



**Assessing the Impact of
Microenterprise Services (AIMS)**

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**MEASURING PROFITS AND NET WORTH
OF MICROENTERPRISES:
A FIELD TEST OF EIGHT PROXIES**

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EXECUTIVE SUMMARY

Purpose of Paper

This paper represents the second phase of a two-part project to examine alternative measures of the profits and net worth of microenterprises. Because full measures of profits and net worth are very difficult and expensive to collect, donors and practitioners tend to look for other variables, such as changes in sales revenue or changes in the value of fixed assets, to assess the impact of microenterprise support programs. While these measures offer some indication of the changes in an enterprise's status, profits and net worth are much better indicators of enterprise growth and stability. The first phase of this project developed eight proxies to measure profits and net worth and designed a field test to examine these proxies. This paper presents the results of the field test.

Survey Method

The field test to evaluate the profit and net worth proxies was conducted in Zimbabwe from August to September, 1999. A microenterprise was defined as any type of income-generating activity or business that sold at least 50 percent of its output and employed up to three workers. The definition of workers included the proprietor, unpaid family members, paid workers, and apprentices. A total of 448 questionnaires were administered in one urban area and one smaller town. These enumeration areas were selected randomly using a stratified, one-stage cluster sampling technique.

Criteria for Judging Proxies

The proxies were judged by two criteria: accuracy and cost. Accuracy was measured by several methods: (1) the percentage of cases that could be estimated by proprietors; (2) the ease with which proprietors answered the questions related to each proxy; (3) the percentage of cases with positive profits; (4) the level of variation within each proxy as compared to the other proxies; and (5) the correlation of each proxy with the other measures. Cost was measured by the time needed to implement each proxy. Obviously, there may be tradeoffs between these two criteria since a greater level of accuracy may require a greater number of questions.

Definitions of the Proxies

Four profit proxies and four net worth proxies were measured along with a full measure for each variable. The simplest profit proxy was based on a single question asking the proprietor to estimate profits for the last month. The second profit proxy was based on three questions that asked for the value of the product consumed by the household, money from the enterprise used by the household, and any money left over. The third profit proxy used a more traditional approach of asking for sales in the past month followed by a list of operating expenses and the amount spent on each. The fourth proxy examined sales over the last year as well as operating costs and depreciation costs. A separate section for traders was also used to examine the costs of restocking the business. Finally, the full measure of profit included all of the components of the fourth proxy as well as information on the output consumed or given away, sharing of business assets with the household, and detailed labor information.

The simplest net worth proxy was based on a single question that asked the proprietor for an estimate of net worth at the time of the interview. The second proxy was based on the value of fixed assets if they were to be sold today. The information on fixed assets was combined with the value of inventory, accounts receivable, and outstanding debt to estimate the third proxy. The fourth proxy included all of the components of the third proxy plus the cash of the business. This was done by

asking how much the proprietor could invest if he or she had a good opportunity. Finally, the full measure of net worth included all of the components of the fourth proxy with more detailed information about the inventory and sharing of fixed assets with the household. A more direct question about the amount of cash-on-hand for the business was also included.

Implementation and Statistical Analysis of the Profit Proxies

The time to administer the questions for each of the profit proxies ranged from less than one minute to 15 minutes. The single-question proxy had the highest proportion of cases that could not be estimated and it was the most difficult for the proprietors. While the first two proxies had no cases with negative profits, the proportion of cases with negative estimates increased as the proxies became more complex. Although economic theory indicates that firms will operate in the short run with negative profits, the third, fourth, and full measure of profits produced negative profits in one-third to one-half of all cases. It is unlikely that such a large number of firms operate with negative returns. Overall, the large proportion of negative estimates indicate that the more complex measures of profits are not accurate.

The third proxy, based on sales and costs in the last month, showed the greatest degree of variation compared to the other proxies indicating that it is an inaccurate measure of profits. The Pearson correlation coefficients revealed that the first two proxies were positively correlated and the two most complex measures were positively correlated. The correlation between the simple measures and the complex measures, however, was negative. The rank correlation with Kruskal-Wallis tests showed the same results.

Implementation and Statistical Analysis of the Net Worth Proxies

The time to administer the questions for each of the net worth proxies ranged from less than one minute to eight minutes. As in the case of the profit proxies, the single-question proxy had the highest proportion of cases that could not be estimated and it was the most difficult proxy for the proprietors. There were a few cases with negative net worth values among the full measure and the third and fourth proxies. This is not necessarily inaccurate, however, since some enterprises may have large outstanding debts.

The Pearson correlation coefficients and the rank correlations with the Kruskal-Wallis test showed that all of the proxies were positively correlated. Overall, the net worth proxies appeared to be possible substitutes for the full measure of net worth.

Correlation Between Profit and Net Worth

In addition to examining the net worth and profit proxies separately, Pearson correlation coefficients showed that there was a positive relationship between the first two profit proxies and all of the net worth proxies. The more complex measures of profit, however, were negatively correlated with the net worth proxies. These results strengthen the conclusion that the two simplest measures of profits are more accurate than the most complex measures of profits.

Conclusions

The results from this paper indicate that the single-question proxies for profits and net worth are too difficult for proprietors to answer and result in a large number of cases that cannot be estimated. Among the more complex measures, a greater degree of complexity in the profit proxies leads to less accurate results with a large proportion of negative estimates. Furthermore, the more complex

measures are negatively correlated with the simpler measures. The third proxy, based on sales and operating costs over the last month, appears to be the least reliable estimate. It has the highest coefficient of variation and it is positively correlated with the simpler proxies in some analyses and positively correlated with the more complex measures in other analyses. Overall, the second proxy based on three questions appears to be the best measure of profits. All proprietors could answer the questions related to this proxy and it did not produce any negative profits. Furthermore, this proxy is positively correlated with the net worth measures.

In the case of the net worth proxies, all of the measures appear to produce accurate results. The proxies exhibit relatively similar coefficients of variation and they are positively correlated with each other. Nonetheless, the third proxy showed the highest correlation with the full measure of net worth. In addition to being most closely correlated with the full measure, this proxy is relatively quick to implement and it avoids the sensitive questions related to the cash of the business.

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I. INTRODUCTION

Information on enterprise profits and net worth can be critical to assessing the impact of microenterprise services. Because full measures of profits and net worth can be difficult and expensive to collect, there is a tendency to look for alternative variables, such as changes in sales revenue or changes in the value of fixed assets, to assess the impact of microenterprise support programs. While these alternative measures offer some indication of the changes in an enterprise's status, profits and net worth are considered to be much better indicators of enterprise growth and stability.

This paper represents the second phase of a two-part project to examine alternative measures of microenterprise profits and net worth.¹ The first phase of the project designed a field test and developed eight proxies to measure profits and net worth based on a review of previous studies (Daniels 1999). In particular, that report identified over twelve methods used by different studies to calculate profits. These methods ranged from an estimate of profits last month provided by the proprietor to the more complex methods of subtracting capital services and the value of non-family labor from value added. Examining the individual components of profits, there were nine methods to estimate sales, seven methods to estimate labor costs, seven methods to estimate operating costs, and six methods to estimate fixed costs. Overall, a total of 378 proxies could be developed based on the various combinations of the components to estimate profits. In the case of net worth, no studies were located that estimated the complete value of net worth. This was partly due to the sensitivity of questions related to net worth, such as questions about the cash-on-hand of the enterprise.

The second phase of this project included a field test of the eight proxies identified in the first phase and an analysis of the results, which are presented in this report. The definitions of the proxies used in this study are provided in sections III and V below. They range from single-question proxies to full measures for each variable including up to 209 and 59 subquestions for profits and net worth, respectively. The proxies were judged by two criteria: accuracy and cost. Accuracy is measured by several methods: (1) the percentage of cases that could be estimated by proprietors; (2) the ease with which proprietors answered the questions related to each proxy; (3) the percentage of cases with positive profits; (4) the level of variation within each proxy as compared to the other proxies; and (5) the correlation of each proxy with the other measures. Cost was measured by the time needed to implement each proxy. Obviously, there may be tradeoffs between these two criteria since a greater level of accuracy may require a greater number of questions.

Overall, the results show that the simplest proxies appear to provide more accurate estimates of profits, whereas the more complex methods produce a large proportion of negative estimates. Although some firms do operate with negative profits in the short run, the high proportion of cases with negative estimates indicates that these measure are not very accurate. Among the net worth measures, all of the proxies appear to be possible substitutes for the full measure of net worth. Nonetheless, the third proxy based on fixed assets, inventory, accounts receivable, and outstanding debt appeared to be the best proxy. All proprietors could answer the questions related to this proxy and it had the highest correlation with the full measure of net worth.

¹ Both phases of this project were conducted as part of the Assessing the Impact of Microenterprise Services (AIMS) Project. The goals of the AIMS project are to gain a better understanding of the processes by which microenterprise services strengthen businesses and improve the welfare of microentrepreneurs and their households. In addition, the goal of the AIMS project is to improve the ability of USAID and its partners to assess the impacts of their microenterprise programs. More information on the AIMS Project is available on the website (<http://www.mip.org>).

A key limitation of this study is that the full measure of profits is based on a single-visit survey. Ideally, the profit proxies should be compared to a full measure that is estimated through repeated visits. Furthermore, the full measure of profits turned out to be inaccurate because of the large proportion of negative estimates, as mentioned above. The profit proxies are not, therefore, judged by their correlation to the full measure of profits. In the case of net worth, a single visit is appropriate to estimate a full measure since the concept of net worth is associated with a single point in time.

This paper begins, in section II, with a brief description of the survey methods used in the study. Section III provides some basic information about the profit proxies including the questions used, the time needed to collect the data for each proxy, the number of cases that could not be estimated, the number of cases with negative profits, and the level of difficulty and sensitivity for each proxy. The statistical analysis of the profit proxies is presented in section IV. The types of statistics include coefficients of variation, Pearson correlation coefficients, and rank correlations. Sections V and VI repeat the same information for the net worth proxies. The correlation between the profit proxies and net worth proxies is then examined in section VII. Finally, section VIII offers some brief conclusions.

II. SURVEY METHOD

For the purposes of this survey, a microenterprise was defined as any income-generating activity with three or fewer workers selling 50 percent or more of its product. Agriculture, mining, and forestry were excluded from the survey. A total of 448 questionnaires were administered in Zimbabwe from August 23 to September 2, 1999. The sample selection and data collection methods are described briefly below.

In 1991, 1993, and 1998, the USAID-funded GEMINI project conducted national surveys of microenterprises in Zimbabwe (McPherson 1991; Daniels 1994; McPherson 1998). Each time, the surveys used a stratified, one-stage cluster sampling technique. This involved three steps. First, the country was divided into eight strata based on population density and commercial activities. Urban areas were defined as cities with more than 20,000 inhabitants as estimated by the 1982 census. Within this group, there were four strata: high-density areas, low-density areas, commercial districts, and industrial areas.² The remaining four strata in rural areas included small towns, growth points, district councils, and rural councils.³ Second, a random sample of enumeration areas within each stratum was selected. The enumeration areas were based on areas delineated by the Central Statistics Office for the national census. Third, all households in each selected enumeration area were approached. If a household had an enterprise, a questionnaire was administered. In addition, all mobile businesses and businesses located outside of households were included in the surveys.

A subset of enumeration areas from the GEMINI surveys was selected randomly to be included in the survey for this study. In particular, 230 proprietors were identified and interviewed in one enumeration area from the urban high-density stratum and 218 proprietors were identified and interviewed in one enumeration area from the smaller town stratum. Based on these sample sizes,

² High-density areas are typically inhabited by low-income households while low-density areas are inhabited by high-income households.

³ Growth points are towns designated by the government to promote rural development. Incentives are provided in these towns to promote the establishment and growth of businesses. For more information on growth points see Pedersen (1992), Gasper (1988), and Wekwete (1987).

the results from the urban high-density area represent a 17 percent margin of error with a 90 percent confidence level for the mean value of profit. In the smaller town area, the results represent a 21 percent margin of error with a 90 percent confidence level.

The data were collected by nine enumerators and two supervisors. Enumerators and supervisors were trained for one week, followed by the final field tests of the questionnaire. Twelve enumerators attended training, but only nine were selected for the fieldwork based on written test scores and performance during training.

To administer the survey, enumerators visited all houses, shops, street vendors, and hawkers within the geographic boundaries of each enumeration area. Questionnaires were then coded and checked for errors. Each enumerator checked his or her own work at the end of the day and was then asked to check the work of one other enumerator. The supervisors then checked all questionnaires and gave them to the data entry person who also checked them for errors. As an extra measure of accuracy, the data entry person entered the data from each questionnaire twice. Once all data were entered, frequency charts were examined for each variable and any unusual numbers were identified and returned to the enumerator for verification.

III. DEFINITIONS AND IMPLEMENTATION OF PROFIT PROXIES

A. Definitions of Profit Proxies

As described in the introduction, information was collected to estimate four profit proxies and four net worth proxies. The definitions and a brief description of each profit proxy are provided below. Because wages for the proprietor and any unpaid employees were not deducted from the four profits proxies, all of the proxies represent the return to proprietors and unpaid workers. Only the full measure of profits deducts the value of in-kind payments to unpaid employees. The full measure, therefore, represents returns to the proprietor only.

