Philippine Institute for Development Studies

Macroeconomic Policy Change and Household Health Outcomes: A Simulation of the Impact of the 1988-1992 Tariff Reform Program on the Demand for Outpatient Care in the Philippines

Aniceto C. Orbeta Jr. and Michael M. Alba

DISCUSSION PAPER SERIES NO. 98-03

February 1998

For comments, suggestions or further inquiries please contact:
The Research Information Staff, Philippine Institute for Development Studies
3rd Floor, NEDA sa Makati Building, 106 Amorsolo Street, Legaspi Village, Makati City, Philippines
Tel Nos: 8924059 and 8935705; Fax No: 8939589; E-mail: publications@pidsnet.pids.gov.ph
Or visit our website at http://www.pids.gov.ph

Macroeconomic Policy Change and Household Health Outcomes: A Simulation of the Impact of the 1990-2000 Tariff Reform Program on the Demand for Outpatient Care in the Philippines

Aniceto C. Orbeta, Jr.* and Michael M. Alba**

1. Introduction

Macroeconomic policy changes are designed to put an economy in a sustainable growth path. Success of the policy change, therefore, are often measured within the narrow confines of macroeconomic performance. However, it is well known that there are profound implications of any changes in macroeconomic policy on household decisions over health, nutrition, schooling, labor force participation, and fertility, among others. It is only in recent years that these issues caught the attention of analysts and evaluation of macroeconomic policy change were beginning to be enriched by analyses of household response to policy changes. Even then these efforts were, at best, limited.

These concerns provide the general motivation of this paper. This is part of an on-going effort at the Philippine Institute of Development Studies to develop models to analyze the impact of macroeconomic policy changes on households[1]. Initial research efforts in this program had identified the transmission mechanisms between macroeconomic policy change and household decisions. These transmission mechanisms consist of incomes, market prices of outputs and inputs and the delivery of government services (Lamberte, Llanto and Orbeta (1992)). Given these mechanisms, household models then must incorporate these variables explicitly while macroeconometric models and general equilibrium models translate policy changes into changes in these intermediary variables. An overview of this modeling strategy and what has been accomplished so far is given in Reyes and Cororaton (1996).

* Research Fellow, Philippine Institute for Development Studies, 106 Amorsolo Street, Legaspi Village, Makati City. E-mail: aorbeta@gate.pids.gov.ph.

** Assistant Professor, School of Economics, University of the Philippines, Diliman, Quezon City. Email: malba@gate.pids.gov.ph.

A. Orbeta is grateful for the comments of M. Reich and W. Yip of the Harvard School of Public Health on an earlier version of this paper. All errors, however, remains the responsibility of the authors. Acknowledgment is also due the DOH-PIDS Baseline Research on Health Care Financing Project and O. Solon, the project director, through which the data used in this study was generated. An earlier version of this paper was written while A. Orbeta was Takemi Fellow, Harvard School of Public Health with financial support from the International Health Policy Program through the Health Economics Program of the School of Economics, University of the Philippines and the Takemi Program in International Health.

[1] This research program called Micro Impacts of Macroeconomic Adjustment Policies is being implemented by the Policy Development Foundation, Inc. with financial support from the International Development Research Center, Ottawa, Canada.

This paper specifically deals with the household choice of health care facility. The literature on this area is maturing so there is nothing novel that this paper will be offering except to contribute a set of carefully estimated price and income elasticities of health facility choice. The ultimate objective of the study is to use the estimated model to simulate the impact of macroeconomic policy change on this aspect of household choice. By doing so, it will help describe the likely impact of macroeconomic policy changes on households in more specific terms. It also important to note that these elasticities are important inputs in the design of user fee schemes. User fees have become a popular but controversial tool for keeping available and/or improving the quality of publicly provided health care while minimizing the undesirable distributional impact.

A discrete choice model of outpatient care was estimated using data drawn form a household survey covering 4 regions and 7 provinces involving 2,798 households and some 14,200 individuals. The choice alternatives include home care and formal care which consists of hospital outpatient clinics, independent private clinics, and public or charity clinics. Both simple and nested logit model specifications were estimated. Unlike the results in Gertler and van dee Gaag (1990), the data did not support rejection of the simple logit in favor of the nested logit model specification. The paper found that, contrary to early results (e.g., Akin et al. 1985), prices or user fees and income are important determinants of health care choice. The price elasticities, however, are small in magnitude compared to those in Ching (1995). However, just like the result in Ching (1995) there is a clear tendency for bigger price elasticities among lower income households compared to high income households. The estimated elasticities also agree with those obtained by others using data from other developing countries reviewed in Gertler and Hammer (1997). These elasticities imply that while price or user fee increases will not drastically affect the average demand for formal care, a uniform application of any price or user fee increase will hurt the poor more than the rich. This provides a case for shielding the poor from any uniform price increase in health care fees. The model was also used to simulate the impact of the 1990-2000 tariff reform program on the health status of household which in this paper is measured by the probability of using a health facility when one is sick. The simulation results show that households in lower income groups will use less hospital outpatient and independent private clinics and will depend more on home care and on public / charity clinics. The progressive income effects of the tariff reform program appears to be insufficient to counteract the expected price increase of health care in hospital outpatient and independent private clinics.

