by 10 rupees between the end of November and the end of December, then the cost of goods sold in December is 90 rupees. We found that firms had a difficult time reporting on the level of inventories at the end of November and December. The non-response rates were relatively high: about 13% of firms failed to report a November inventory level, and 10% failed to report a December inventory level. Among the firms reporting data, these data increased the correlation between reported profits and adjusted revenues minus expenses from 0.26 to 0.42 for manufacturers, but has almost no effect for retailers, where the correlation falls slightly from 0.35 to 0.34.

In sum, the mismatch between purchase of inputs and the sales of goods associated with those purchases is a major cause of the differences between reported profits and revenues–expenses. When we use data on the markups over inputs costs, we find very significant improvements in the correlations between these two reported measures. Gathering information on the markup of inputs appears to be an effective way of adjusting for timing mismatches. Direct methods of asking for inputs associated with a given month’s sales do not do as well. The direct methods appear to work better for manufacturers than for retail firms. The markup question is applicable even in cross sectional surveys. After making adjustments for the mixing of household and enterprise accounts, and for timing mismatches, we find a very high correlation between reported and calculated profits. We should note also that raw materials represent the vast

Table 4B  
Markups and inventory turns

		≥75% of inventories sold in same month	<60% of inventories sold in same month
Correlations:	Pearson	0.698	0.138
Adjusted Profits vs. Adjusted Rev–Exp	Spearman	0.767	0.297
	p-value	0.000	0.000
Correlations:	Pearson	0.701	0.659
Adjusted Profits vs. Markup Adjusted	Spearman	0.742	0.698
	p-value	0.000	0.000

All data trimmed at 1/99% by profits and revenues–expenses.

<sup>10</sup> These data are from round 8 of the SLMS survey. We first asked these questions in the round 7 survey. As with the round 8 data, adjusting for the estimated cost of goods sold increases the correlations moderately, from 0.48 to 0.61 for manufacturers and from 0.51 to 0.65 for retailers.

Table 5  
How important are recall errors?

	Mean	Median	25th	75th	Correlations	
					Pearson	Spearman
<i>One month vs Four month recall</i>						
SLMS March Sales Asked in Round 1 (April)	12,358	7100	3000	15,000	0.491	0.654
SLMS March Sales Asked in Round 2 (July)	11,185	6000	2050	15,000		
% difference	-9.5	-15.5	-31.7	0.0		
<i>Quarterly recall vs Annual recall</i>						
SLMS 12 month sales as sum of quarterly	256,598.7	142,922	66,700	334,000	0.763	0.841
SLMS 12 month sales as recall over year	248,167.3	132,000	60,000	300,000		
% difference	-3.3	-7.6	-10.0	-10.2		

majority of variable costs in the enterprises from which our data are gathered. In larger enterprises with more paid employees, timing mismatches for labor and other variable costs will also need to be accounted for. We believe measuring markups has promise in these adjustments as well, though our data do not allow us to confirm this. We do conclude that the low correlation between reported profits and revenues minus expenses does not signal that the quality of microenterprise operating data is low, as has been implied by the literature to date.

5.1. Do reported profits move with reported sales?

It appears reasonable that firm owners have a good general idea of the level of their profits, since this forms the basis for household consumption and for any reinvestments in the business. However, in many applications one is also interested in the dynamics of profits. One would therefore like to know whether (a) reported profits respond to interventions; and (b) whether reported profits vary with changes in sales levels which might occur, for example, due to seasonal expenditure patterns. Evidence that reported profits respond to interventions is seen in de Mel et al., (2007), who show that a randomized experiment which increased the capital stock of some firms led to increases in profits. To test (b), we use the 8 waves of the SLMS to regress

reported profits on reported sales, firm fixed effects, and period fixed effects. The coefficient on reported sales is 0.130, with a *t*-statistic of 9.55. Hence reported profits are strongly responsive to periods of stronger sales for individual firms, providing evidence that reported profits are also useful for studying dynamics.