Profit Proxy 1: Profits in last month as estimated by the proprietor in a single question

The first proxy was based on a single question. Proprietors were asked to estimate their profits over the past week or month. They were reminded to consider all costs such as transport, inputs, supplies, and paid labor. If the proprietor gave the profits for the last week only, the enumerator asked if profits were low, average, or high for that week. An estimate for the month was then recorded by multiplying the response by four if the week was average or adding the profit for each week if it varied over the past month.

Profit Proxy 2: Value of product consumed plus money from the enterprise used by the household plus any money left over

The second proxy was based on three questions used by the World Bank as part of the Living Standards Measurement Surveys (LSMS).⁴ The first question asked proprietors to estimate the value of the product normally consumed by the household. The second question asked proprietors to estimate how much money from the business they normally use for themselves or their household. Finally, the third question asked proprietors to estimate the amount of money that they had left over

⁴ The World Bank has conducted Living Standard Measurement Surveys in several dozen countries. The studies are used to examine household income and expenditure patterns. For a review of the questions related to microenterprises from these studies see Vijverberg and Mead (forthcoming).

after consuming some of the product and using some of the money from the business. Converting these answers to monthly estimates and adding them together provided the second proxy for profits. One advantage of this measure is that it avoids estimation of sales, fixed assets, and operating costs plus all of the recall problems associated with these components of profits.

Profit Proxy 3: Sales revenue minus operating costs in the last month

The third proxy was based on five questions with a maximum of 28 subquestions. Profits were estimated as sales revenue minus operating costs in the last month. Information on sales revenue was collected in a single question that asked about sales last month. Operating costs were based on a list of costs and the amount spent on each per week or month in the last month. Although this proxy approaches a full measure of profits, it does not include depreciation of fixed assets. It also ignores seasonality of sales throughout the year.

Profit Proxy 4: Sales revenue minus operating costs minus depreciation in the last year

The fourth proxy for profits was estimated as sales revenue minus operating costs and depreciation. It was based on a total of seven questions with a maximum of 138 subquestions. Information on sales revenue was based on the average amount earned in high, low, and medium months.⁵ Information on operating costs was collected through the same list of expenses described above for the third profit proxy. In addition, however, a ratio of variable costs to sales revenue was estimated for the past month and then applied to high, low, and average sales months to determine the costs per month throughout the year. Depreciation of fixed assets was also incorporated into this proxy by subtracting 20 percent of the current value of equipment and five percent of the current value of buildings.⁶ Finally, a separate section was used for traders to estimate the costs to restock their businesses. After estimating the annual profits using this proxy, the number was converted to a monthly estimate in order to compare it to the other proxies.

Full Measure of Profits: Proxy 4 plus output consumed by the household or given away and refinements in depreciation, labor use, and asset sharing

The full measure of profits was based on nine questions with a maximum of 209 subquestions. In addition to all of the information used in the fourth profit proxy, the full measure included information about output consumed or given away by the household and detailed information on individual workers employed by the microenterprise over the past year. Rather than using a straight-line depreciation method as in the fourth proxy, the full measure first estimated the proportion of each asset used by the business and then depreciated that portion based on the number of years left of use as estimated by the proprietor.

In theory, the full measure should provide the most accurate estimate of profits. As described in the introduction, however, the full measure had a large proportion of cases with negative estimates. Again, while some firms may have negative profits, it is unlikely that such a large proportion of firms operate with negative profits. The full measure was not, therefore, used as a standard to

⁵ Proprietors were asked whether each month of the year was a high, low, or medium sales month. The number of each type of month was then multiplied by the average sales in that type of month as stated by the proprietor in order to determine annual sales. There was no assumption that all proprietors had a certain number of high, low, or medium sales months.

⁶ The value of buildings was only included if it was purchased for the business. If the business was run from the home, the cost of the house was not included.

examine the other proxies. Other characteristics, listed in the introduction, were used to judge each proxy.

B. Implementation of Profit Proxies

Table 1: Implementation of Profit Proxies

	Profit Proxy 1	Profit Proxy 2	Profit Proxy 3	Profit Proxy 4	Full Measure
Question numbers from the questionnaire (see appendix 6)	C1	C6, C7, C8	B5, C3, D1, E1, F1	B5, D2, E1, F1, G1, G2, H1	B5, D2, E1, F1, G1, G2, G3, H1, J1
Number of questions including maximum subquestions	1	3	28	138	209
Average time to collect proxy per interview (minutes)	0.9	1.8	7.5	13.7	15.2
% of cases that could not be estimated due to missing information	32%	0%	14%	11%	17%
% of cases with negative estimates (among those that answered)	0%	0%	37%	55%	52%
Average level of difficulty (0=none, 3=extreme)	1.3	0.73	0.44	0.50	0.56

Table 1 illustrates the questions used for each of the four profit proxies and the full measure of profit. As illustrated, the time to administer each proxy ranged from less than one minute to 15 minutes for the full measure. The simplest proxies were completed in under two minutes whereas the most complex proxies required eight or more minutes per interview on average.

Although the first proxy was the simplest in terms of the number of questions, it had the highest proportion of cases that could not be estimated. Close to one-third of proprietors could not answer the single question for this proxy. Alternatively, all proprietors answered the questions related to the second proxy. Among the two most complex proxies and the full measure of profits, 11 to 17 percent could not be estimated. The table in appendix 1 details the extent of proprietors' inability or refusal to answer the individual questions involved in each proxy.

As described in the AIMS report for the first phase of this project (Daniels 1999), negative profit estimates are common among the more complex measures of profits. For example, Vijverberg and Mead (forthcoming) showed that the percent of cases with negative profits in the LSMS data ranged from 14 percent in Vietnam to 64 percent in Ghana. They suggest that the large percentage of negative cases is not plausible. In this field test in Zimbabwe, the two simplest measures of profits did not yield any cases with negative profits. As the proxies became more complex, however, the percentage of negative cases ranged from 37 percent to 55 percent. While some firms may operate with negative profits in the short run, one-third to one half of all firms operating with negative profits seems unrealistic. A closer examination of the negative estimates revealed that the greatest number of negative estimates are generated from cases where input costs are greater than sales.⁷ Similarly,

⁷ For the third proxy, input costs, operating costs, and restocking costs (for traders) were greater than sales in 43 percent, 33 percent, and 13 percent of the negative cases, respectively. For the fourth proxy, input costs, operating costs, trader's costs, and depreciation costs were greater than sales in 36 percent, 18 percent, five percent, and two

all firms operating with positive profits, as indicated by the first two proxies, seems unrealistic.

The level of difficulty that proprietors experienced when answering questions was estimated through an end-of-survey questionnaire administered to the enumerators. The enumerators were asked to rate each question according to the following scale: 0=no difficulty; 1=some difficulty; 2=a lot of difficulty; and 3=an extreme amount of difficulty. The level of difficulty does not refer to sensitivity of the question. Instead, the level of difficulty refers to the ability of the proprietor to provide the information. Considering the modal values, the highest level of difficulty for any single question related to the profit proxies was a “one” or some difficulty. As the number of questions per proxy increased, the number of questions with a mode of one increased as well. This indicates that the proxies themselves are not necessarily more difficult, but there are a greater number of more difficult questions as the proxies become more complex. The table in appendix 2 provides more detail about the level of difficulty for each of the questions used in the proxies.

Sensitivity issues were covered by written comments provided by the enumerators. The complete set of comments are included in appendix 3. In general, all of the enumerators reported that the questions concerning cash or profits were sensitive. Considering only those questions related to the profit proxies, seven of the ten enumerators mentioned the estimate of profits last month (question C1) as one of the most sensitive questions. The questions related to wages paid to employees was also mentioned as sensitive by seven of the enumerators. One enumerator reported that it was particularly difficult for the proprietor to answer these questions with more than one employee present during the interview.

percent of the negative cases, respectively. Finally, for the full measure of profits, inputs costs, operating costs (excluding labor), labor costs, fixed costs, restocking costs, and depreciation were greater than sales in 37 percent, 12 percent, five percent, four percent, four percent, and 0.5 percent of the negative cases, respectively.

IV. RESULTS FOR PROFIT PROXIES⁸

This section reports the results of the statistical analysis related to the proxies and full measure of profits. Prior to the analysis, extreme outliers were removed based on the assumption that they provided inaccurate data. In particular, all cases that were three standard deviations above or below the mean for any proxy were removed from the data set. A total of 20 cases, or 4.5 percent, were removed.⁹

A. Descriptive Statistics

Table 2: Descriptive Statistics for Profit Proxies

	Mean (Z\$)	Median (Z\$)	Standard Deviation (Z\$)	Coefficient of Variation (%)
Profit Proxy 1	1885	900	2754	146%
Profit Proxy 2	2615	1500	3241	124%
Profit Proxy 3	1448	285	17758	1226%
Profit Proxy 4	-1096	-35	5343	488%
Full Measure	-948	-19	4949	522%

The means were tested for pairwise differences using the Wilcoxon test. All pairs showed statistically significant differences. The medians were tested for pairwise differences using a chi-square statistic. All pairs showed statistically significant differences with the exception of the fourth proxy and the full measure.

Table 2 lists the mean, median, standard deviation, and coefficient of variation for the proxies and full measure of profit. The coefficient of variation, which provides a measure of the variability of each proxy in percentage terms, is measured as follows:

$$\text{Coefficient of Variation} = \frac{\text{Standard Deviation}}{|\text{Mean}|} \times 100$$

The first two proxies have remarkably similar characteristics and the lowest coefficients of variation among the five measures. The third proxy, based on sales last month, has the greatest coefficient of variation. Although it is impossible to determine which level of variation among the proxies is the most accurate, the large level of variation within the third proxy as compared to the other proxies

⁸ The analyses reported in this section as well as information on the implementation of the profit proxies were also examined at the sector level (manufacturing, commerce, and service) and at the stratum level (urban and rural). Because there were no substantially different results than those reported at the aggregated level, the tables were not included in this paper. If the reader is interested in these tables, they are available from the author.

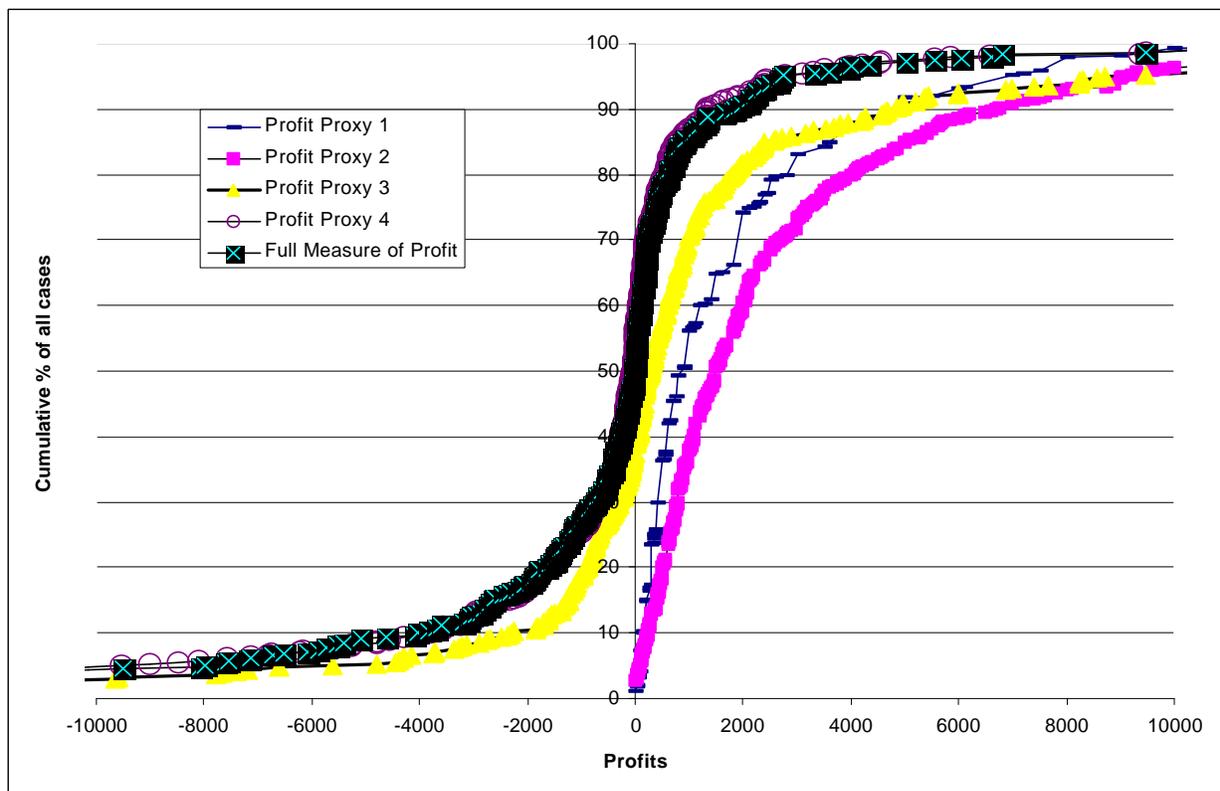
⁹ Since the point of this study was to determine which proxies provide the most accurate estimates of profits, it could be argued that it is not appropriate to remove any cases. If, however, the extreme outliers remain in the data set, the Pearson correlation coefficients and the descriptive statistics would be almost useless. In addition, studies that attempt to measure profits with more complex methods will most likely produce extreme outliers that would be removed from the data set before analysis.

suggests that this proxy may not be as accurate. The fourth proxy and the full measure had similar characteristics. This is not surprising since the calculation of the two measures is very similar .