The organization of the paper is as follows. The next section reviews the theoretical and empirical specification literature of health care demand. Section 3 provides a description of the dataset used and the definition of variables used in the estimation. The descriptive statistics of relevant variables are also presented in this section. Section 4 presents the estimation results and implications. Section 5 discuss the elasticity estimates and the following section deals with the simulation results. The final section concludes and lists the areas where the paper can be improved and directions for future research.

2. Review of Theory and Empirical Specification

2.1. Theory

The paper adopts the framework presented in Gertler and van der Gaag(1990). It assumes that the individuals derive utility from consumption of health (h) and non-health (c) goods. In particular, individuals have the following utility conditional on using health care provider j

$$U_j = U(c_j, h_j) \tag{1}$$

They are assumed to maximize this utility function subject to two constraints. One, is the usual budget constraint

$$Y = c_j + p_j \tag{2}$$

where p_j is the total price for using provider j and Y is the share of the individual in the household budget. The other is the health production function

$$h_j = h_0 + q_j \tag{3}$$

where h_0 is the health status without professional health care and q_j measures the incremental health benefits from using health care provider j. To simplify matters, it is assumed that $q_0 = 0$ for the self-care alternative or equivalently, $h_j = h_0$. Substituting the budget constraint (2) into (1) yields the indirect utility function

$$U_j = U(Y - p_j, h_j) \tag{4}$$

Given J alternative health care providers, the utility maximization problem given a person complained about his health is

$$U^* = max(U_0, U_1, ..., U_J) \tag{5}$$

Since this utility is conditional on a person complaining about his health, it should be interpreted as short-run demand for health care and that the long-run demand should correct for those who are not currently complaining about their health (Dow 1995a).

2.2. Empirical Specification

Empirical implementations of the above framework utilize the notion that analysts are not privy to the full set of factors considered by subjects in deciding which alternative to choose. What they can observe, however, is a subset of these factors. Thus, the following relation is postulated

$$U_j = V_j + \epsilon_j \tag{6}$$

where V_j represents the factors known to the researcher and ϵ_j is the "catchall" variable for the unknown factors. Parameter estimation procedures follows from the distributional assumptions of ϵ_j.

The specification of the function of known factors, V_j, has spawned two strands of modeling in the literature. More recently, a third strand which attempts to combine these two earlier strands is proposed. Each of these strands will subsequently be discussed.

One of the strand uses a linear utility model of the form

$$V_j = \alpha_1 Y + \alpha_2 p_j + \alpha_3 h_j \tag{7}$$

The sample of studies using this framework include Akin et al. (1985), Dor and van der Gaag(1993), and Ellis et al. (1996). These studies allowed the coefficients of alternative-specific variables to vary across alternatives.

Gertler, Locay and Sanderson (1987) found this formulation restrictive because it does not allow price elasticities to vary with income. It has been argued that if health is a normal good, then higher income individuals will choose high price – high quality alternatives while the poor will choose low price – low quality alternative. To accommodate this concept, they proposed the following quadratic utility function

$$V_j = \alpha_4 (Y - p_j) + \alpha_5 (Y - p_j)^2 + \alpha_3 h_j \tag{8}$$

In addition, this strand of the literature constrain the coefficients of alternative-specific variables to be constant across alternatives following closely the requirements of the conditional logit model developed by McFadden (1973, 1981).

The nesting of alternatives to take advantage of correlation between alternatives is employed by both strands. For instance, formal care alternatives such as from hospital and clinics are grouped separately from self-care forming a two-level nesting of alternatives.

More recently, Dow (1995b) proposed what he calls a flexible functional form which enables a nested testing of alternative forms of parameter restrictions. The theorizing makes use of forward-looking behavior, budgeting period considerations, interactions between benefits from a health-care provider and characteristics of the patients, and different valuation of health benefits. He proposed the following utility function

$$V_j = \alpha_1(Y_t - p_{j,t}) + \alpha_2(Y_t - p_{j,t})^2 + \alpha_3 E[Y_{t+1} - p_{j,t+1}] + \alpha_4 E[h_{j,t}] + \alpha_5 E[h_{j,t+1}] \tag{9}$$

where $E[w_{j,t}]$ is the expected value of argument w for choosing alternative j at time t. This specification leads to the following functional form

$$V_j = \beta_{1j} p_j + \beta_{2j} p_j^2 + \beta_{3j}(p_j Y) + \beta_{4j} Y + \beta_{6j} h_j \tag{10}$$

where: $\beta_{2j} = -2\beta_{3j}$

Note that all parameters can be allowed to vary across alternatives or restricted to be the same across alternatives. Tests can then be done to determine which restrictions will be validated by the data.

To complete the empirical specification of the indirect utility function, it is assumed that h_j is a function of individual characteristics ($\mathbf{X}$) and other facilities characteristics ($\mathbf{G_j}$) besides prices (p_j), i.e.

$$h_j = \delta_{0j} + \delta_{1j} X + \delta_{2j} G_j \tag{11}$$

where δ_{0j} captures the common unobserved elements of each alternative provider. This yields the following functional form of the utility function

$$V_j = \beta_{1j} p_j + \beta_{2j} p_j^2 + \beta_{3j}(p_j Y) + \beta_{4j} Y + \beta_{5j} p_k + \beta_{6j} h_j + \beta_{01} + \beta_{7j} X + \beta_{8j} G_j \tag{12}$$

where: $\beta_{01} = \delta_{0j}$, $\beta_{7j} = \delta_{1j}$, $\beta_{8j} = \delta_{2j}$