6. How important are recall errors?

The fact that few microenterprises keep formal business records means that surveys usually must rely on recall to collect business revenue and profit data. Relatively few studies have tried to measure the accuracy of this recall. However, the results of two small studies (summarized in Liedholm, 1991) carried out on 81 entrepreneurs in Honduras and 80 entrepreneurs in Jamaica from 1979–80 give cause for concern. Each study collected data twice-weekly from firms for one year, and then at the end of the period asked them for their best estimate of sales, costs, and profits for the one-year period. In Honduras, mean sales from the one-year recall were 85% higher than those derived from twice-weekly visits, and only one-quarter of responses were within 25% of the enumerated values. In Jamaica, 45% of respondents said they could not recall annual sales, and mean sales were underestimated by 20% for those who did offer a response.

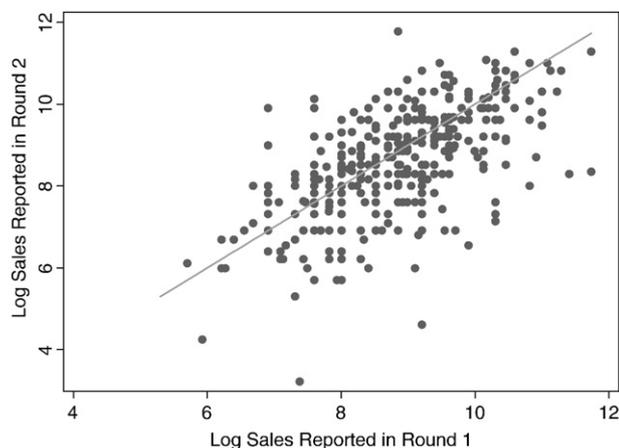


Fig. 1. One month vs. four month recall of monthly sales for the month of March 2005.

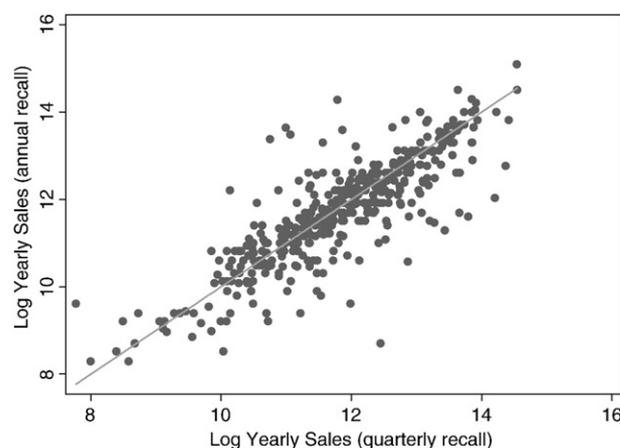


Fig. 2. Quarterly vs. annual recall of 12 month sales for the year 1 April 2005 to 31 March 2006.

Our analysis of firms in Sri Lanka offers suggests recall error for sales is important, but not as severe as these studies suggest. In the SLMS we asked March 2005 sales from firms in the April 2005 baseline survey, and then asked month by month sales for the first six months of 2005 in the second round in July 2005. Table 5 compares the distributions of the two reports of March 2005 sales, and Fig. 1 plots log March sales in round 1 against log sales for the same month reported in round 2. One quarter of firms did not report March sales when asked in the second round. For the 428 firms reporting sales in both rounds, the mean (median) sales are 10% (16%) lower when asked the second time. The Pearson correlation between the two measures is 0.491, with a Spearman correlation of 0.65. These results therefore suggest recall error is important, providing a reason to keep the recall period at a month rather than for longer periods.