B. Cumulative Density Functions

Figure 1 shows the cumulative density functions of the five profit proxies.¹⁰ Ideally, these distributions should be identical since the proxies attempt to estimate the same number. As illustrated on the graph, however, the distribution of the first two proxies is quite different than the remaining proxies due to the large number of negative estimates for the third, fourth, and full measures of profits. Considering only the first two proxies, the distributions are quite similar. The distribution of the second profit proxy, however, suggests a higher estimate of profits than the first profit proxy. The fourth and full measures of profits appear to be almost identical. As mentioned above, this is not surprising since the calculation of the two measures is similar.

Figure 1: Cumulative Density Functions of the Profit Proxies



C. Pearson Correlation Coefficients

The Pearson correlation coefficients for the proxies and the full measure of profits are provided in table 3. In cases where the coefficients are statistically significant, they can be interpreted as the strength or weakness of the linear association between two variables. The extreme values of negative one or positive one indicate a perfect negative or positive correlation between two variables, respectively.

¹⁰ Figure 1 has been truncated in order to provide a clearer illustration of the density functions.

Examining the individual pairs of relationships in table 3, the first proxy is positively correlated with the second and third proxies. The first proxy is not, however, correlated with the fourth and full measures of profits. The second proxy is significantly correlated with third, fourth, and full measure of profits. The magnitude of the correlation is, however, very weak and it is negative in the case of the fourth and full measures of profits. The fourth and full measures are strongly correlated, which is not surprising since the calculation of the two measures is very similar. Overall, the results show that the first two proxies could possibly be substituted for one another and the first and third proxy. The fourth and full measures of profits do not have a strong relationship with any of the three simpler measures. Because of the large number of negative cases among the most complex measures, it appears that the simplest measures may be more accurate. There is a tradeoff, however, since many proprietors had difficulty answering the questions related to the single-question proxy.

Table 3: Pearson Correlation Coefficients for Profit Proxies

	Proxy 2	Proxy 3	Proxy 4	Full Measure
Proxy 1	.615*	.615*	-.094	-.061
Proxy 2		.476*	-.141*	-.144*
Proxy 3			.196*	.176*
Proxy 4				.961*

*Significant at the .10 level.

D. Rank Correlations and the Kruskal-Wallis Test

In addition to examining Pearson correlation coefficients, the correlations between the proxies and full measure were tested using rank correlations with the Kruskal-Wallis test. This test compares the mean rank of one variable within the deciles of another variable.¹¹ By replacing the profit estimates with their ranks, this test eliminates the influence of extreme outliers. The results of the Kruskal-Wallis test are reported in table 4, which shows a significant relationship between all combinations of the proxies. The only exception is that the first two proxies are not significantly related to the fourth and full measures of profits.

¹¹ For the Kruskal-Wallis test, two proxies are compared by creating a variable that is a decile of the first proxy. The lowest ten percent of the values of the first proxy are given a value of one. The second lowest ten percent of the values are given a value of two, and so on. This first variable ranges from one to ten. A second variable is then created that replaces the value of the second proxy by its rank in the data set from one to 428 (the number of cases in the data set). The mean rank of the second variable is then examined within the deciles created for the first proxy. The null hypothesis is that the mean rank for the second variable is the same in all ten deciles of the first variable. If there is a relationship between the two variables, the null hypothesis is rejected.

Table 4: Kruskal-Wallis Test Results for Profit Proxies

Decile Grouping		Enterprise Profits				
		Proxy 1	Proxy 2	Proxy 3	Proxy 4	Full Measure
Proxy 1	Chi-Square Asymp. Sig.		70.03 .000	21.12 .012	5.64 .776	6.12 .728
Proxy 2	Chi-Square Asymp. Sig.	70.82 .000		18.60 .029	10.93 .280	10.03 .348
Proxy 3	Chi-Square Asymp. Sig.	52.02 .000	57.50 .000		74.96 .000	62.75 .000
Proxy 4	Chi-Square Asymp. Sig.	57.42 .000	57.49 .000	60.82 .000		302.50 .000
Full Measure	Chi-Square Asymp. Sig.	62.35 .000	55.98 .000	45.11 .000	303.32 .000	

The Chi-square is significant at the 90 percent confidence level if the asymptotic significance is less than .10.

The results of the Kruskal-Wallis test only indicate if there is a significant relationship between two proxies. The test does not indicate if the relationship is positive or negative. To examine this issue, figures A.1 through A.5 in appendix 5 illustrate the shape of each relationship. The horizontal axis shows the decile for one proxy while the vertical axis shows the mean rank of the remaining proxies. An upward slope in the graphs means that there is a positive correlation, whereas a downward slope indicates a negative correlation. A flat slope indicates little or no correlation.

Figure A.1 shows the relationship between the first-proxy deciles and the mean rank for the other measures of profits. The relationship between the first and second proxy appears to be positive. The relationship between the first proxy and the remaining measures, however, is much less clear. Figure A.2 uses the deciles of the second proxy on the horizontal axis. Again, only the first two proxies have a positive relationship. When examining the mean rank of the proxies within the deciles of the third, fourth, and full measure of profits, figures A.3, A.4, and A.5 show almost identical patterns. The first two proxies exhibit a U-shaped line whereas the last three measures appear to be positively correlated.¹² Finally, there is a positive correlation between the first two proxies and the fourth and full measures in the higher deciles or the positive estimates of profits for the fourth and full measure. Overall, these results are similar to the Pearson correlation coefficient results. There appears to be a positive relationship between the first two proxies and a positive relationship among the third, fourth, and full measure of profits. The first two proxies, however, do not show a positive correlation with the three other measures of profit.

E. Implications for the Measurement of Microenterprise Profits

Combining the information on the implementation of the proxies and the statistical analyses, the results indicate that the first and second profit proxies appear to be better estimates of profits than the more complex measures. In terms of cost, the simpler proxies are quicker to implement. In terms of accuracy, the first two proxies did not exhibit the large number of negative cases found among the more complex proxies. Again, however, it is unrealistic to assume that there are no firms

¹² The U-shaped pattern of the first two proxies could indicate that among those cases with large negative values for the fourth and full measures, proprietors estimated their own profits in the first two proxies at much higher rates. At the fifth decile, when profits are estimated as zero for the fourth and full measures, the estimates of proxies one and two are much lower.

operating with negative profits. Finally, the two simplest measures were positively correlated. Although both of the simplest proxies appear to be less costly and more accurate than the most complex measures, the second proxy appears to be the best measure of profits. All proprietors answered the questions related to the second proxy compared to only two-thirds of respondents for the first proxy. Also, the majority of enumerators indicated that the first proxy, estimated by a single question, was one of the most sensitive questions on the questionnaire. Again, this indicates that the second proxy is the best estimate of profits among the five measures.

V. DEFINITIONS AND IMPLEMENTATION OF NET WORTH PROXIES

A. Definitions of Net Worth Proxies

Net worth was also estimated using four proxies with increasing levels of complexity. Unlike the profit proxies that each attempted to measure the full amount of profits, the second and third net worth proxies attempt to measure only some portion of net worth. For these proxies, the correlation with the full measure becomes a more important measure of accuracy than a comparison of the means or medians. The definitions and a brief description of each net worth proxy are provided below.

Net Worth Proxy 1: Proprietor's estimate of net worth based on a single question

The first proxy was based on a single question that asked for the proprietor's estimate of the net worth of the business on the day of the interview. Proprietors were reminded to consider the value of all inputs, materials, finished goods, cash, and savings for the business as well as any debts and fixed assets.

Net Worth Proxy 2: Current value of fixed assets

The second proxy of net worth was based on the value of fixed assets. A list of 20 fixed assets was read to the proprietor, who was asked to estimate the value of each item if it were to be sold that day.

Net Worth Proxy 3: Current value of fixed assets plus inventory, accounts receivable, and outstanding debt

In addition to the value of fixed assets, the third proxy included the value of the current inventory, accounts receivable, and outstanding debt for a total of 32 subquestions. The value of current inventory was estimated as the total value of raw materials and the total value of finished products. Accounts receivable were estimated as the total amount owed today by customers, traders, and family members or friends. Similarly, outstanding debt was estimated by reading a list of possible sources of debt to the proprietor and asking for the amount still owed to each source as of the day of the interview.

Net Worth Proxy 4: Proxy 3 plus cash of business (opportunity to invest)

The fourth proxy included all of the components of the third proxy. In addition, it included the cash available to the business today. This was done by asking how much the proprietor could spend from the business cash and savings if she or he had an excellent opportunity for a business investment on the day of the interview.

Full Measure of Net Worth: Current value of fixed assets (portion used by business) plus detailed inventory value, accounts receivable, outstanding debt, and cash-on-hand of business

The full measure was based on a total of 59 subquestions and included all of the components of the fourth proxy with slightly greater detail. The value of inventory, for example, was calculated by asking for the quantity of every item in stock and the value of the item if it were to be sold today. The value of fixed assets was calculated using the same list described for the second proxy. Proprietors were also asked, however, if the asset was shared by another business or the household and the proportion of the time that the asset was actually used by the business. Only the proportion of the asset used by the business was incorporated into the value of net worth. Finally, proprietors were asked for the amount of cash-on-hand today instead of asking about the cash available for an investment opportunity.

B. Implementation of Net Worth Proxies

Table 5 lists the questions used for each of the four proxies and for the full measure of net worth. As illustrated in table 5, questions for the simplest net worth proxies were completed in under three minutes whereas the most complex proxies required an average of seven to eight minutes per interview. Although the first proxy was the simplest in terms of the number of questions, over one-third of all proprietors could not estimate their net worth in this way. In contrast, all proprietors answered the questions related to the second and third proxies. For the fourth proxy and the full measure of net worth, four percent and 13 percent could not be estimated, respectively. The table in appendix 1 provides more detail about the percentage of cases that could not be estimated for individual questions included in the proxies.

The percentage of cases with negative estimates of net worth was quite low for the two most complex proxies and the full measure of net worth. It is reasonable to expect some businesses to have a negative net worth since they may have considerable debt. All of the cases had positive estimates for the first two net worth proxies.

As described earlier, the level of difficulty that proprietors experienced when answering each question was estimated by the enumerators following the survey. A level of zero indicated no difficulty whereas a level of three indicated an extreme amount of difficulty. Considering the modal response, the first proxy, based on one question, had a mode of three, indicating that this was extremely difficult to answer. The list of fixed assets for the second proxy had a modal response of zero, indicating that this is a relatively easy set of questions for the proprietor. For the third, only one question had a modal value of one and all others were zero. Similarly, the fourth proxy, which adds one question to the third proxy, had zero as a modal value for all questions with the exception of two questions with a modal value of one. The full measure had primarily zeroes for the modal values with the exception of two questions with a mode of one and one question (cash of the business) with a mode of three. Overall, these results indicate that the first proxy is the least accurate in terms of the ability of the proprietor to answer the question. The full measure had one question that was extremely difficult for the proprietors. The majority of the questions for the full measure and the second, third, and fourth, proxies, however, could be answered without much difficulty. The table in appendix 2 provides more detail regarding the level of difficulty for the individual questions included in the proxies.

Table 5: Implementation of Net Worth Proxies

	Proxy 1	Proxy 2	Proxy 3	Proxy 4	Full Measure
Question numbers from the questionnaire	C5	H1	H1, I1, I2, K1, K2, K3, K4	H1, I1, I2, K1, K2, K3, K4, L1	H1, I3, K1, K2, K3, K4, L2, L3
Number of questions including subquestions	1	20	32	33	59
Average time to collect proxy per interview (minutes)	0.9	2.6	7.0	7.6	7.6
% of cases that could not be estimated due to missing information	36%	0%	0%	4%	13%
% of cases with negative estimates (among those that answered)	0%	0%	4.5%	2.3%	2.8%

The enumerators provided a set of written comments about sensitivity issues, which are reported in appendix 3. In general, there were many more questions related to the net worth proxies that were considered sensitive compared to the profit proxies. In particular, enumerators identified the questions related to the detailed inventory, outstanding debts, and savings (questions I3, K1, K3, K3, L1, L2, and L3) as sensitive questions. Overall, the question related to cash-on-hand (L2) appeared to be the most sensitive.