Continuing on to the statistical implementation of the model, a rational individual i will choose provider j over all other alternatives if and only if for all k $\neq$ j

$$U_{ij} > U_{ik}. \tag{13}$$

This means the probability statements that for all k $\neq$ j

$$\begin{aligned} Pr(ij) &= (V_{ij} + \epsilon_{ij} > V_{ik} + \epsilon_{ik}) \\ &= (\epsilon_{ij} - \epsilon_{ik} > V_{ik} - V_{ij}) \\ &= (\nu_{ij} > V_{ik} - V_{ij}) \end{aligned} \tag{14}$$

As mentioned earlier, this is implemented by making a distributional assumption on ν. McFadden(1973) has shown that if ν_{ij} is independent and follows the extreme value distribution

$$F(\nu_{ij}) = exp(exp(-\nu_{ij})) \tag{15}$$

then the probability that individual i chooses alternative j is

$$Pr(ij) = \frac{exp(\beta' \mathbf{Z_{ij}})}{\sum_j exp(\beta' \mathbf{Z_{ij}})}. \tag{16}$$

When Z_{ij} are all alternative-specific variables this is known as the *conditional logit model*. When, on the other hand, Z_{ij} contains only individual-specific variables, this is known as *multinomial logit model*.

The vector Z_{ij} in the current case will consist of all the variables in V. This means Z_{ij} can contain both alternative (X_{ij}) and individual-specific (W_i) variables, i.e. $\mathbf{Z_{ij}} = [\mathbf{X_{ij}}, \mathbf{W_j}]$. To avoid confusion, this model is often times known as the *mixed logit model*[2]. Note that because $\nu_{ij} = \epsilon_{ij} - \epsilon_{ik}$, variables that do not vary across alternatives such as W_i will fall out of the probability unless some modification is done. This modification involves allowing the coefficients of these variables to vary across alternatives, i.e.,

$$\begin{aligned} \nu_{ij} &= -(V_{ij} - V_{ik}) \\ &= \beta'(\mathbf{X_{ij}} - \mathbf{X_{ik}}) + (\gamma_\mathbf{j} - \gamma_\mathbf{k})' \mathbf{W_i} \end{aligned} \tag{17}$$

[2] This term has been used differently in the literature. The usage here implies that the explanatory variables include both alternative-specific explanatory variables (which are the only explanatory variables in conditional logit models) and individual-specific variables (which are the only explanatory variables in multinomial logit models).

While this model is computationally easier, it has the unattractive property known as the *independence of irrelevant alternatives.* Simply stated, this means that the probability ratio between two alternatives is not affected by the presence or absence of other alternatives. The model that does not have this undesirable characteristic is the *multinomial probit model.* This model, however, has not been used that much in applications because of the computational difficulty involved when choices go beyond three alternatives. A solution offered in McFadden(1981) is the *nested logit model.* This model makes use of the correlation between alternatives, albeit in a limited way compared to multinomial probit. Alternatives that are more closely correlated are grouped into nests to form a hierarchy of grouped alternatives. Since this is the empirical specification that motivated the estimations done in this paper, we illustrate this idea by using as an example the model that this paper will estimate.

The paper deals with the health care choice of a person who complained about his health. The choice set include home care or formal outpatient care[3] in three alternative formal settings, namely, hospital outpatient (OP) clinic, independent private clinics, public or charity clinics. Under this setup, it is natural to group the three formal care alternatives together since they are expected to be more closely correlated compared to home care (e.g. Gertler and van der Gaag, 1990). Under this assumption, the choice become a two-level nested model depicted in **Figure 1** which we shall specify as a nested logit model.

Given the foregoing considerations, let home care be indexed alternative 0, and formal care alternatives hospital OP, independent private and public / charity clinics be indexed 1,2, and 3, respectively. In addition, let J_1 consist of the alternatives in the lower level nests and J_2 be the alternatives in the upper level nest, i.e., $J_2 = \{0, J_1\}$ and $J_1 = \{1, 2, 3\}$. The index for individuals, i, is dropped for the moment to simplify the notations. The probability of alternative 0 (home care) in the upper level nest is given by

$$Pr(0) = \frac{exp(V_0)}{exp(V_0) + (\sum_j exp(V_j/\theta))^{\theta}.} \tag{18}$$

The conditional probability, on the other hand, of any alternative j in the lower level nest (formal care) given J_1 is identical in form to the conditional logit model, i.e.,

$$Pr(j|J_1) = \frac{exp(V_j/\theta)}{\sum_j exp(V_j/\theta)} \tag{19}$$

The unconditional probability is given by

[3] Inpatient care is entirely distinct from outpatient care and is not considered in this version of the paper.

$$\begin{aligned} Pr(j) &= Pr(j|J_1)Pr(J_1) \\ &= Pr(j|J_1)(1 - Pr(0)) \\ &= \frac{exp(V_j/\theta)[\sum_{J_1} exp(V_j/\theta)^{(\theta-1)}]}{exp(V_0) + [\sum_{J_1} exp(V_j/\theta)]^{\theta}} \end{aligned} \tag{20}$$

The parameter θ is the known as the *dissimilarity parameter* which is one minus a measure of the similarity[4] of the alternatives in the nest, hence, the name dissimilarity. For this model to be globally consistent with the stochastic utility model the condition $0 < \theta < 1$ must be satisfied (McFadden 1981). This is known as the Daly-Zachary-McFadden condition (Daly and Zachary 1979, McFadden 1981).[5] Finally, it is easy to see that when $\theta = 1$, the model reverts to conditional logit. Thus, the condition $\theta = 1$ is also the null hypothesis for the test whether the simple logit model can be rejected in favor of the nested logit model (McFadden 1981). The test statistic is $\frac{(\theta-1)^2}{(SE(\theta))^2} \sim \chi^2$ with 1 degrees of freedom in the null.