However, we also find that recall is not much different over 12 months compared to the sum of monthly data collected four times during the year. In the fifth round of the SLMS, in April 2006, we asked firms for their sales over the previous 12 month period (from 1 April 2005 through 31 March 2006). We then compare this to the total 12 month sales computed from the quarterly surveys. Each quarterly survey asks sales for each of the previous three months (recall of one, two and three months). Fig. 2 shows the two measures are very close to one another, with a Pearson (Spearman) correlation of 0.763 (0.841). Mean sales are only 3% lower with annual recall than with the quarterly reports. This suggests that while some precision is lost in going from monthly to longer recall periods, firm owners can give quite consistent recall of annual sales.

## 7. Bookkeeping experiments

One obvious solution to recall problems, fungibility issues, and mismatching of expenses and revenues is to try and get microenterprise owners to keep better records. This approach

has long been a staple of household consumption surveys, with some surveys asking households to keep diaries of all expenditures during a set period. Deaton and Grosh (2000) summarize several studies of this nature, including experiments comparing diaries to recall. The use of diaries was found to increase food expenditure by 46% in Latvia and 33% in Armenia compared to recall, with more mixed results for non-food items. However, Deaton and Grosh note that there is evidence that the rate of reporting declines over time, with more reported in the first week of a two-week diary than in the second week.

However, to our knowledge, the diary approach has not been pursued experimentally with firms. We therefore set out in both the KMS and SLMS surveys to see how the use of simple ledgers can improve the collection of data from small enterprises. We designed simple ledgers for firms, with five columns to be filled out:

- (a) Expenses on goods and raw materials
- (b) Other expenses
- (c) Goods taken from the enterprise for household use
- (d) Total Business Revenue
- (e) Business income used to pay household expenses

We randomly assigned some firms to receive books, and others as control firms. Firms receiving books were asked to record daily amounts in each of the five columns, and were given clocks or umbrellas as small incentives for participating in the bookkeeping.

In Kandy we randomly allocated firms into three groups, each of 60 firms. The first group was re-interviewed in early October and asked about September sales, expenses and profits. The second and third groups were given the ledger books. The second group were then given weekly interviews, and the third group were given interviews every two days. Compliance with the bookkeeping was extremely high, and 71% of firms said

Table 6  
How much difference does keeping books make? Treatment Effect for the Treatment of Receiving an account book

	KMS September		SLMS round 3		SLMS round 4	
	Pure effect	Controlling for lagged outcome	ITT effect	TOT effect	ITT effect	TOT effect
<i>Outcome:</i>						
Total Revenues	4123 (0.82)	5418 (1.56)	1050 (0.57)	2141 (0.57)	4352 (1.62)	7689 (1.61)
Purchase of materials and items for resale	6209 (1.32)	7412 (2.25**)	726 (0.46)	1461 (0.46)	3094 (1.64)	5344 (1.63)
Total Expenses	6191 (1.29)	7286 (2.14**)	755 (0.48)	1541 (0.48)	2288 (1.17)	4038 (1.16)
Revenue – Expenses	–2068 (1.02)	–1988 (0.98)	356 (0.28)	726 (0.28)	2363 (1.57)	4178 (1.56)
Value of goods used for home consumption	783 (2.02**)	708 (1.89*)	12 (0.09)	25 (0.09)	–12 (0.09)	–22 (0.09)
Profits	103 (0.17)	379 (0.72)	716 (1.42)	1431 (1.41)	–117 (0.29)	–204 (0.29)
Sample Size	173	173	418	418	413	413

Notes: For firms not keeping financial records in baseline survey.

All SLMS regressions also include the round 2 (pre-treatment) lagged outcome. Robust *t*-statistics in parentheses.

\*, \*\*, and \*\*\* indicate significance at the 10%, 5% and 1% levels respectively.

they planned to continue maintaining the books after the experiment was over. Unannounced visits to the firms in November 2005, one month after we had thanked them for participating in the experiment, found 52% were still keeping the books of their own volition.