VI. RESULTS FOR NET WORTH PROXIES¹³

This section reports the results related to the proxies and full measure of net worth. As described earlier, twenty cases were removed from the data set because they included measures of profit or net worth that were more than three standard deviations away from the mean of the proxy. In addition, the detailed inventory used for the full measure of net worth had many estimates that were abnormally high. An examination of the questionnaires revealed that this was due to incorrect recording of sales units. For those cases where the detailed inventory was 100 times greater than the estimate of the value of inventory provided by the proprietor, the detailed inventory value was replaced by the proprietor's estimate.¹⁴

A. Descriptive Statistics

Table 6 provides the means, medians, standard deviations, and coefficients of variation for the proxies and for the full measure of net worth. Unlike the profit proxies, which exhibited coefficients of variation ranging from 124 percent to 1,226 percent, the range for the coefficients of variation for the net worth proxies is much smaller. Also, as described earlier, the second and third proxies attempt to measure only a portion of the full measure of net worth. Their means should, therefore, be lower than the mean of the full measure. The fourth measure, which uses the full value of assets used by the business rather than a portion actually used, should exhibit a higher mean value than the full measure.

Table 6: Descriptive Statistics for Net Worth Proxies

	Mean (Z\$)	Median (Z\$)	Standard Deviation (Z\$)	Coefficient of Variation (%)
Net Worth Proxy 1	12450	3000	27141	218%
Net Worth Proxy 2	3565	130	13558	380%
Net Worth Proxy 3	10181	1680	24955	245%
Net Worth Proxy 4	21167	5090	54840	259%
Full Measure	12147	2978	25883	213%

The means were tested for pairwise differences using the Wilcoxon test. All pairs showed statistically significant differences with the exception of the first and third proxy. The medians were tested for pairwise differences using a chi-square statistic. All pairs showed statistically significant differences.

B. Cumulative Density Functions

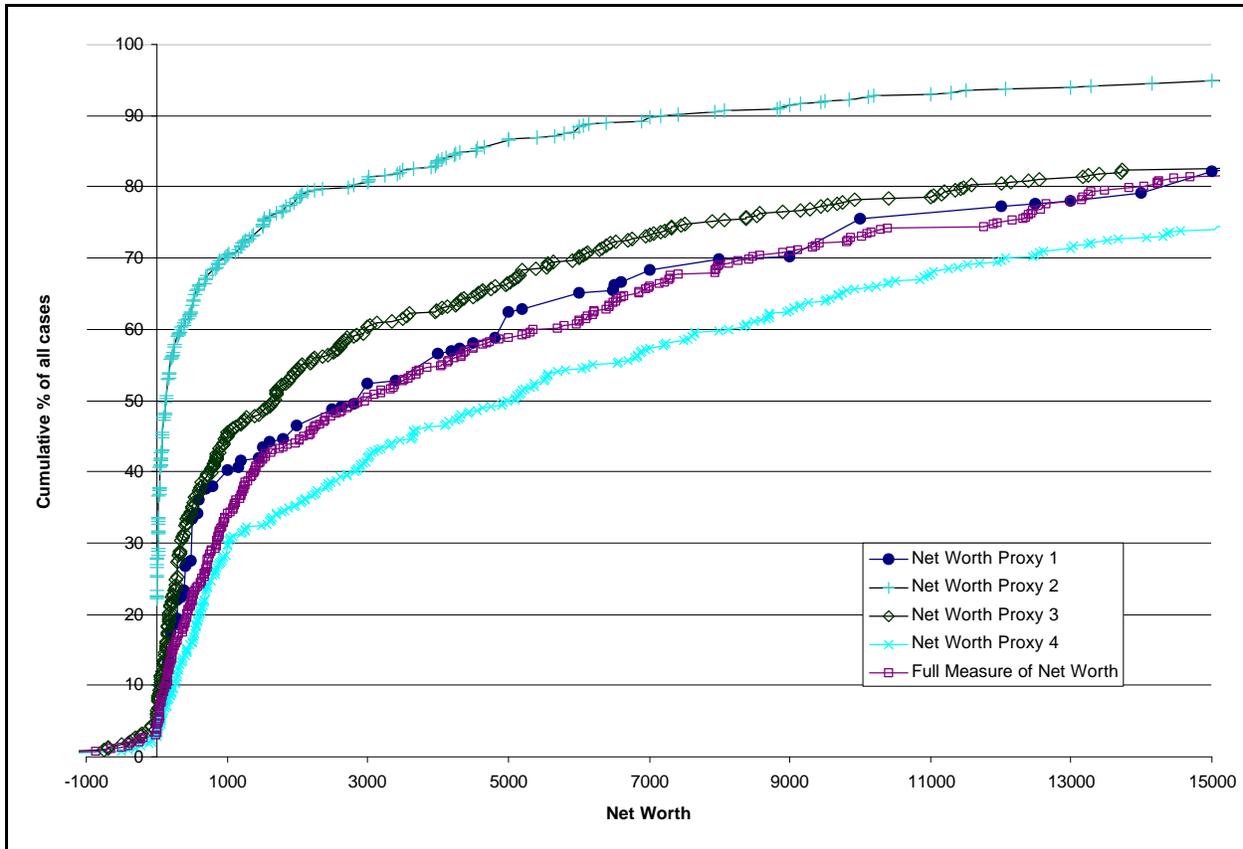
Figure 2 shows the cumulative density functions of the five net worth proxies. As described above, the second and third measures of net worth should provide lower estimates of net worth.

¹³ The analyses reported in this section as well as information on the implementation of the net worth proxies were also examined at the sector level (manufacturing, commerce, and service) and at the stratum level (urban and rural). Because there were no substantially different results than those reported at the aggregated level, the tables were not included in this paper. If the reader is interested in these tables, they are available from the author.

¹⁴ This type of error could be avoided in future surveys by providing enumerators with more thorough training on the recording of inventory units.

Alternatively, the first net worth proxy should exhibit the same distribution as the full measure since these two measures both estimate the full value of net worth. Finally, the fourth proxy should exhibit slightly higher estimates of net worth than the full measure. These two measures are almost identical with the exception of the calculation of fixed assets. The fourth proxy uses the full value of fixed assets whereas the full measure uses only the portion of the asset actually used by the business. All of these patterns are exhibited in Figure 2.¹⁵ The distributions of the full measure and the first net worth proxy are very similar. The second, third, and fourth measures offer successively higher estimates of net worth as expected and the fourth proxy offers a higher estimate than the full measure of net worth.

Figure 2: Cumulative Density Functions for Net Worth Proxies



C. Pearson Correlation Coefficients

The Pearson correlation coefficients for the proxies and the full measure of net worth are provided in table 7. Because the five measures are not attempting to estimate the exact same value, the correlations become more important as a means of judging accuracy. All pairs of proxies and the full measure are positively correlated and these correlations are statistically significant. This suggests that all of the proxies work reasonably well with the exception of the second and fourth proxy where the correlation is relatively weak. The highest degree of correlation is between the third proxy and the full measure.

¹⁵ Figure 2 has been truncated in order to provide a clearer illustration of the density functions.

Table 7: Pearson Correlation Coefficients for Net Worth Proxies

	Proxy 2	Proxy 3	Proxy 4	Full Measure
Proxy 1	.569*	.705*	.509*	.706*
Proxy 2		.646*	.348*	.553*
Proxy 3			.578*	.838*
Proxy 4				.561*

*Significant at the .10 level.

D. Rank Correlations and the Kruskal-Wallis Test

Table 8: Kruskal-Wallis Test Results for Net Worth Proxies

Decile Grouping		Proxy 1	Proxy 2	Proxy 3	Proxy 4	Full Measure
Proxy 1	Chi-Square Asymp. Sig.		99.08 .000	160.39 .000	158.10 .000	122.78 .000
Proxy 2	Chi-Square Asymp. Sig.	120.00 .000		205.96 .000	173.52 .000	333.34 .000
Proxy 3	Chi-Square Asymp. Sig.	161.89 .000	198.83 .000		345.89 .000	245.28 .000
Proxy 4	Chi-Square Asymp. Sig.	151.22 .000	152.69 .000	343.15 .000		211.08 .000
Full Measure	Chi-Square Asymp. Sig.	129.27 .000	382.27 .000	244.52 .000	212.23 .000	

The correlation between the measures was tested using rank correlations and the Kruskal-Wallis test, as described earlier. Again, outliers have less influence in this test since the data values are replaced by their ranks. Table 8 shows that there is a significant relationship between each pair of net worth measures. This relationship is positive in all cases as illustrated in figures A.6 through A.10 in appendix 5. Overall, this indicates that all of the proxies are appropriate substitutes for the full measure of net worth.

E. Relative Magnitude of Difference Between the Full Measure and the Proxies¹⁶

This section examines the relative magnitude of variation within the net worth proxies. In particular, table 9 shows the percent of cases for each proxy that are two or three times greater or less

¹⁶ This analysis was not carried out for the profit proxies since the full measure of profits proved to be unreliable.

than the full measure of net worth.¹⁷ Overall, this table shows that there are very few cases that deviate substantially from the full measure by a large amount. Only the fourth proxy showed that close to one-fifth of the cases produced a much higher estimate of net worth than the full measure. This reflects the fact that the fourth proxy includes the entire value of fixed assets as part of the net worth, whereas the full measure uses a reduced portion of the value of the asset if it is shared with other businesses or with the household.

F. Implications for the Measurement of Microenterprise Net Worth

Combining the information on the implementation of the proxies and the statistical analyses, the results indicate that the third proxy appears to be the best estimate of net worth for a number of reasons. First, it is less sensitive than the most complex measures because it avoids asking about the cash of the business. In terms of difficulty, enumerators indicated that only two questions posed some difficulty for the proprietors, whereas the majority of the questions posed no difficulty at all. In terms of the statistical analyses, the third proxy had the highest correlation with the full measure of net worth. Finally, all proprietors could answer the questions related to this proxy. It should be kept in mind, however, that the third proxy is only a partial measure of net worth. It omits the value of the cash-on-hand of the business. Although it is positively correlated with net worth, it will understate the true value of net worth.

Table 9: Relative Magnitude of Differences Between Net Worth Proxies and Full Measure

Ratio of Proxy to Full Measure	Net Worth Proxy 1	Net Worth Proxy 2	Net Worth Proxy 3	Net Worth Proxy 4
3 times greater	7.5%	0.3%	3.2%	19.0%
3 times less	0.8%	0.0%	0.5%	1.1%
2 times greater	11.3%	0.3%	5.1%	30.7%
2 times less	0.8%	0.0%	0.8%	1.1%

VII. CORRELATION BETWEEN PROFITS AND NET WORTH

Although net worth is measured at one point in time (i.e., net worth at the time of the interview) and profits are measured over some previous time period (e.g., last month or last year) there could be some correlation between the two measures. For example, a firm that earns high profits may reinvest that profit into the business and thus exhibit higher net worth. Obviously this correlation will depend on the extent to which proprietors reinvest profits into the business. Because this relationship may exist, this section examines the correlation between the two sets of proxies. Table 10 shows the results. The first and second profit proxies are positively correlated with all of the net worth measures. The correlation, however is very weak in some cases. The third profit proxy exhibits more irregular results. The correlation is only statistically significant for the first, third, and full measure of net worth and the correlation in these cases is very weak. The two most complex measures of profit are negatively correlated with the net worth measures. Because all of the net worth proxies produced more consistently accurate estimates, these results strengthen the conclusion that the two simplest measures of profits are more accurate than the most complex measures of

¹⁷ This assumes that the full measure of net worth is the most accurate measure. Although there is no way to prove that the full measure is the most accurate method without extensive data collection, the results from the analysis above indicate that all of the proxies and the full measure of net worth are relatively reliable.

profit.

Table 10: Pearson Correlation Coefficients Between the Profit and Net Worth Proxies

Profit Proxies	Net Worth Proxies				
	Proxy 1	Proxy 2	Proxy 3	Proxy 4	Full Measure
Proxy 1	.551*	.210*	.528*	.374*	.566*
Proxy 2	.321*	.204*	.356*	.203*	.354*
Proxy 3	.226*	.001	.121*	.059	.152*
Proxy 4	-.156*	-.084*	-.206*	-.174*	-.171*
Full Measure	-.165*	-.126	-.237*	-.185*	-.213*

*Significant at the .10 level.

VIII. CONCLUSIONS

The results related to the profit proxies can be summarized as follows:

- The simplest profit proxy had the highest number of cases that could not be estimated by the proprietor.
- The second profit proxy could be estimated by all proprietors and it did not produce the large number of negative estimates as in the case of the complex proxies. Furthermore, it was positively correlated with the net worth proxies. Nonetheless, it was somewhat sensitive for proprietors.
- The third profit proxy, based on sales and costs last month, appeared to provide the most inconsistent estimate of profits. In some analyses it was correlated with the simpler proxies, and in other analyses it was correlated with the more complex measures. It also produced a large number of negative cases and it had an extremely high coefficient of variation compared to the other proxies.
- The fourth proxy and the full measure of profit produced large numbers of negative estimates. These profit estimates were negatively correlated with the simpler proxies.