It has been shown (McFadden 1981) that the probability functions of a nested logit model are derivable from a Generalized Extreme Value (GEV) distribution. For instance, this two-level nested logit we are discussing can be derived form the GEV distribution of the form

$$F(V_0, V_1, ..., V_j, ..., V_J) = exp(V_0) + (\sum_{J_1} exp(V_j/\theta))^{\theta} \tag{21}$$

Since only the difference in utility between alternatives matter and let home care be the reference alternative, we obtain the following:

$$Pr(0) = \frac{1}{1 + [\sum_{J_1} exp((V_j/\theta) - V_0)]^{\theta}} \tag{18a}$$

and

$$Pr(j) = \frac{exp((V_j/\theta) - V_0)[\sum_{J_1} exp((V_j/\theta) - V_0)]^{(\theta-1)}}{1 + [\sum_{J_1} exp((V_j/\theta) - V_0)]^{\theta}} \tag{20a}$$

---

4 Some consider this as the correlation coefficient between the alternatives. Madalla (1983) p. 71, however, noted that McFadden failed to establish this but found that it is in the ballpark of the correlation coefficient, i.e. if σ is the similarity parameter and ρ is the correlation coefficient $(\sigma = 1 - \theta)$, then $\sigma \leq \rho \leq \sigma + 0.045$.

5 This condition has been relaxed for local consistency (Börsch-Supan,1990) but this was recently proven to have only extended the limits from 1 in a very limited extent (Herriges and Kling, 1996). Therefore, for all intents and purposes the unit interval limit for θ stands. However, as noted in Herriges and Kling(1996), it is not uncommon to find violations of this condition in practical applications.

Estimation of the nested logit model can be done sequentially or in a full-information maximum likelihood. The sequential estimation uses the idea that at every nest, the model is a conditional logit so that ordinary logit estimation packages can be used. Although consistent, the sequential estimation is inefficient, i.e., produces larger standard errors for a given sample (Börsch-Supan (1987), Henser (1986)). The inefficiency emanates from two reasons which are quite intuitive. One is that information is passed only in a unidirectional manner; from lower level nests to upper level nests. The other is that instruments (the estimated inclusive values[6] from lower level nets) are used in the estimations in upper level nests rather than actual values of variables. When there are restrictions on parameters across nests, sequential estimation procedure is no longer possible (Börsch-Supan, 1987). This case requires full-information maximum likelihood. The sample of studies that used full-information maximum likelihood estimation include Henser(1986), Börsch-Supan(1987) and Gertler and van der Gaag (1990). This is done by maximizing the log likelihood function

$$LogL = \sum_{J} d_l logPr(l) \tag{21}$$

where $d_l = 1$ if alternative l is chosen, 0 otherwise, and $\sum_J d_l = 1$.

Full-information maximum likelihood is used in the paper because of the restrictions that the coefficients of the net expenditure variable and its square is the same for all alternatives, including those for home care which is an alternative in the upper level nest. This condition follows from the reasoning that it should not matter in what alternative the money is spent, i.e., the coefficient of net expenditure and its square in the utility function should be identical whatever provider is chosen.

---

[6] $ln[\sum exp(V_j/\theta)]$.

3. Data Set, Variables and Descriptive Statistics

The data set used in the study comes from the Department of Health – Philippine Institute for Development Studies (DOH-PIDS) survey of households done in 1991 as part of the research program known as the "Baseline Research on Health Care Financing Reforms."

The survey included 2,798 households and some 14,200 individuals from 7 provinces and 4 regions. The data set include basic socioeconomic characteristics of the household and its members as well as health status and health facility utilization of all members. Information were taken for all members who complained about their health in the last 4 weeks, those who had consultation during the last month, and those who were confined during the last year.

The outpatients in this paper include all those that complained about their health and/or had outpatient consultation during the last four weeks of the survey. Data on confinement episodes during the last 12 months were removed because, as explained above, inpatient care is expected to have different response to prices and incomes which are the main concern of this paper.

This dataset has also been used to estimate a sequential nested logit of choice of health facility for all types of patients. This study used only the net expenditures as explanatory variable in the first stage and socioeconomic variables and the inclusive value of the first stage are used to explain health status in the second stage estimation (Quising, Alba and Solon (1994)).

Health Facilities. Health facility alternatives are grouped into two major categories, namely, home care and formal care. Formal care are classified into hospital outpatient clinics, independent private clinics, and public or charity clinics. Public or charity clinics include village ("barangay") health stations, rural health units, other national or local government – operated clinics and public or private charity clinics. Home care consists of those that opted to stay at home and those treated by traditional healers.

Price Variables. To estimate the model described in the previous section, data on prices for all alternatives have to be available. In this study these include doctor's fees, transportation cost, cost of medicines and tests. This was achieved by computing the median of these variables by municipality/city and going up the geographic-administrative ladder in case of missing values, i.e. using provincial median if median for municipalities are not available and using regional median if provincial medians are not available. The median was chosen because the mean is known to be sensitive to extreme values[7]. For home care, only the cost of self-prescribed medicine is included.

