CHAPTER 7

EVALUATING THE APPROACH

As stated in the conceptual framework, the ultimate evaluative test for the approach is how accurate it is, in predicting the choice of communities. This can only be confirmed if successful community financing schemes are implemented where it suggests so and vice versa.

However, only the quantitative static model was tested in this thesis. This is due to the obvious logistical problems of testing all the steps of the approach. Also the other steps can only evaluated after contact with the community.

The quantitative static model represents the first and most important step of the approach. Its also based on it that the other steps are derived. Therefore testing and analyzing it would give an idea on how the approach is going to perform. The test focused on how reliable and statistically significant the model was.

7.1 Methodology for testing the Quantitative Static Model

This was be done by simulation modelling. Attempt was made to represent the real life situation as much as possible. The steps in the simulation were the following:-

1. Sampling: 3 hypothetical onchocerciasis endemic communities were used. This is because there are three possible categories of communities namely low peformane, middle performance, and high performance. Therefore, these three characteristics can be examined fully with three communities.

2. 100 households from each of the 3 communities were used as the sample for the simulation. This was expected to be an adequate sample to run the OLS regression analysis.

3. Different levels of ATF and WTF were assumed for each community. This was io order to be able to run adequate sensitivity analysis for all possible types of community characteristics Thus:

* Community A = low ATF and low WTF. Therefore, more scores were allocated to low ATF, and the remainder equally shared between middle and low ATF because not all the households would have low ATF. The same procedure was be used for WTF.
* Community B = Middle ATF and WTF. The same procedure as in community A was be used here also.
* Community C = High ATF and WTF. The same procedure as in A above was applied in this case too.

4. Allocation of scores: The possible scores for the variables causing ATF and WTF are 1.00, 2.00, 3.00, and 4.00. There are 5 variables for both ATF and WTF. Therefore, values for ATF and WTF would be between 5 to 20.

5. Method of allocation of scores: Random numbers were generated using a computer software to represent the scores for the variables. Subsequently, the scores were allocated according to the pattern of the random numbers. The allocation of scores was done using the random numbers as guides.

6. Ordinary least squares (OLS) multiple regression analysis and tests of significance: After allocating the scores, values for ATF and WTF for each household were calculated by a summation of the scores for the variables. Then multiple regression analyses were performed between ATF and WTF and their causal variables respectively. This was to confirm the expected strength of association, completeness of the data and statistical significance of the specified model. If the data is complete, there should be a perfect fit, and all the statistical tests should be highly significant.

7. Sensitivity analysis: It was done by performing many multiple regression for communities A to D. This was by varying the pattern of allocation of scores for the communities, and observing what change the variations had on the parameters, and statistical tests.

7.2 The result

The summary of the results for the three hypothetical communities are presented in the figures below. The conditions similar to all the results are the following:

1. Calculation of WTF values

a. The mean values for the causal values are used.
b. The ranges for the values are 5-20 for WTF and 1-4 for the causal variables respectively.
c. Standard deviations are in parentheses.

2. OLS multiple regression analysis

a. The general specification is;
   $WTF = a + a_1Aw + a_2Rc + a_3Lk + a_4Pc + a_5Pr + u$
b. Standard errors are in parentheses.

3. Abbreviations

a. HPC = High performance community
b. MPC = Middle performance community
c. LPC = Low performance community
d. SEr = Standard error of regression
e. DW = Durbin-Watson statistic
f. Comm type = Community type
G. D.V = Dependent variable
H. STAT TESTS = Statistical tests

TABLE 7.1 Result of the calculation of WTF values

Comm type	VARIABLES						
	Aw	Lk	Pr	Pc	Rc	WTF	%WTF
HPC	3.02 (0.93)	2.96 (0.86)	3.04 (0.92)	3.15 (0.97)	3.00 (0.89)	15.17 (3.80)	75.85
MPC	2.57 (0.76)	2.52 (0.78)	2.57 (0.82)	2.60 (0.86)	2.65 (0.85)	12.89 (3.11)	64.45
LPC	2.01 (0.87)	1.93 (0.90)	2.00 (0.94)	1.97 (0.87)	1.93 (0.92)	9.8 (3.9)	49.25