Based on these results, the second profit proxy appears to be the most accurate measure of profits and it has a relatively low cost of implementation compared to the more complex proxies.

The results related to the net worth proxies can be summarized as follows:

- The simplest net worth proxy had the highest number of cases that could not be estimated and it was extremely difficult for the proprietor to answer.
- All proxies appeared to produce accurate results, and they were positively correlated.

Although all of the net worth proxies could be used as a substitute for the full measure of net worth, the third proxy showed the highest correlation with the full measure of net worth. In addition, this

proxy is relatively quick to implement and it avoids the sensitive questions associated with the cash of the business that are included in the fourth proxy and the full measure of net worth. Finally, all proprietors could answer the questions related to this proxy.

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APPENDIX 1:
PERCENT OF CASES THAT
THE PROPRIETOR DID NOT KNOW
THE ANSWER OR
REFUSED TO ANSWER

Variables that are not listed in this table did not have any cases where the proprietor could not answer or refused to answer.

Question	Variable Label	Percent of cases where the:	
		Proprietor Could Not Answer	Proprietor Refused to Answer
B3A	Month Started	22	0
B3B	Year Started	0.4	0
B5A	Months Operate in Last Year	0.4	0
B5B2	Days Per Month: Average	0.4	0
B5C2	Hours Per Day: Average	0.2	0
C1	Profit: One Question	29.7	1.8
C2	Profit Last Year for MSE> One Year Old Enterprise	47.3	0.4
C3	Sales Last Week/Month	12.3	0.2
C4	Expenses Last Week/Month	9.2	0
C5	Net Worth: One Question	35	1.3
C6	Value of Product/Services used by HH	4.7	0
C7	Value of Money Used by HH	8.7	0
C8	Money Left	9.7	.7
C8A	Time Period	39.5	0
D1B	Restock in AVERAGE Month	0.7	0
D2A3	Number of Units Sold Last Day/Week/Month	4.7	0
D2A5	Purchase Price Of Product	0.7	0
D2A7	Units of Sales Per Unit of Purchase	2.5	0
D2B3	Number of Units Sold Last Day/Week/Month	3.6	0
D2B7	Units of Sales Per Unit of Purchase	1.8	0
D2C3	Number of Units Sold Last Day/Week/Month	2.7	0
D2C7	Units of Sales Per Unit of Purchase	0.7	0
D2D3	Number of Units Sold Last Day/Week/Month	1.3	0
D2D7	Units of Sales Per Unit of Purchase	0.4	0

Question	Variable Label	Percent of cases where the:	
		Proprietor Could Not Answer	Proprietor Refused to Answer
D2E3	Number of Units Sold Last Day/Week/Month	0.7	0
D2E7	Units of Sales Per Unit of Purchase	0.7	0
D2F3	Number of Units Sold Last Day/Week/Month	7.6	0
D2F7	Units of Sales Per Unit of Purchase	0.2	0
D2G3	Number of Units Sold Last Day/Week/Month	5.1	0
D2G7	Units of Sales Per Unit of Purchase	5.1	0
D2H3	Number of Units Sold Last Day/Week/Month	4.2	0
D2H7	Units of Sales Per Unit of Purchase	4.2	0
D2I3	Number of Units Sold Last Day/Week/Month	3.1	0
D2I7	Units of Sales Per Unit of Purchase	3.1	0
D2J3	Number of Units Sold Last Day/Week/Month	2.2	0
D2J7	Units of Sales Per Unit of Purchase	2.2	0
F1F1	Cost: Water	0.4	0
F1H1	Cost: Transport of Inputs	0.2	0
F1I1	Cost: Transport of Final Product	0.9	0
F1M1	Cost: Repairs/Service of Machines	0.2	0
F1N1	Cost: Other	0.2	0
G2A	Typical High Sales Per Month	2.2	.9
G2B	Typical Average Sales Per Month	9.8	1.1
G2C	Typical Low Sales Per Month	1.3	0.4
G3A1	Value: Consumption of Output in Household	3.1	0.2
G3D1	Value: Give Away	2.2	0.2
H1A3	Tools: Time Left of Use	2.9	0.2
H1A5	Tools: Price if Sold Today	5.1	2.0
H1B3	Tools: Time Left of Use	2.2	0.2
H1B4	Tools: Original Purchase Price	2.7	0

Question	Variable Label	Percent of cases where the:	
		Proprietor Could Not Answer	Proprietor Refused to Answer
H1B5	Tools: Price if Sold Today	1.3	1.3
H1C3	Tools: Time Left of Use	0.2	0.2
H1C4	Tools: Original Purchase Price	1.1	0
H1C5	Tools: Price if Sold Today	1.8	0.2
H1D4	Tools: Original Purchase Price	0.7	0
H1D5	Tools: Price if Sold Today	0.4	0
H1E3	Furnishings: Time Left of Use	0.4	0.2
H1E4	Furnishings: Original Purchase Price	1.8	0
H1E5	Furnishings: Price if Sold Today	1.1	0.2
H1F3	Furnishings: Time Left of Use	0.2	0
H1F4	Furnishings: Original Purchase Price	0.4	0
H1F5	Furnishings: Price if Sold Today	0.4	0
H1G3	Vehicles: Time Left of Use	0.2	0
H1G4	Vehicles: Original Purchase Price	0.2	0
H1G5	Vehicles: Price if Sold Today	0.7	0
H1H3	Machinery/Equipment: Time Left of Use	4.2	0
H1H4	Machinery/Equipment: Original Purchase Price	5.6	0
H1H5	Machinery/Equipment: Price if Sold Today	6.5	0.9
H1I3	Machinery/Equipment: Time Left of Use	1.3	0
H1I4	Machinery/Equipment: Original Purchase Price	1.3	0
H1I5	Machinery/Equipment: Price if Sold Today	1.1	0.2
H1J3	Buildings: Time Left of Use	0.7	0
H1J4	Buildings: Original Purchase Price	1.6	0
H1J5	Buildings: Price if Sold Today	1.3	0.2
H1K5	Buildings: Price if Sold Today	0.2	0
H1M4	Other: Original Purchase Price	0.9	0

Question	Variable Label	Percent of cases where the:	
		Proprietor Could Not Answer	Proprietor Refused to Answer
H1M5	Other: Price if Sold Today	2.9	0
H1N4	Other: Original Purchase Price	0.4	0
H1N5	Other: Price if Sold Today	0.2	0
H1O4	Other: Original Purchase Price	0.2	0
H1P1	Other: Time Owned	0.2	0
H1P4	Other: Original Purchase Price	0.2	0
H1Q1	Other: Time Owned	0.2	0
H1R1	Other: Time Owned	0.2	0
I1	Total Value of Raw Materials if Sold Today	6.7	0
I2	Total Value of Finished Products if Sold Today	10.7	0.2
I3A2	Number of Raw Materials in Inventory	0.7	0
I3B2	Number of Raw Materials in Inventory	0.4	0
I3C2	Number of Raw Materials in Inventory	0.2	0
I3D2	Number of Raw Materials in Inventory	0.2	0
I3E2	Number of Raw Materials in Inventory	0.2	0
I3E3	Cost of One Product/Raw Material	0.2	0
J1A2	Number of Months Worked: Past 12 Months	0.2	0
J1A3	Number of Days Per Month	0.2	0
J1A4	Number of Hours Per Day	0.2	0
J1A5	Salary: Amount	0.7	0.2
J1A7	In-Kind Payment: Amount	2.0	0
J1B2	Number of Months Worked: Past 12 Months	0.2	0
J1B3	Number of Days Per Month	0.2	0
J1B5	Salary: Amount	0	0.2
J1B7	In-Kind Payment: Amount	0.2	0
J1C2	Number of Months Worked: Past 12 Months	0.2	0

Question	Variable Label	Percent of cases where the:	
		Proprietor Could Not Answer	Proprietor Refused to Answer
J1C3	Number of Days Per Month	0.2	0
J1C5	Salary: Amount	0	0.4
J1D5	Salary: Amount	0.2	0
K1	Amount: Owed by Customers	0.2	0.4
K3	Amount: Owed by Friends/Family Members	0.7	0
L1	Opportunity to Invest: Amount Available	3.8	0
L2	Cash on Hand Today: Amount	2.9	7.4
L3A	Bank Savings: Amount	0.4	3.3
L3B	Post Office Savings: Amount	0.2	1.6
L3C	Savings Club: Amount	.2	0

APPENDIX 2:
END-OF-SURVEY QUESTIONNAIRE
RESULTS

This table is based on a questionnaire administered to the enumerators at the end of the survey. Each enumerator estimated the number of minutes to administer the questions listed below and the level of difficulty on a scale of zero to three.

Question	Variable Label	Average Number of Minutes to Administer	Percent of enumerators that reported each level of difficulty (0=none, 3=Extreme)			
			0	1	2	3
B5A	Months Operated in Last Year	0.34	100	0	0	0
B5B	Days Operated per Month	0.353	80	20	0	0
B5C	Hours Operated per Day	0.41	70	30	0	0
C1	Profit Last Month	1.03	0	70	30	0
C2	Profit Last Year	1.343	0	10	60	30
C3	Sales Last Week	0.915	10	80	10	0
C4	Expenses Last Week	1.01	40	50	10	0
C5	Net Worth	2.35	0	0	30	70
C6	Household Consumption	0.739	40	50	10	0
C7	Money Used from Business	0.652	50	50	0	0
C8	Money Left From Business	0.66	30	40	30	0
D1	Traders - Amount to Restock Business	0.985	70	30	0	0
D2	Traders - Prices and Volume	3.8	70	30	0	0
E1	Non-traders - Input Costs	2.9	50	50	0	0
F1	Other Operating Expenses	2.75	40	40	20	0
G1	Sales Volume by Month	1.193	40	40	20	0
G2	Sales Revenue	1.09	30	50	20	0
G3	Produce Consumed or Given Away	0.84	60	40	0	0
H1	Fixed Assets	3.0	50	30	20	0
I1	Value of Raw Material	1.675	40	40	20	0
I2	Value of Finished Products	1.55	50	20	20	10
I3	Inventory of Raw Materials	2.65	70	30	0	0
J1	Employment in the Business	0.915	90	0	10	0

Question	Variable Label	Average Number of Minutes to Administer	Percent of enumerators that reported each level of difficulty (0=none, 3=Extreme)			
			0	1	2	3
K1	Amount Customers Owe You	0.643	80	20	0	0
K2	Amount Traders Owe You	0.318	90	0	10	0
K3	Amount Family or Friends Owe You	0.312	90	0	10	0
K4	Credit Still Owed	0.591	90	10	0	0
L1	Amount You Could Invest Today	0.748	10	40	30	20
L2	Cash From Business Today	0.8330	20	30	20	30
L3	Savings From the Business	0.502	40	40	20	0

APPENDIX 3:
SENSITIVITY COMMENTS
PROVIDED BY ENUMERATORS

ENUMERATOR ONE

- 1) Respondents did not find it easy and safe to answer questions that had something to do with cash, especially C1, C2, L2, L3.
- 2) The question of licenses was also sensitive because they ended up thinking we had something to do with people having licenses when a business activity is carried out.
- 3) The question of laborers was also sensitive because they thought maybe we were from a trade union since some of them cannot afford to pay their laborers the required wages.

ENUMERATOR TWO

- 1) In conducting this survey I discovered that proprietors did not want to disclose their financial status, especially on questions C1, C2, C3, L2, and L3.
- 2) Some also found question I3 (inventory) sensitive, especially those who did not have a lot of things to sell.
- 3) Most of the small business proprietors do not pay for licenses and they thought we would take them to the Income Tax Offices.
- 4) Those who have employees thought we would report to the Trade Union that they were underpaying their workers.

ENUMERATOR THREE

- 1) Respondents were reluctant to answer such questions as C1, L2, and L3 which asked for the amounts of money they make (C1 - profit from last month) and cash they had in hand and at the bank (L2 and L3 respectively).
- 2) Another sensitive question concerns the salaries of both both the proprietors and their workers (for those that had employees). They were very reluctant to disclose their salary amounts (J1).

ENUMERATOR FOUR

- 1) Those that were interviewed were not comfortable disclosing their profits.
- 2) Question C2 was also sensitive. People were also not comfortable with C8 as interviewees could not easily disclose how much money they had after household consumption.
- 3) K4 also caused some sensitivity as interviewees could not easily disclose how much they owed a certain institution.
- 4) L2 was also sensitive. Those interviewed thought that it was part of their secrecy to disclose moneys that they had in their coffers.
- 5) J11 was also sensitive because proprietors were not comfortable to disclose the salaries of their employees.

ENUMERATOR FIVE

- 1) Questions that involved money, like C1, C2, C3, and C8, were quite sensitive.
- 2) Also questions concerning savings, like L1, L2 and L3, were sensitive.
- 3) Generally, money, profit, and savings oriented questions were quite sensitive.

ENUMERATOR SIX

- 1) People did not want to talk about licenses and workers. They thought we were concerned about taxes.
- 2) They also did not want to talk about cash on hand (L2); it was too personal.