[7] An alternative way of doing this is estimating hedonic price equations to forecast prices for

Income Variables. The income variable used in the estimation are the household expenditures. Household expenditures are used more often used than current income because it reflects permanent income which is expected to be more stable than current income. Per capita expenditure rather than total household expenditure are used to capture the concept of individual share in the total household expenditure. This also avoids the likely strong correlation between expenditure (income) and household size.

Education. Education variables are treated as "ladder-type" dummy variables. Those who have college education will necessarily have high school and elementary education while those with high school education will have elementary education. Therefore, those who are reported to have high school education include those who have college education attainment. The nice thing about this setup is that the variables will only capture the incremental effects of the levels of education. In addition, for respondents whose ages are lower than 15 years, the education of the mother is used instead. This follows from the assumption that for younger children, it is the mother who make health care decisions.

Education was found to have mixed effect in the Philippine literature of health care demand. For instance, Akin et al. (1986) and Quising et al. (1994) found that educated mothers tend to use modern facilities more. Ching (1995), on the other hand, obtained the opposite effect.

Severity. The severity variable is a tri-valued self-assessment of health condition indicating mild, moderate and severe. Severity is often thought of as an important motivation that drive people to seek formal care.

Age. The age of the respondent is expected to capture the well-known U-shaped age profile of health care demand. Health care demand is high for children and is expected to decline as the child grows before it rises up gain in advance ages. Of course, the nature of the disease will be different, but we are not differentiating type of diseases in this study.

Location. The last set of variables, namely urban and region, are designed to capture the geographic differences in availability and access to facilities as well as other cultural motivations which differ across areas.

Out of the 14,248 individuals, 2,677 (19%) complained about their health and/or had consultation. Of 2,677 individuals, 1,391 (52%) had home care, 1,286 (48%) had formal outpatient care. The difference between the total number of observations used in the estimation (2,485) and the sum of those who complained about their health are the observations where some variables had missing values.

all choice alternatives, e.g. Ching (1995).

Table 1 shows the descriptive statistics of variables used in the estimation. The table shows that distribution of respondents between home care, hospital outpatient (OP) clinic, private clinic, and public/charity clinics, respectively, is 52%, 15%, 21% and 12%. Note that the attrition due to missing values appears to have not disturbed the distribution between home care and formal care.

The average total expenditures (prices) by type of facility is 12 pesos[8] for home care, 305 pesos for hospital OP clinic, 236 pesos for private clinic, and 71 pesos for public/charity clinic. The average doctor's fee, on the other hand, is 97 pesos for hospital OP clinic, 71 pesos for private clinic, 6 pesos for public/charity clinic. Transport cost does not vary much between types of facility with 9 pesos for hospital OP clinic and 6 pesos for both private and public clinics. Finally, cost of medicines for each type of facility is 12 pesos for home care, 199 pesos for hospital OP clinic, 159 for private clinic, and 59 pesos for public/charity clinic.

It is shown in the table that only 7% have private insurance. The respondents were asked to assess their health complaints into mild, moderate and server. The distribution of this self-assessments is 61%, 35%, and 4%, respectively.

Table 2 shows the distribution of variables by type of facility. While some tendencies are shown in this table, it must be viewed with caution. Bivariate cross-tabulation, by definition, does not control for other variables that are known to affect the choice of health facilities.

As is expected, patients with higher income (expenditures) are the users of hospital OP and private clinics while those with lower income tend to use public/charity clinics.

In terms of self-assessment of health condition, the table confirms what one would expect, that is those patients who considered their case severe or moderate will tend to use hospital OP or private clinics. Only a very small proportion use public clinics or home care among those who consider their case as severe.

From the distribution of average age of patients, it appears that the younger ones are sent to private and public clinics while the older ones use hospital outpatient clinics. Those (or the parents of children) who prefer home care seems to follow closely the average distribution of schooling attainment. Hospital outpatient and independent private clinic users, on the other hand, are those with college education. Users of public/charity clinics are dominated by those with lower education. Those (or the parents of children) who had elementary education choose public clinics while those with college education use very little public clinics.

In terms of location of residence, the use of hospitals OP and public clinics

[8] The average exchange rate is 1 dollar to 27.4 pesos in 1991.

are much more heavy in urban areas as expected. Patients in national capital region (NCR) are above average users of hospital outpatient and private clinics while those of other regions are below average users of these facilities. It is to public/charity clinics that patients in other regions flock.

4. Estimation Results

The paper assumes that any individual who complained about his health seek either formal or home care. The choices for those opting for formal care are outpatient clinics in hospitals, independent private clinics and public/charitable clinics. Those who did not use formal care are assumed to prefer "home" care. Given these alternatives, formal care alternatives are grouped since these are relatively closer alternatives with each other compared to home care (e.g. Gertler and van de Gaag, 1990). Under this setup, a two-level nested logit model is called for. The first level is the choice between formal care and home care and the second level is the choice between the three formal care alternatives given that one opted to seek formal care. The other obvious alternative model specification is, of course, to treat all alternatives including home care as equally substitutable with each other implying a simple logit model. Since there is no a priori reason to prefer one or the other, both of these model formulations were estimated and results compared.