In the SLMS we randomly allocated half of the firms to receive the books when the second round of the survey was collected. Firms were then given new books during the third and fourth round surveys, in sum receiving books for 9 months. This is much longer than the typical expenditure diary, which asks for two-weeks, or at most one month's expenditure. In contrast to the Kandy experiment, in which data were collected from the books weekly or at two-day intervals, in the SLMS book data were collected alongside the regular survey, every three months. The increased time between giving out the books and checking that they were being maintained, along with the longer time for which they were given, resulted in less compliance with the book treatment. 68% of firms given books had recorded data in them for the first month (July 2005), falling to 53% by the third month for which books were given. The first round of data collection from the books then increased use of the books in October 2005, up to 69%, with use falling to 57% by December 2005. The January interview did not lead to any increase in book use, and book use continued to fall, until only 43% recorded information in March 2006, the last full month for which books were kept. A probit regression of whether or not a firm allocated to the book treatment is still keeping records 3 months or 6 months later finds no significant association between continuing to keep books and age, sex, marital status, education, or household asset holdings.

We then estimate the effect of keeping books on reported revenues, materials purchases, total expenses, revenue–expenses, home consumed goods, and profits. We do this for the subsample of firms not keeping books in the baseline survey (for whom the treatment would therefore be a change of status). Table 6 presents the resulting estimates. Bookkeeping is found to have a significant effect in the KMS, where books were kept for the relatively short period of one month and compliance was high. Purchases of materials and items for resale and total expenses were both 7000 rupees higher with books, a statistically significant difference which is approximately 22% of the mean levels for those without books. The value of goods used in home consumption was also significantly higher, with the treatment effect equal to 28% of the

Table 7  
Correlation between Revenue–Expenses and Profits for those with and without book treatment

	KMS	SLMS	SLMS
	September	round 3	round 4
Pearson Correlation:	0.126	0.168	0.453
Treated with books	[−0.08, 0.33]	[−0.02, 0.36]	[0.25, 0.66]
Pearson Correlation:	0.231	0.277	0.458
Untreated	[−0.04, 0.50]	[0.02, 0.54]	[0.30, 0.62]
Spearman Correlation:	0.075	0.535	0.624
Treated with books	[−0.11, 0.26]	[0.42, 0.65]	[0.52, 0.73]
Spearman Correlation:	0.431	0.468	0.492
Untreated	[0.20, 0.67]	[0.34, 0.60]	[0.37, 0.61]

Note: 95% bootstrapped confidence intervals in parentheses. For firms not keeping financial records in baseline survey.

Table 8  
Do firms deliberately misreport? % of firms saying that many enterprise owners tend to

	KMS	SLMS
<i>Expenses:</i>		
Firms overstate expenses	54	45
Firms understate expenses	10	13
Firms state expenses correctly	36	42
<i>Revenues:</i>		
Firms overstate revenues	1	4
Firms understate revenues	86	60
Firms state revenues correctly	13	36
<i>Profits:</i>		
Firms overstate profits	NA	2
Firms understate profits	NA	66
Firms state revenues profits	NA	32

mean level of those without books. Reported revenues were 5400 rupees higher (14% at the mean), but the difference was not statistically significant. Profits were only 379 rupees higher with books (8% of the mean), a statistically insignificant difference.

The allocation of books results in more modest and insignificant reported intent-to-treat estimates in the SLMS. However, while the KMS had 100% compliance with the book treatment, compliance was less frequent in the SLMS. We therefore also present the effect of the books treatment on those who take up the books (TOT estimates), using the assignment of books as an instrument for whether books are actually used. This does increase the magnitudes of the reported effects, although they remain insignificant. However, the signs and magnitudes again suggest that both revenue and expenses are underreported without books, with less overall effect on profits.

These bookkeeping exercises therefore suggest that both revenues and expenses are underreported when records are not kept. However, reported profits don't change significantly when books are used, suggesting that recall and other such problems are not having major effects on profits. Table 7 shows that the use of books does not help increase the correlation between reported revenue–expenses and reported profits: In the KMS those without books have higher correlations between the two measures, while in the SLMS the Pearson correlations are very close to one another, and the Spearman correlations slightly larger with books.