ENUMERATOR SEVEN

- 1) J1 was a sensitive question because they thought we wanted to liaise with labor so they they could be penalized for paying them too little.
- 2) L2 was also a sensitive question because they did not want us or strangers to know how much they have as cash in hand.
- 3) L3 was another sensitive question because they did not want us to know how much they have in the bank or elsewhere.

ENUMERATOR EIGHT

- 1) The most sensitive questions were those which required the respondents to give us their cash inflows and outflows - especially their savings. C1 and C2, which were asking for the profitability of the businesses, I believe forced the respondents to make an assumption that we wanted to know about their income, which they thought was none of our business.
- 2) K1 was also sensitive because the respondents thought we wanted to know about their financial position.
- 3) Lastly, I think L2 and L3 were the most sensitive questions because the respondents did not trust us and could not believe our purpose.

ENUMERATOR NINE

- 1) Respondents has difficulties in understanding Net Worth (Question C5).
- 2) On questions C2, C3 and C4, the respondents could not easily recall their usiness operations during the previous weeks or months.
- 3) Questions concerning their money from the business were very sensitive. They could not disclose that. The questions in this category were C1, C2, L2 and L3.
- 4) On remaining questions, the respondents were able to understand and answered them more easily.

ENUMERATOR TEN

- 1) All questions concerning money were sensitive.
- 2) Question J1 where a proprietor is asked how much money he pays employee one when employee two is present.
- 3) Question K3, when when a proprietor is asked if friends or family owe him when they are present.
- 4) Question L2, when proprietor is asked how much money he/she has saved from the business.
- 5) Question L3, when proprietor is asked how much is in the bank saved from the business.