Since the explanatory variables include both alternative-specific and individual-specific variables, a mixed logit model will be estimated for both model formulations. Additionally, it is assumed that the coefficients of net-expenditures and its square are assumed to be the same for all choices. As noted in the previous section, under this setup the nested logit model can no longer be estimated by sequential method. So full-information maximum likelihood was used to estimate the nested logit model. Finally, identification of the parameters requires that a reference alternative must be identified because only the difference in utility between any alternative and the reference alternative matters in the estimation of the coefficients. The obvious natural reference alternative is home care. For alternative-specific variables where coefficients are the same across alternatives, it is required that the values of these variables vary across alternatives. For individual-specific variables, on the other hand, coefficients vary across alternatives. The interpretation of the coefficients follows from these identification requirements.

Table 3 shows the estimation results of the simple and nested mixed logit models. The test of the hypothesis that $\theta = 1$ yielded $\chi^2 = 0.187$ which is not significant implying that the simple mixed logit model cannot be rejected in favor of the nested logit model. Note also that the values of the likelihood of the two models are very similar which necessary implies that a likelihood ratio test will also yield the conclusion that the parameters will not be significantly different.

Turning now to the coefficients, the coefficients of the net expenditures and its square are positive and negative, respectively. This implies that probability of seeking care is concave with respect to net expenditures. However, only the net expenditure variable in the nested logit model turned out to be not statistically significant.

A noteworthy result and one that everybody expects is that the choice of formal care is significantly determined by the patient's evaluation of the severity of his health problem. The estimation results tell us that compared to mild cases, hospital outpatient clinics are the favorite choice when the patient considers his case as severe and private clinics is an alternative only for moderate cases. An unexpected result is that, contrary to other studies, health insurance[9] is not a significant determinant of health facility choice.

Age is shown to have a convex effect on choice of all health care alternatives. Demand for care declines first as the individual grows older and bottoms out before it increases again. This agrees with common knowledge of the profile of health care demand which follows a U-shaped function when plotted against age. Sex of the individual is not a significant determinant of using hospital OP clinic or private clinic. Males, however, definitely use less public and charitable clinics compared to females. Educated individuals (or educated mothers of children below 15 years) use more of hospitals OP clinics and private clinics and less of public and charitable clinics. These results appears to indicate that there seems to be a dislike for public and charitable clinics. This can be a reaction to the common perception that these facilities provide lower quality service.

Patients in urban areas use less public and charitable clinics compared to patients in rural areas. Three regional dummy variables, with the national capital region (NCR) as the reference area, are used to capture regional disparities. There seems to be no disparity in the use of hospital outpatient clinics. But region 7 patients exhibit a dislike for both private and public clinics compared to patients in the NCR.

[9] This only include private health insurance because social insurance in the country, called Medicare, does not cover outpatient care.

5. Elasticities

The formula for price elasticities given the two-level nested logit model is as follows:

$$e_{jk} = \begin{cases} \frac{\partial V_k}{\partial P_k} P_k[\frac{\delta_{jk}}{\theta} + (1 - \frac{1}{\theta})Pr(k|J_1) - Pr(k)] & \text{if } k \in J_1 \\ \frac{\partial V_k}{\partial P_k} P_k[\frac{\delta_{jk}}{\theta} - Pr(k)] & \text{if } k \in J_2 \end{cases}$$

where δ_{jk} is a kronecker which is 1 if $j = k$, 0 otherwise. Note that if $\theta = 1$ the model reverts to the mixed logit model with price elasticities:

$$e_{jk} = \frac{\partial V_i}{\partial P_i} P_i[\delta_{jk} - Pr(k)].$$

The income elasticities for the nested logit model are

$$\eta_k = \begin{cases} y[\frac{1}{\theta}\frac{\partial V_k}{\partial y} + (1 - \frac{1}{\theta})\sum_{J_1} \frac{\partial V_l}{\partial y} Pr(k|J_1) - \sum_J \frac{\partial V_l}{\partial y} Pr(k)] & \text{if } k \in J_1 \\ y[\frac{\partial V_k}{\partial y} - \sum_J \frac{\partial V_l}{\partial y} Pr(k)] & \text{if } k \in J_2 \end{cases}$$

Again this reduces to the income elasticities of a simple logit model when $\theta = 1$ which is given by

$$\eta_k = y\left\{\frac{\partial V_k}{\partial y} - \sum_J \frac{\partial V_l}{\partial y} Pr(k)\right\}$$

Elasticities by income quintile derived from the estimated simple logit model are given in **Table 4**. These were computed as the average of individual estimated elasticities as recommended in Train (1986). The price elasticities are small compared to those obtained in Ching (1995). However, like the results in Ching (1995) there is a clear pattern of higher elasticities for lower income groups compared to lower income groups. Gertler and Hammer (1997) compiled elasticity estimates of different analysts using data from many other developing countries. The table of elasticities is reproduced here as **Table 5**. Two features are highlighted in this table. One, the elasticity estimates are generally below unity. Two, higher elasticities are obtained for poorer households compared to richer households. Therefore, the estimated elasticities in this study agrees with the results of other studies.

What do these numbers imply for policy? On the one hand, elasticities lower than unity means that prices or user fee increases will not have much adverse effect on the average demand for care. On the other hand, higher elasticities for lower income compared to higher income households means that a uniform price or user fee increase will lower more the demand for formal care of lower income groups compared to higher income groups. Thus, while price or userfee increases will not hurt so much the average demand for care, the poor will be hurt more by a uniform price increase. Certainly, the own-price positive elasticities for the top most income quintile is not expected. This seems to convey the need to control for quality of the provider. Unfortunately, there is no variable available in the data set that can indicate quality.