We interpret the changes in reporting arising from the bookkeeping experiments as due to better measurement, rather than to the books themselves improving the profitability of the business. There are several reasons to believe this. First, the books affect expenses and goods used in home consumption most – the categories we think recall errors are likely largest for – and profits least. Second, the most significant results occur in the Kandy data, over one month, whereas we would expect any direct effect of bookkeeping on business profits to take some months to arise. Nevertheless, as a further check, we revisited the Kandy firms one year later, and collected sales and profits data for August and September 2006. This allows us to check whether annual sales or profits growth is higher for firms which received the book treatment. We find no statistically significant effect of books on annual profits or sales growth, with the point estimates

suggesting, if anything, lower growth for those assigned books. This acts as further evidence that the books are not themselves increasing firm profitability.<sup>11</sup>

## 8. Deliberate misreporting

Issues such as recall problems, fungibility with the household, and mismatching of purchases and sales can all be resolved to some degree through questionnaire design. However, a final cause for concern is the tendency of business owners to deliberately misreport revenue and expenses. As with corruption, it is difficult to directly ask firm owners whether they do this. We therefore followed a common approach in the corruption literature and asked firms to consider other enterprises similar in all respects to theirs, and asked “in your opinion, when providing information about expenses in surveys such as this, do enterprise owners tend to over-state expenses, under-state expenses, or state expenses correctly?”. We asked similar questions for revenues and profits.<sup>12</sup>

Table 8 summarizes the firm responses. Approximately half of all firms believe firms would overstate expenses, while a small minority believes firms understate expenses. Most firms think firms like theirs understate revenues: 86% of firms in Kandy and 60% of firms in the south and west believe this. Under reporting rates are similar with respect to profits, with 66% saying firms understate and 36% saying firms report accurately. We then asked firms open-ended questions as to why they think firms overstate expenses and understate revenues and profits. The principal reason mentioned was fear of taxes, which was seen as especially a reason for understating revenues and profits. Approximately 10% of firms also gave fear of robbery, lack of trust in the interviewer, and the anticipation of some financial benefit as reasons for understating income. The median level of under/over reporting for each of three variables is the same for male and female, younger and older, and more and less-educated owners.

The mean level of over-reporting of expenses is slightly lower among owners over 40 years of age (11,700 vs. 11,200 rupees). Similarly, there is no variation at the median and no significant variation at the mean by initial capital stock, industry, or whether the firm kept written records at the time of the baseline survey.

We then asked all firms how much they thought firms like theirs would report if true revenue were 10,000 rupees, and similarly for expenses and (for the SLMS) profits.<sup>13</sup> Table 9 summarizes the distribution of the results. In Kandy the median firm thought firms like theirs would overstate expenses by 20% and understate revenues by 30%. In the SLMS the median firm believed firms like theirs would correctly report expenses, but

Table 9

If the truth is 10,000, how much would owners report?

	Revenue			Expenses		Profits	
	KMS-all	KMS-2	SLMS	KMS	SLMS	KMS	SLMS
	day						
Mean	6744	6668	8204	12,254	11,417	NA	7801
10th percentile	4500	5000	6000	10,000	8000	NA	5000
25th percentile	5000	5500	7000	10,000	10,000	NA	6000
50th percentile	7000	7000	8000	12,000	10,000	NA	8000
75th percentile	8000	7500	10,000	15,000	13,000	NA	10,000
90th percentile	10,000	10,000	10,000	15,000	15,000	NA	10,000

Note: KMS-all indicates all KMS firms; KMS-2 day refers to the 58 KMS firms receiving visits every 2 days.

would understate revenue by 18% and profits by 22%. We find that keeping books has no effect on the answers to these questions. In the KMS sample, for example, those assigned the mean firm assigned the books treatment said firms like theirs would under report revenues by 23%, compared with 21% for those not receiving the book treatment.