APPENDIX 4:
RANK CORRELATION GRAPHS

Figure A.1: Rank Correlation, Profit Proxy 1

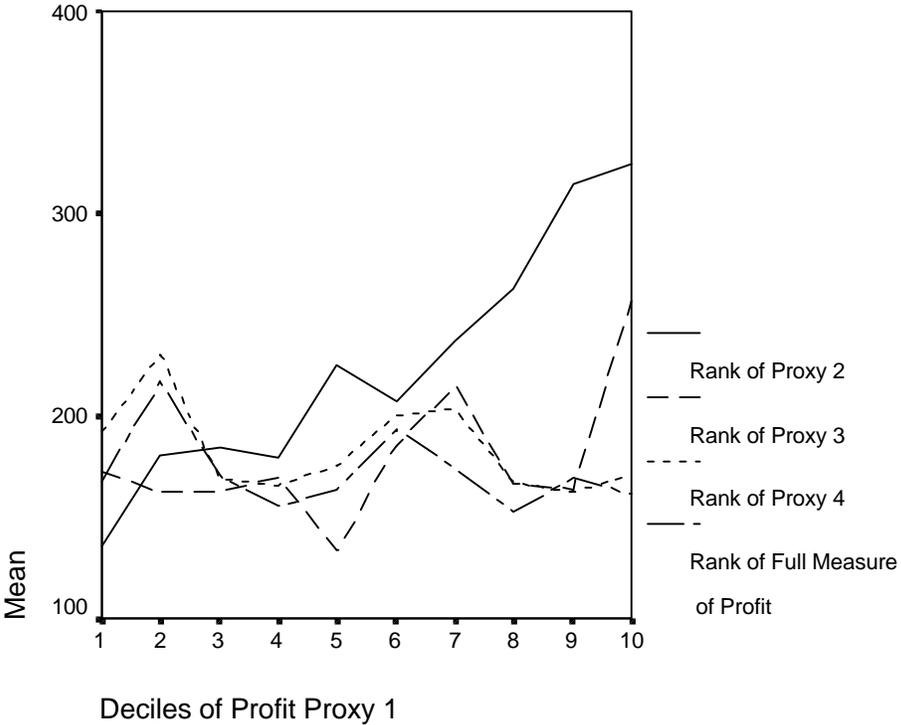


Figure A.2: Rank Correlation, Profit Proxy 2

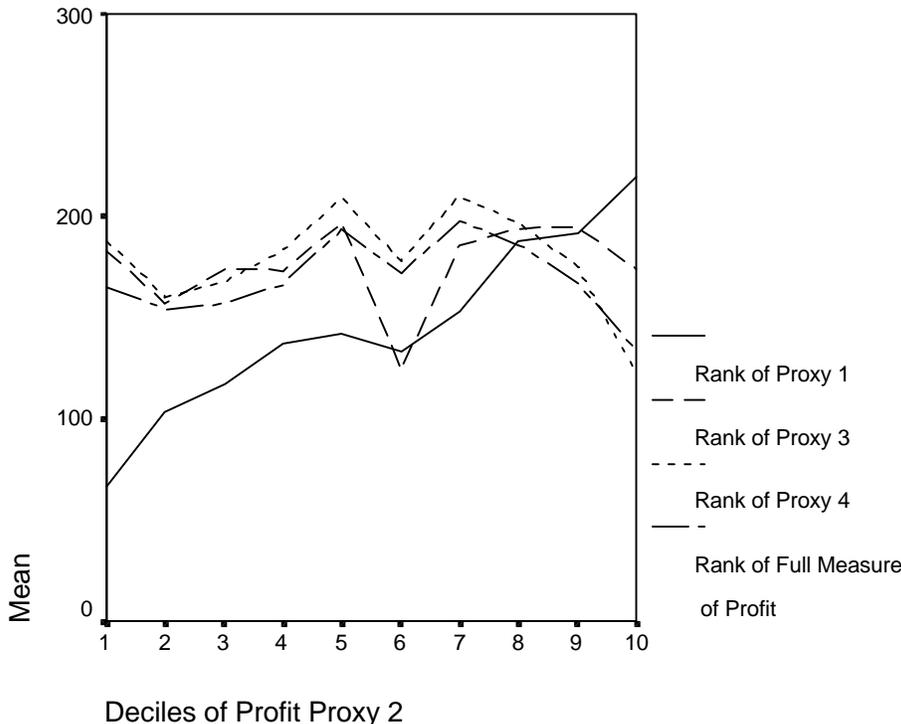


Figure A.3: Rank Correlation, Profit Proxy 3

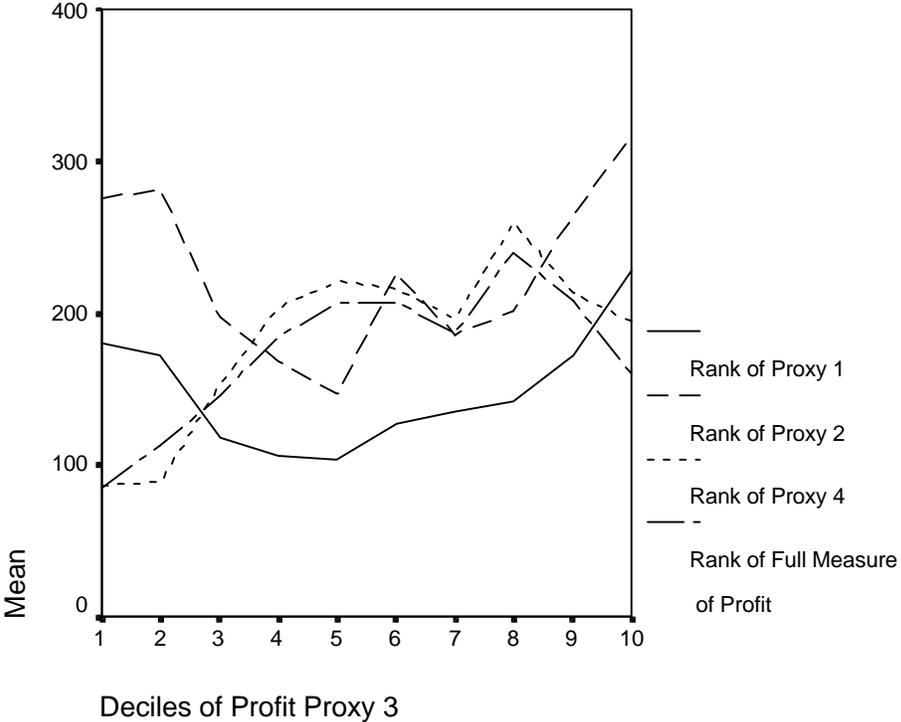


Figure A.4: Rank Correlation, Profit Proxy 4

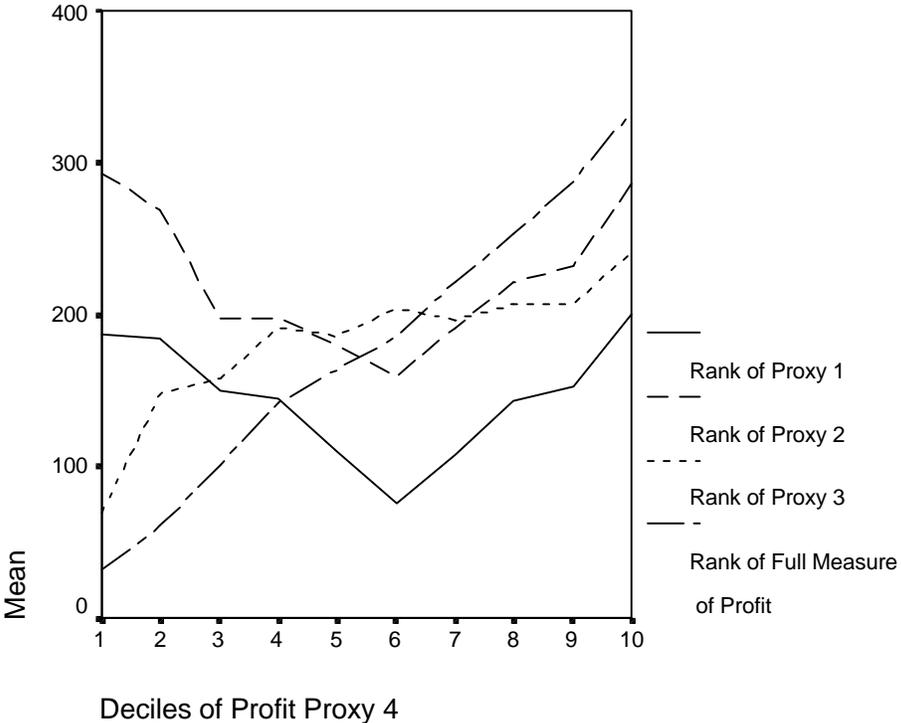


Figure A.5: Rank Correlation, Full Measure of Profits

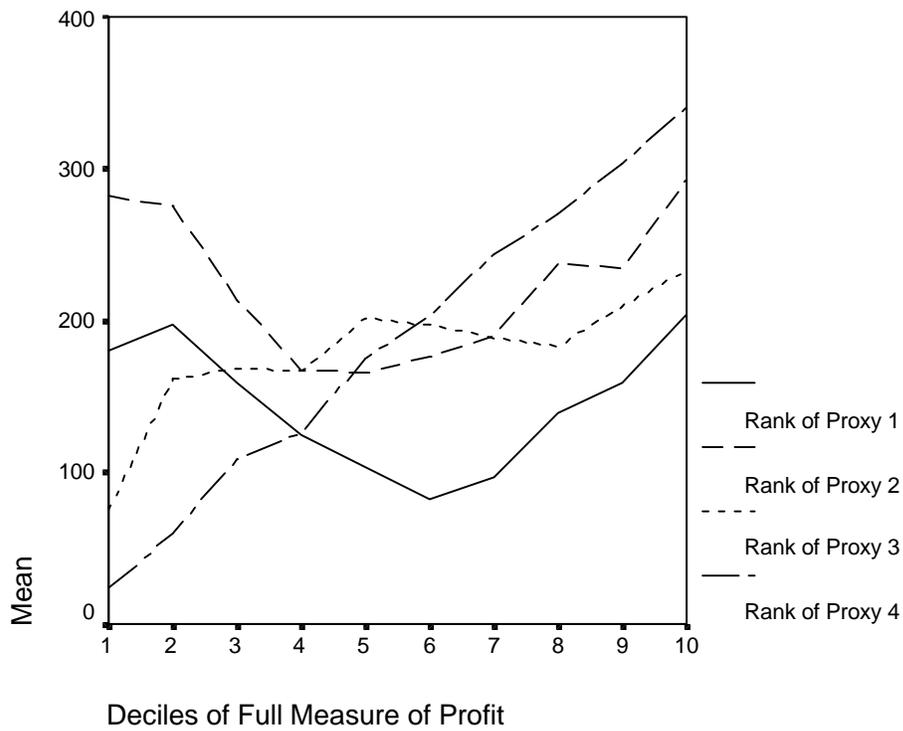


Figure A.6: Rank Correlation, Net Worth Proxy 1

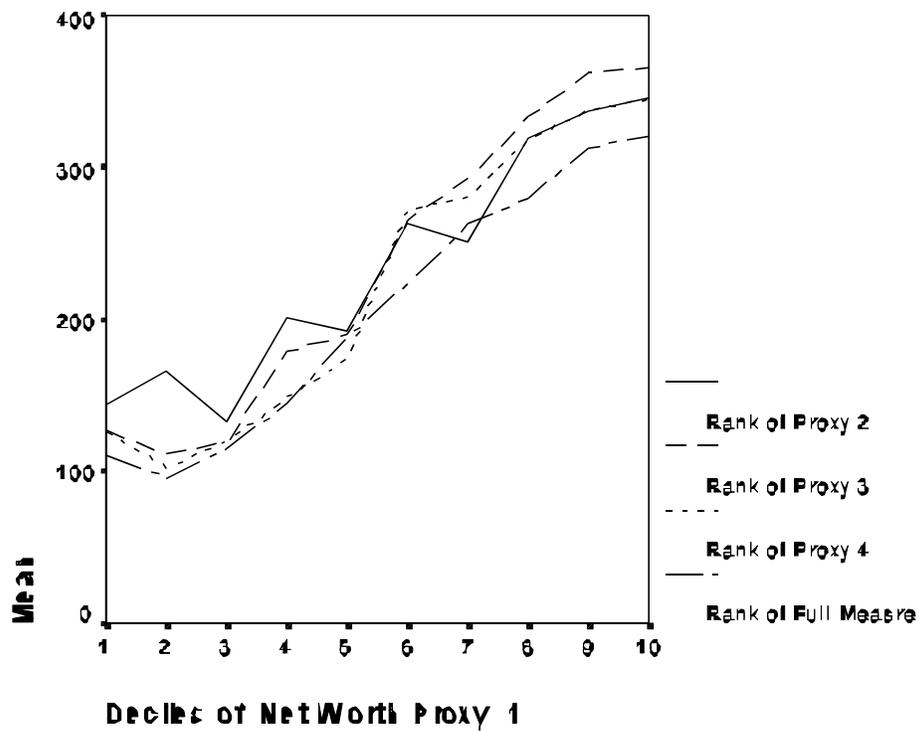


Figure A.7: Rank Correlation, Net Worth Proxy 2

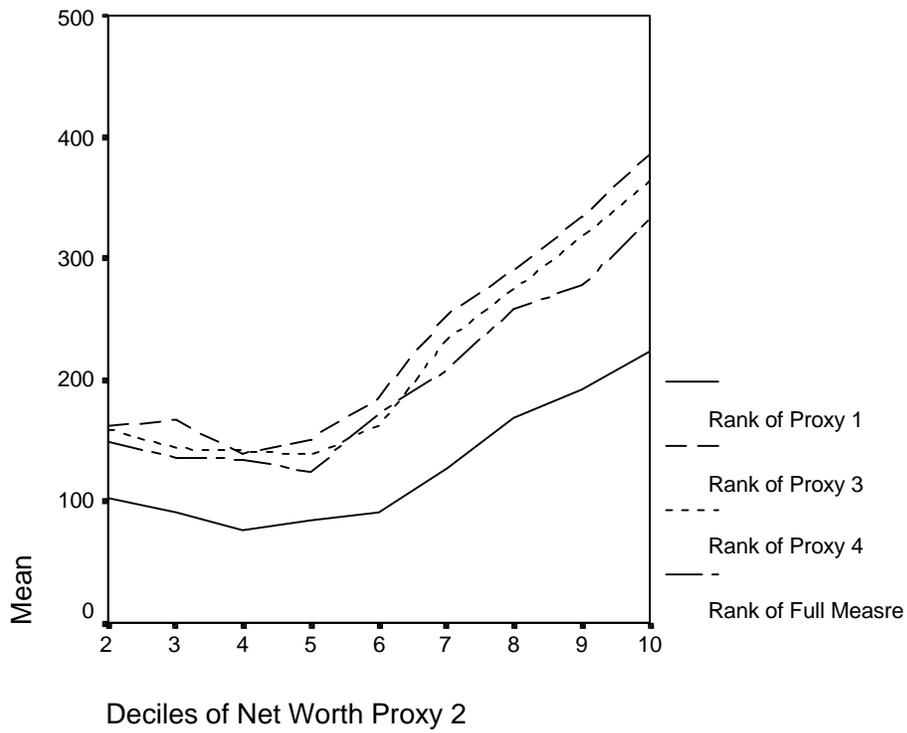


Figure A.8: Rank Correlation, Net Worth Proxy 3

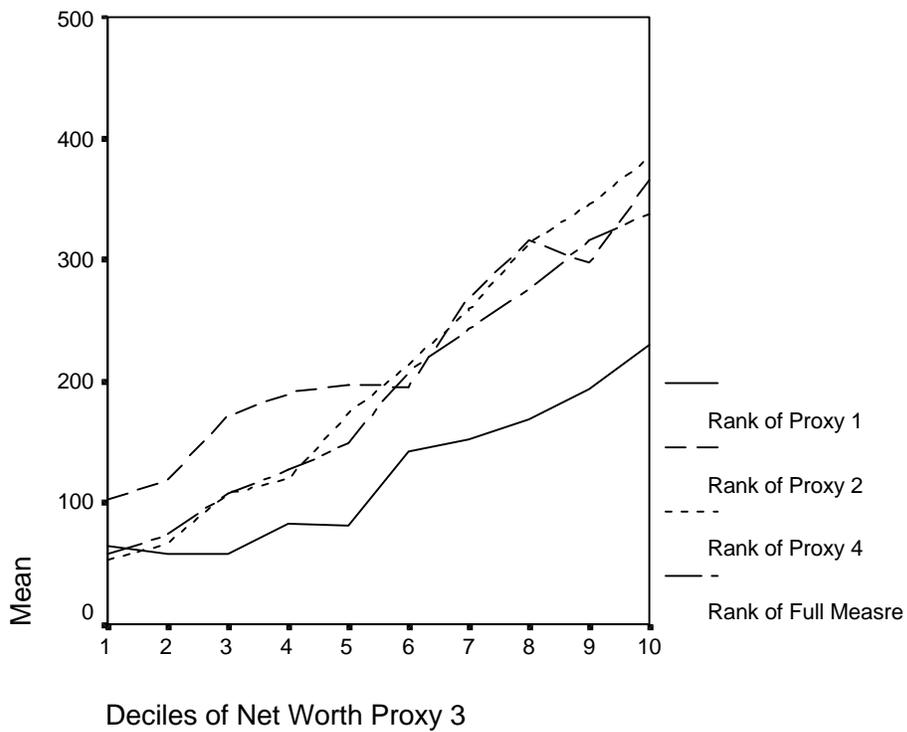


Figure A.9: Rank Correlation, Net Worth Proxy 4

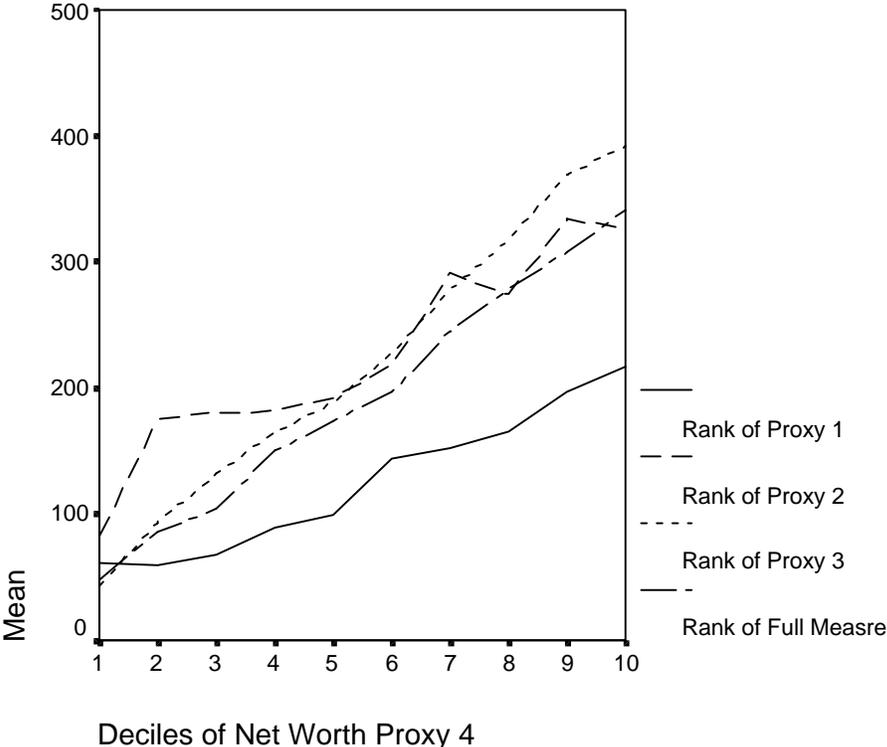
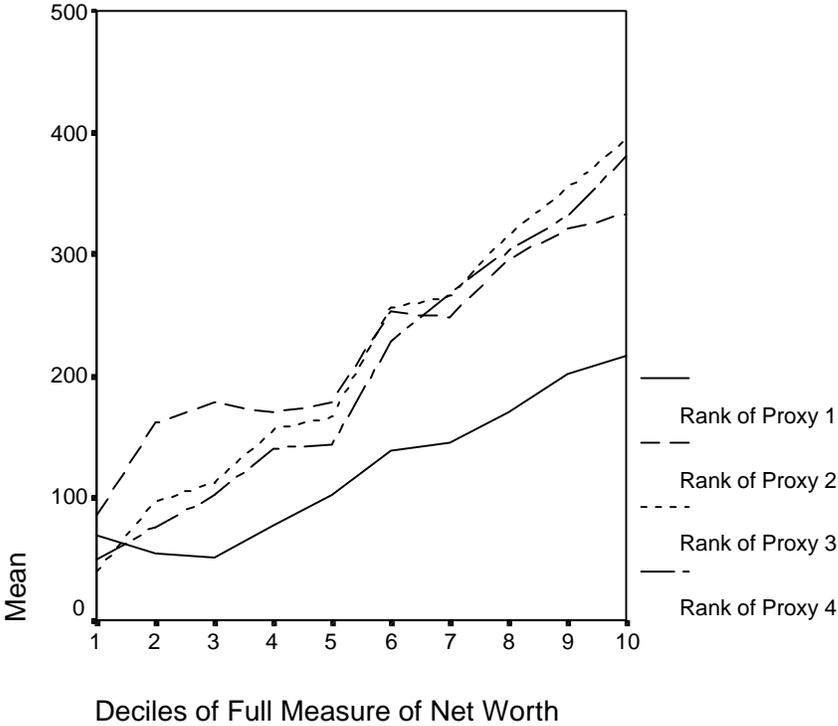


Figure A.10: Rank Correlation, Full Measure of Net Worth



APPENDIX 5:
QUESTIONNAIRE

**Assessing the Impact of Microenterprise Services
Microenterprise Survey, August 1999, Zimbabwe
Developing Alternative Measures of Profits and Net Worth
August 25, 1999**

Time started	
Time ended	

House No. _____

Use the following codes when you cannot fill in an answer:

RTA Proprietor "Refuses To Answer" the question

DNK Proprietor "Does Not Know" the answer

dash The information is "Not Applicable" to this business (record a dash "-")

Date proofed:	Date entered:	ID#:
----------------------	----------------------	-------------

A SURVEY INFORMATION *(to be filled in prior to the interview)*

A1 Enumerator Name _____

A2 Supervisor Name _____

A3 Cluster Name _____

(1) Budiro (2) Nyanga

B GENERAL ENTERPRISE INFORMATION

B1 Proprietor Name _____

B2 Enterprise type _____

(fill in code later)

B3 Date started?

A Month _____

B Year _____

B4 Location of business *(Choose one.)* _____

(1) Home

(2) Market

(3) Roadside

(4) Shop in commercial district

(5) Industrial site

(6) Mobile

(7) Other

B5 Working patterns

A How many months did the business operate during the last 12 months? _____

B How many days per month did you operate on average during the last year for a high month, average month, and low month? *(If the business is < 1 year old and respondent cannot determine what is a typical high or low month, record the number of days worked per month in the space for average month. Record a dash for high and low months.)*

1	During a high month	
2	During an average month	
3	During a low month	

(all days of month = 30)
 (all days except Sundays = 25)
 (Mondays thru Fridays = 20)
 (Mondays thru Thursdays = 15)

C How many hours per day do you operate on average during the (If the business is < 1 year old and respondent cannot determine the number of hours in a high or low month, record the number of hours the business operates in an average month. Record a dash for high and low months.)