The computed income elasticities highlight a different, although not totally unexpected story. Home care and public/charity clinics have negative income elasticities. This means that as the income of patients increase, public/charity clinics and home care are avoided. This seems to reflect the perception of low quality service in these facilities.

6. Illustrative Simulation

As mentioned earlier, the ultimate aim of this study is to use the estimated model to simulate the impact of macroeconomic policy changes on health status of households which is measured here as the probability of using a health facility when one is sick. The policy reform that will be used is the 1990-2000 tariff reform program of the Philippines which is the same experiment used in Orbeta and Alba (1999) to analyze the impact of macroeconomic policy change on school attendance of children 7 to 14 years old. Cororaton (1998) simulated the impact of this program using a general equilibrium model. This study computed the impact of the program on prices of public and private health care services as well as on the distribution of household income. The simulation assumes that the impact of the program on prices is such that price changes for private health care services applies to hospital outpatient and independent private clinics while the price change for public health care applies to home care and public or charity clinics. This assumption is based on the main cost items in each type of health care provider. Specifically, it is presumed that home care and care in public/charity clinics will mainly consists of medicine costs and no professional fees while those for hospital outpatient and independent private clinics include professional fees. Given this assumption, the simulation in Cororaton (1998)shows that, in general, the price of health care in hospital outpatient and private clinics are expected to increase while those for home care and public/charity clinics are expected to decline. On income distribution effect, the study found that the impact of the program is regressive in the initial years and became progressive later on although the total impact for the whole decade was found to be progressive. **Table 6a, 6b** and **6c** provides the details of the estimated changes in prices and household income during the three program episodes, namely, 1990-1995, 1996-2000, and 1990-2000, respectively.

As explained in Train (1986), 'what-if' simulations using a discrete choice model involves doing two simulations. One simulation use the "base values" of the exogenous variables to compute for the probabilities. The other computes the probabilities using the values of exogenous variables reflecting the policy being analyzed. The difference between the two results is the impact of the policy change.

Tables 6a, 6b and **6c** show the results of the simulation. The tables show that households in lower income quintiles will use less hopital outpatient and independent private clinics and will depend more on home care and public and charity clinics. The progressive income effect of the tariff reform program appears to be insufficient to counteract the increase in prices. Only the households in the highest income quintile are expected to increase their use of hospital outpatient and independent private clinics in spite of the price increase.

7. Summary and Conclusion

The paper reviewed the maturing literature of the demand for health care. It then estimated a discrete choice model for health care facilities using a household survey from the Philippines. Contrary to previous results, e.g. Akin et al (1985), prices or user fees and income (embedded in the net expenditures variables) are statistically significant determinants of health care choice. The price elasticities computed, however, are far smaller than those computed in Ching (1995). But it shares the flavor of the magnitude of the elasticities across income groups obtained in Ching (1995) which shows a clear tendency of larger price elasticities for lower income groups compared to high income groups. The results are also similar to what was obtained by other analysts using data from different developing countries (Gertler and Hammer, 1997). However, the data did not lend support to the nesting of health care alternatives as was found in Gertler and van deer Gaag (1990).

The estimated elasticities imply that while price increase will not affect health care demand that much, any uniform price increase will hurt the demand of the poor more than the rich. There is therefore a case for shielding the poor from price increases in health care. Another significant result is that public / charity clinics and home care are considered inferior alternatives by all income groups. As household increase their income, they will tend to avoid using public / charity clinics. This is considered a reflection of patient's reaction to the poor quality of these facilities.

The model was used to simulate the impact of macroeconomic policy change on household health outcomes which in this paper is measured by the probability of using a health facility when one is sick. The policy reform used is the 1990-2000 tariff reform program of the Philippines. The simulation results show that households in lower income quintiles will use less hopital outpatient and independent private clinics and will depend more on home care and public and charity clinics. Only the households in the highest income quintile are expected to increase the use of hospital outpatient and independent private clinics in spite of the price increase. It appears that the progressive income effect of the tariff reform program is insufficient to counteract the expected price increase of health care in hospital outpatient and independent private clinics.

The major weakness of this paper is the absence of variables that can capture the quality of providers. It is well known that rich people opt for high-priced high-quality care. When one does not have quality variables, these tend to be captured by the price variable. This seems to be the case in this paper when positive own price elasticities were obtained for the richest quintile of the sample. In addition, these kinds of studies also depend on actual prices that patients pay for using a health care alternative and not only the chosen one. The price set should include all available alternatives. The results of the paper depend critically on the integrity of the price variables used. Finally, the paper assumes that all alternatives are available to all patients. To the extent that this is not the case may bias the results.

In terms for directions for future research, the nesting of alternatives, which is was done in this paper, is only one way of relaxing the restriction on the correlation of alternatives imposed by simple logit models. One clear research direction that could be taken in the future on the household modelling side of this study is the use of multinomial probit to allow for flexible correlations between alternatives. The technology of simulated maximum likelihood is increasingly becoming available to researchers. For instance, Dow (1995a) has used multinomial probit to check on the implication of alternative covariance configurations on the estimates of health care demand. Another obvious, although different, research track is the use of these type of models to analyze the impact of other policy reform initiatives on households.