We obtain a more objective measure of underreporting from the sample of firms in Kandy which was interviewed every two days. The research assistants conducting the interviews visited these firms 15 to 16 times during September. Though the interview was short, they were instructed to extend the visit and record the number and value of transactions occurring while they were on the premises. The visits averaged 35 minutes, and were made at different times throughout the day, from 8 am to 7pm, and different days of the week. In total each firm was observed for approximately 7 to 9 hours during the month. We divide the total value of transactions observed by the number of hours the firm was observed for to obtain an estimate of average hourly revenue for the firm. We then multiply this by four times the number of hours the owner reports that he or she works per week to obtain an estimate of September revenues.<sup>14</sup> Table 10 compares this to the revenues reported by the same firms for September. Mean (median) reported revenues are 31 (32)% lower than mean estimated revenues based on our observed transactions and reported hours.

The implied level of underreporting of sales based on our direct observations of firms therefore accords very closely with the average level of underreporting that firms say firms like theirs do. It therefore seems reasonable to conclude that revenues are likely to be deliberately understated by firms. Nevertheless, when we adjust the revenue for each firm by the extent which it reports that firms like itself misreport, we find that both the Pearson and Spearman correlations between reported and estimated revenues are 0.66. This suggests that reported revenues still are providing reasonable information as to the scale of firm activities, just that most firms are understating this scale.

## 9. How well do reported profit levels reflect reality?

Once we account for the overlap of household and enterprise activities and for the timing of input purchases and sales, we find

<sup>11</sup> This is not to say that business training, of which bookkeeping training may be an important part, may be successful in raising profits. Our analysis suggests that merely providing the books, without any business training, has no effect.

<sup>12</sup> The revenue and expense questions were asked in the SLMS in the April 2006 wave. The profits questions were asked in the April 2007 wave. Because of attrition, the sample is slightly smaller for the profits questions. However, none of the data reported are affected in any material way by the differences in sample size. The profits questions were not asked in the KMS.

<sup>13</sup> The question on over- or under-reporting of profits was carried out in the April 2007 wave of the SLMS.

<sup>14</sup> The average firm was closed for 2 days during the month, so we base our calculations on 28 days rather than 30.

Table 10  
Comparison of reported sales to directly monitored sales For 58 km firms receiving visits every 2 days

	Mean	S.D.	Median	25th	75th
Hours of transactions observed in month	8.2	1.8	8.0	7.0	9.3
Reported Sales for September	37,090	26,205	303,60	17,150	50,462
Estimated Sales based on observed transactions and weekly hours reported	53,630	39,224	44,405	22,723	71,712
Implied % underreporting	30.8		31.6	24.5	29.6

that the two methods of calculating profits are quite highly correlated with one another. While these adjustments also close the gap the mean or median levels of estimated profits, profit levels reported in response to the direct question on profits average 6300 rupees over seven quarters, about a third higher than the 4900 rupee average of revenues–expenses. Can we say anything about which is likely to be the more accurate reflection of profits?

While it is not possible to provide a definite answer to this question, we present three pieces of evidence which lead to a preference for the directly reported profit data. First, taken at face value, the responses to the over/under reporting question discussed in the preceding section imply that profits will be under reported less severely than will revenues–expenses. The mean responses imply that a firm with actual values of 10,000 rupees in revenue, 5000 rupees in expenses, and 5000 rupees in profits would report 8200 in revenue, 5700 in expenses, and 3900 in profits. Subtracting revenues from expenses would result in a calculated profit of 2500. The first understate direct profit by 22% and calculated profit by 50%.

A second indication comes from the wages paid to entry-level workers in similar industries to those our firms operate in. Interviews with owners of firms with 5 to 45 workers in the garment, coir, lottery ticket sales, fishing, and boat-building industries revealed typical daily wages of 300–350 rupees, leading to monthly wages of 6000–7000 rupees.