1	High month	
2	Average month	
3	Low month	

C PROPRIETOR'S ESTIMATE OF PROFITS AND NET WORTH

C1 After all costs are considered -- such as transport, cost of inputs, supplies, paid labor -- how much profit did you earn in this business over the past week or month? Do not include the value of payments in kind to family members or payments to yourself. (If the estimate is for the last week, try to find out if that week was high, low, or average. Work with the proprietor to get a monthly estimate.) _____

C2 (If business is > 1 year old)
 After all costs are considered, how much profit did you earn in this business over the past year?
 (If business is < 1 year old, record a dash for NA.) _____

C3 How much were your sales last week or month?
 (Let the proprietor specify the time period and estimate sales.) _____

C3A Time Period (1) week (2) month _____

C4 How much were your total expenses last week or month? _____

C4A Time Period (1) week (2) month _____

C5 Considering all of your inputs, materials, finished goods, cash and savings for the business, debts that you owe, debts owed to you, and your fixed assets, how much would you say this business is worth today? (Read the full question. Do not provide assistance with the calculation except possibly with the calculator. Do not spend a lot of time on this question.) _____

C6 Does your household consume or use any of this business' products or services? If yes, what is the value of the products normally consumed or used by your household? (Put a zero if nothing has been consumed or used by the household.) _____

C6A Time period

(1)daily (2)weekly (3)monthly (4)quarterly (5)semi-annually (6)yearly_____
(If C6 is zero, put a dash in C6A.)

**C7 Do you use part of the money you get from this business for _____
yourself or for your household? If yes, how much money from
the business do you normally use for yourself or your household?
(Put a zero if no money has been used.)**

C7A Time period

(1)daily (2)weekly (3)monthly (4)quarterly (5)semi-annually (6)yearly_____
(If C7 is zero, put a dash in C7A.)

**C8 After making purchases for the business and after using some money _____
for yourself or your household, is there usually any money left?
If yes, how much money do you usually have left after purchases
for the business and using some of the money for yourself or your
household? (Put a zero if no money is left.)**

C8A Time period

(1)daily (2)weekly (3)monthly (4)quarterly (5)semi-annually (6)yearly_____
(If C8 is zero, put a dash in C8A.)

D FOR TRADERS ONLY -- COST INFORMATION

(If respondent is not a trader, skip to section E.)

D1 How much do you usually spend to restock your business *(If the business < 1 year old and the respondent cannot determine stock costs for a typical high and low month, record the amount stocked in an average month in D1B.)*

D1A	During a high-sales month	
D1B	During an average-sales month	
D1C	During a low-sales month	

D2 Please tell me about the 10 products that provide you with the most revenue from sales?

Product <i>(Write the name of the product in this column)</i>	Most frequent selling price per piece in the last week		How many did you sell last day/week/month?		Purchase price of the product		(7) Units of sales per unit of purchases
	(1) Price (Z\$)	(2) Unit	(3) # of units	(4) Time period (1)Day (2)Week (3)Month	(5) Price (Z\$)	(6) Unit	How many of (2) are in one unit of (6)
A							
B							
C							
D							
E							
F							
G							
H							
I							
J							

E FOR NONTRADERS -- COST INFORMATION (*manufacturers, repairs, or service enterprises*) (*If trader, skip to section F.*)

E1 What were the costs of your inputs or supplies in the recent past such as last week or month? (*If respondent says the cost is per day, ask if they buy this everyday!*)

Inputs/supplies (<i>write out name in this column</i>)	(1) Cost (Z\$)	(2) Per time period: 1) day 2) week 3) month 4) year 5) 2 years
A		
B		
C		
D		
E		
F		
G		
H		
I		
J		
K		
L		
M		
N		
O		
P		
Q		
R		
S		
T		
U		

F. FOR ALL TYPES OF BUSINESSES -- OTHER OPERATING EXPENSES

F1. What were your costs of doing business in the recent past, such as last week or last month? (If the respondent says that the cost is per day, ask if s/he buys it everyday!) (Only include expenses that are used by this business) (Put zero if not a cost including a zero for "Other" rows N, O, and P.) If column (1) is a zero, column (2) should have a dash.)

Cost Category	(1) Cost (Z\$)	(2) Per time period 1) day 2) week 3) month 4) year
A. Paid labor (salaries)		
B. Paid labor (piece workers) <i>(How many pieces does the worker make in a day/week/month? Try to get an estimate for a time period.)</i>		
C. Paid labor (others)		
D. Unpaid non family member labor (value of in-kind payments)		
E. Electricity for business (only if installed for business)		
F. Water for business (only if used for business)		
G. Telephone (only if installed for business)		
H. Transport of inputs		
I. Transport of final products		
J. Rent of shop or storage space (only if separate space for business)		
K. License		
L. Costs of credit (interest costs only)		
M. Repairs/service of machines		
N. Other (specify) _____		
O. Other (specify) _____		
P. Other (specify) _____		

G. SALES AND OUTPUT INFORMATION

G1 Please designate months with high, average, and low levels of sales *(If business < 1 year old and respondent cannot determine high and low levels of sales by month, place a “one” under each month that the business operated in the average row, row B.)*

	(1) Ja n	(2) Fe b	(3) Ma r	(4) Apr	(5) May	(6) Jun	(7) Jul	(8) Au g	(9) Sep	(10) Oct	(11) Nov	(12) Dec	(13) Tot
A High													
B Avg													
C Low													
D Not in oper- ation													

G2 What is the average sales per month (including in-kind payments) for each type of month? *(If business < 1 year old, ask for average sales per month and record information for an average month.)*

A	High sales month	
B	Average sales month	
C	Low sales month	

G3 In addition to your sales, do you consume/use or give away part of your output? (If respondent replies daily, ask if s/he really consumes/uses or gives away output every day.) (Each row is for a DIFFERENT time period.)

	(1) Value (Z\$)	(2) How often? (1) per day (2) per week (3) per month (4) per year
A Consume in the household		
B Consume in the household		
C Consume in the household		
D Give away		
E Give away		

H. FIXED ASSETS

H1. Please tell me about the machinery, equipment, hand tools, buildings, and land that are owned and used in this enterprise beginning with tools (*read the entire list to the proprietor and ask for information about each*). (*If you need more space, write on the back of the form and indicate this to your supervisor.*) (*Put a dash if NA.*)

Item	(1) Time owned	(2) (1) Years (2) Months	(3) Years left of use	(4) Original purchase price	(5) Price if sold today	(6) If shared with other businesses or household, what % of time is it used by this business?
A Tools						
B Tools						
C Tools						
D Tools						
E Furniture or furnishings						
F Furniture or furnishings						
G Vehicles						
H Machinery or equipment						
I Machinery or equipment						
J Buildings (<i>do not include value of house</i>)						
K Buildings						
L Land (<i>only if owned and used by business only</i>)						
M Other						
N Other						
O Other						

I. INVENTORY

I1 What is the total value of your raw materials/supplies if you sold them today (now)? (*Remind the proprietor about the definition of a raw material.*) (*Record dash for traders.*) _____

I2 What is the total value of your finished products if you sold them today (now)? _____

I3 Can we list all of the products or raw materials in your inventory and their value?

(1) Product or raw material	(2) Number of units on hand	(3) Z\$ Value of one unit if sold as is
A		
B		
C		
D		
E		
F		
G		
H		
I		
J		
K		
L		
M		
N		
O		
P		
Q		
R		
S		

Use last page of questionnaire if you need more room to do this. Do NOT change answer to I1 after estimating total with this worksheet.

J. EMPLOYMENT IN THE BUSINESS

J1 Please tell me about all of the people that have worked in this business over the past 12 months beginning with yourself. This would include unpaid workers and could include a worker in the past year. *(Record zero for amount when necessary and put a dash when not applicable. For in-kind payments (7), estimate the value of food or shelter.)*

Person	(1) Rel- ation*	(2) Mo/ Yr	(3) Days/ Mo	(4) Hrs/ Day	Salary		In-kind Payment	
					(5) Amt	(6) Time Unit*	(7) Amt	(8) Time Unit
A Proprietor	1							
B								
C								
D								
E								
F								
G								

*Relation: (1) Family (2) Nonfamily

*Time Unit: (1) per hour (2) per day (3) per week (4) per month (5) per quarter (6) per year

Days of the month in column (3)

(all days of month = 30)

(all days except Sundays = 25)

(Mondays thru Fridays = 20)

(Mondays thru Thursdays = 15)

(Any other period not covered: record the accurate typical days per month the person worked)

K. DEBTS AND ACCOUNTS RECEIVABLE

K1 In total, how much do your customers owe you as of today? _____

(Put zero if nothing is owed.)

K2 How much do other traders owe you as of today? _____

(Put zero if nothing is owed.)

K3 Do other family members or friends owe you money that they borrowed from the business? If yes, how much do they still owe you as of today? *(Put zero if nothing is owed.)* _____

K4 If you have received credit for this business from any of the following sources, how much do you still owe today including interest? *(Put a dash if the proprietor does not have these types of credit.)*

Credit Source	Amount Still Owed
A Family/friends	
B Moneylender (informal)	
C Formal credit institution	
D Microloan program (Zambuko, SEDCO, OMA, etc)	
E Savings clubs	
F Suppliers	
G Other	

L. SAVINGS

L1 If you had an excellent opportunity to invest in this business today, how much could you spend today from your business cash and savings? Do not include borrowed funds. (*Put zero if cannot spend.*) _____

L2 How much cash on hand does your business have today? _____

L3 Do you have any savings from this business? Do not include general savings from the household. (*Put a dash if the proprietor does not have these types of savings.*) _____

Location of Savings	Amount
A Bank	
B Post Office	
C Savings Clubs	
D Other	

M. PROPRIETOR INFORMATION

M1 Level of schooling (*Choose one.*) _____

- (17) No schooling
- (18) Some primary school
- (19) Completed primary school
- (20) Some secondary school
- (21) Completed secondary school
- (22) Additional formal schooling beyond secondary school

M2 Gender _____

- (1) Female
- (2) Male

THANK YOU FOR YOUR TIME!!!!

EXTRA SHEET (ONLY to be used if you need extra space)

H. FIXED ASSETS

H1. Please tell me about the machinery, equipment, hand tools, buildings, and land that are owned and used in this enterprise beginning with tools *(read the entire list to the proprietor and ask for information about each). (Put a dash if NA.)*

Item	(1) Time owned	(2)		(3) Years left of use	(4) Original purchase price	(5) Price if sold today	(6) If shared with other businesses or household, what % of time is it used by this business?
		(1) Years	(2) Months				
P							
Q							
R							
S							
T							

I3. EXTRA INVENTORY

I3 Can we list all of the products or raw materials in your inventory and their value?

(1) Product or raw material	(2) Number of units on hand	(3) Z\$ Value of one unit if sold as is
T		
U		
V		
W		
X		

APPENDIX 6:
A COMPARISON OF SALES TO PROFIT MEASURES

Appendix 6: A Comparison of Sales to Profit Measures

As described in the introduction, proxies are typically substitute measures for variables that are difficult or expensive to collect. One of the primary purposes of this report, however, was to examine four different numerical measures of profits rather than alternative variables. Because sales revenue is often used as a proxy for profits, this appendix provides a comparison of sales revenue with the four proxies and full measure of profits examined in the main body of this report.

Sales revenue is measured as the sales last week or month as estimated by the proprietor. In cases where the proprietor provided the sales last week, the figure was multiplied by four to determine the sales revenue for the month.

Table A.1 below compares sales last month with the four proxies and full measure of profits. As expected, sales last month generates the highest average and median figures. Examining the standard deviation and coefficient of variation, however, the sales estimate varies much more than the first two proxies.

Table A.1: Sales Last Month Compared to the Profit Measures

	Mean (Z\$)	Median (Z\$)	Standard Deviation (Z\$)	Coefficient of Variation (%)
Profit Proxy 1	1885	900	2754	146%
Profit Proxy 2	2615	1500	3241	124%
Profit Proxy 3	1448	285	17758	1226%
Profit Proxy 4	-1096	-35	5343	488%
Full Measure	-948	-19	4949	522%
Sales	4876	1520	18227	374%

Table A.2 shows the correlation coefficients between sales and the five measures of profit. The sales variable is significantly correlated with the first three profit proxies. It is not, however, correlated with the more complex measures of profits. This should be expected since the fourth proxy and full measure of profits were not correlated with the remaining measures of profits as illustrated in section IV.

Table A.2: Pearson Correlation Coefficients for Profit Proxies and Sales

	Proxy 1	Proxy 2	Proxy 3	Proxy 4	Full Measure
Sales	.724*	.545*	.940*	.022	.024

*Significant at the point .10 level.

The results of the Kruskal-Wallis test are presented in table A.3. As described in section IV, this test indicates if there is a significant relationship between two variables. The results show that sales are significantly correlated with the first three proxies. The direction of this relationship is illustrated in figure A.11. The first two proxies have a positive relationship with sales last month. The relationship between sales and the third profit proxy is also positive, but it is less well defined.

Table A.3:Kruskal-Wallis Test Results for Sales and Profit Proxies

Decile Grouping		Proxy 1	Proxy 2	Proxy 3	Proxy 4	Full Measure
Sales	Chi-square Asymp Sig	110.32 .000	95.36 .000	87.84 .000	7.87 .547	15.56 .077

Overall, a comparison of sales last month to the profit proxies indicates that sales can be used as a proxy for profits. The lower coefficient of variation for the first two profit proxies indicate that they are probably more reliable measures of profits, but sales can be substituted when profits are not directly measured.

Figure A.11: Rank Correlation, Sales Last Month