TABLE 7.2 Result of the OLS-regression analysis

Comm Type	C	INDEPENDENT VARIABLES (D.V = WTF)					STAT. TESTS
		Aw	Lk	Pr	Pc	Rc	
HPC	0.077 (0.164)	1.031 (0.061)	1.058 (0.064)	0.906 (0.901)	0.901 (0.062)	1.085 (0.067)	R^2 = 0.989 SEr = 0.395 F stat. = 1809.8 DW = 2.18
MPC	0.495 (0.243)	1.052 (0.091)	0.852 (0.103)	0.939 (0.091)	1.041 (0.089)	0.914 (0.100)	R^2 = 0.966 SEr = 0.574 F stat. = 564.2 DW = 2.02
LPC	0.039 (0.027)	0.986 (0.017)	1.000 (0.019)	0.985 (0.019)	0.983 (0.019)	1.033 (0.018)	R^2 = 0.999 SEr = 0.100 F stat. = 30425.2 DW = 2.05

All independent variables significant at $p<0.005$, and all F statistics significant at $p<0.01$.

As could be seen from the above results, all the statistical tests were very significant. The coefficients all had the correct signs, and showed that their effect on ATF and WTF were considerable. The standard error was minimal for all variables and their T-stat were all highly significant. The R-squared and adjusted R-squared were almost 1.00. The standard error of regression was low, and F-statistic very significant. Similar results were obtained for all the communities. The D.W. statistics were within the normal range showing the absence of autocorrelation. This confirmed the strength of association and completeness of the data.

In the covariance analysis to test for multicollinearity, the causal variables were not significantly intercorrelated as to void the multiple regression at ATF or WTF values above 11.00. However, at values below 11.00, minor intercorrelations were noticed among some variables. This could be due to their low values and hence bunching up. This is because when the data was manipulated in the sensitivity analysis by spreading the range of values for the low performance community, the multicollinearity disappeared. This problem could be due to the simulation modelling, and in the real life situation there may not be large clusters of scores and hence minimal or no significant multicollinearity.

However, according to Maddala (1988), high intercorrelations among the explanatory variables themselves need not cause any problems in inference, if there is enough variation in the explanatory variables and the variance of the error term is sufficiently small. The analysis met with all these and so the minor intercorrelations noticed for low performance communities was not considered a problem.

Nonetheless, since the multiple regression analysis is to test the statistical significance, if there is multicollinearity, the problem should be solved if it is considered a problem. Ad-hoc procedures according to Maddala (1988) include; (1) Ridge regression, (2) Principal component regression, and (3) Dropping variables. He however noted that the basic problem is lack of enough information to answer the questions posed and the only solutions are; (1) To get more information, (2) To ask what questions are answerable with the data at hand, and (3) to examine what prior information will be most helpful.

The plot of the residuals showed constant variance of the regression errors (homoscedasticity), thereby confirming that the specification of the model as a multiple linear function was correct.

It was observed during the sensitivity analysis, that for ATF or WTF to fall into the low, middle or high categories, then at least 70% of the values for the variables from the households must be within the value range needed for that category. Thus, for a low performance community with low ATF or WTF as the case may be, 70% of the households ATF or WTF must be within the low value range, and so on for middle and high values.

The percentage ATF and WTF scores were calculated as seen from

Table 7.1. above, and they correlated well with the criteria and assumptions.

Only the results for WTF analysis were presented. This was because both WTF and ATF results were the same, since similar scale of measurement and weights were attached to the variables. Also, both of them had equal number of variables and the differences were in the terminologies for the dependent and the causal variables.