Finally, in the baseline survey we asked SLMS firms what is the lowest monthly wage they would be prepared to accept to close their business and work in a wage job. The median response was 8000 rupees. We find that the reservation wage varies in sensible ways with the characteristics of owners. The reservation wage increases by 264 rupees for each year of schooling, by 0.55 rupees for each rupee of profit and 0.019 rupees for each rupee of invested capital, both as measured in the baseline survey. Males require an additional 2500 rupees, and married owners an additional 1250 rupees to shift to wage work.<sup>15</sup> This

<sup>15</sup> The reported coefficients are from an OLS regression with years of schooling, age, gender and a variable indicating the owner is married, and baseline profits and capital stock excluding land and buildings as independent variables. The owner's age is not significant. A specification using the log of the reservation wage produces similarly reasonable results. Full regression results are available from the authors on request.

regression suggests that the respondents took the question seriously. Even allowing for a premium for the flexibility of self-employment, this leads us to believe that a reasonable measure of average firm profits is likely to exceed the 5000 rupee level.

## 10. Conclusions and discussion

Few small firms keep business accounts in developing countries, yet data on the profits from such businesses is crucial for answering many important economic questions. We began this paper by showing that there is a very low correlation between what firms report as profits, and what they report as revenue–expenses. We show that a large part of these differences can be reconciled through adjusting revenue–expenses for business goods used for home consumption, and for mismatching of revenues with the expenses incurred to produce those revenues. Asking questions on mark-up can be done easily in cross-sectional surveys and provides a practical method to adjust for differences in the timing of inputs and sales of outputs. Smaller adjustments in profits occur when we also account for unreported drawings in the form of business revenues being used to pay for household expenses.

We then turned to the issue of recall errors. Monthly sales are understated when recalled after four months compared to one month. However, there is little recall error associated with annual sales compared to quarterly collection of monthly sales. We experimented with giving firms diaries to record daily revenue and expenses. The use of diaries increased both reported revenue and expenses, suggesting that recall errors are present in both. However, diaries did not have any significant effect on revenue–expenses or reported profits, nor did they improve the correlation between the two measures.

Finally we considered the issue of deliberate underreporting. Both the self-reports of firms about firms like theirs, and direct observations of transactions suggest that firms underreport revenues by around 30%. The self-reports indicate the average firm also underreports profits by 20 to 22%.

We draw two main conclusions from this exercise. The first is that asking firm owners directly for their profits (including using business revenues used to pay household expenses) provides a measure which appears at least as reasonable as asking for all the ingredients in terms of detailed revenue and expenses. As with our opening analogy, for some purposes, asking for the sausage is enough. However, the level of underreporting we observe suggests that one should still be a cautious consumer.

Finally, we note that carefully asking more detailed questions about revenue, expenses, mark-ups, and household uses can also provide an accurate measure of profits, and in many applications, one is also interested in these sub-components. Furthermore, it may be that aggregating detailed individual questions is more accurate than asking about the aggregate for measuring other elements of a firm's production function, such

as capital stock.<sup>16</sup> Therefore, there is still a case for detailed household enterprise modules in multi-purpose surveys. Our results just show that directly eliciting profits can provide useful information when this is the prime object of interest.

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<sup>16</sup> Deaton and Grosh (2000) also suggest that asking more detailed questions (up to a point) leads to more accurate consumption aggregates. Several reasons for this are somewhat analogous to our discussions, such as the need to adjust for durable expenditure, and for consumption of non-market items. One difference between firm profits and consumption is that consumption smoothing can allow a good picture of consumption to be gathered in as short as one to two weeks of detailed information, whereas longer periods are needed to provide an accurate representation of microenterprise profitability. Our experiment with books suggests owners are unlikely to maintain account books over a long period of time, so in practice one must either rely on recall of a large number of sales and expense items over a long period, or a picture of the microenterprise collapsed into a single profit measure.