Figure 1
Choice of Health Facilities

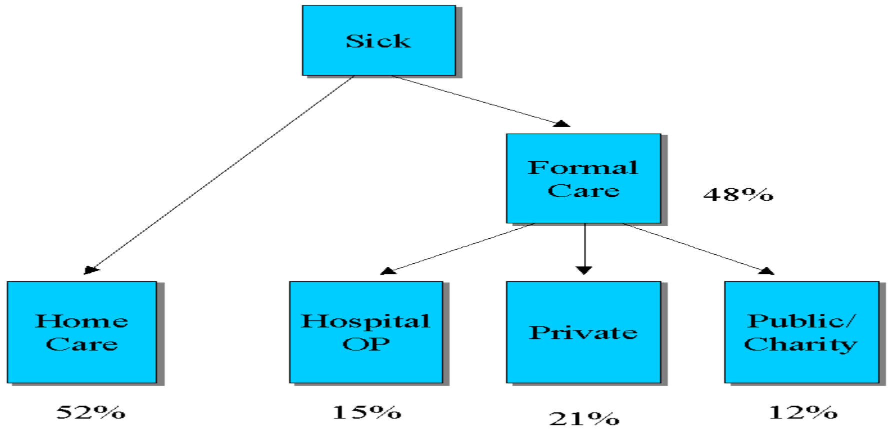

Table 1
Descriptive Statistics of Variables

Variables	Mean	St. Dev.	Min.	Max.
Home care	0.520	0.499	0.0000	1.0000
Hospital OP clinic	0.146	0.353	0.0000	1.0000
Independent clinic	0.207	0.405	0.0000	1.0000
Public clinic	0.124	0.330	0.0000	1.0000
Total price, home care (000)	0.011	0.011	0.0012	0.0562
Total price, hospital OP clinic (000)	0.304	0.191	0.0230	1.5765
Total price, independent clinic (000)	0.235	0.118	0.1190	1.0160
Total price, public clinic (000)	0.070	0.041	0.0035	0.3620
Doctor's fee, hospital OP clinic	96.421	114.857	3.5000	950.0000
Doctor's fee, independent clinic	70.881	42.913	10.0000	500.0000
Doctor's fee, public clinic	5.863	2.922	1.0000	17.5000
Transport, hospital OP clinic	9.357	9.210	1.5000	100.0000
Transport, independent clinic	5.507	6.235	1.0000	66.0000
Transport, public clinic	5.501	4.898	1.0000	20.0000
Medicines, home care	11.630	11.133	1.2500	56.2500
Medicines, hospital OP clinic	198.556	125.540	0.0000	1500.0000
Medicines, independent clinic	159.240	92.527	46.0000	800.0000
Medicines, public clinic	59.044	41.822	0.0000	350.0000
Total per capita expenditure (000)	12.249	11.274	0.3125	105.1333
Moderate	0.348	0.476	0.0000	1.0000
Severe	0.045	0.208	0.0000	1.0000
Private Insurance	0.069	0.254	0.0000	1.0000
Age, respondent	20.402	20.091	0.0000	84.0000
Male	0.463	0.498	0.0000	1.0000
Age, mother	38.887	12.562	12.0000	82.0000
High School*	0.721	0.448	0.0000	1.0000
College*	0.329	0.470	0.0000	1.0000
Urban	0.793	0.405	0.0000	1.0000
National Capital Region	0.532	0.499	0.0000	1.0000
Region 2	0.064	0.246	0.0000	1.0000
Region 7	0.278	0.448	0.0000	1.0000
Region 10	0.124	0.329	0.0000	1.0000
Number of observations = 2,427				

**Education of mother when respondent is less than 15 years old.*

Table 2
Respondents' Descriptive Characteristics by Facility

Variables	Average	Facility Home care	 Hospital OP	 Private	 Public
Total per capita expenditure (000)	12.25	11.39	14.37	15.04	8.72
Moderate	0.35	0.33	0.40	0.40	0.28
Severe	0.05	0.03	0.11	0.04	0.05
Private insurance	0.07	0.06	0.09	0.07	0.07
Age, respondent	21	21	25	17	15
Age, mother	39	39	41	39	35
Elementary*	0.28	0.32	0.20	0.21	0.32
High school*	0.39	0.39	0.35	0.39	0.46
College*	0.33	0.29	0.45	0.40	0.22
Urban	0.79	0.78	0.88	0.82	0.72
National capital region	0.53	0.48	0.63	0.59	0.52
Region 2	0.06	0.06	0.05	0.08	0.07
Region 7	0.28	0.32	0.23	0.22	0.27
Region 8	0.12	0.13	0.09	0.11	0.14

**Education of mother when respondent is less than 15 years old*

Table 3
Estimation Results: Simple and Nested Mixed Logit

	Simple Mixed Logit		Nested Mixed Logit	
Variables	**Coefficients**	**As. t-stat.**	**Coefficients**	**As. t-stat.**
Net expenditure	0.7280	2.11 *	0.5016	1.46
Net exp. square	-0.0184	-2.72 **	-0.0147	-1.90
Hospital OP clinic				
Severe	1.6338	6.45 **	1.3148	3.48 **
Moderate	0.3644	2.61 **	0.2696	1.89
Priv. Insurance	0.1982	0.88	0.1535	0.80
Age	-0.0295	-3.05 **	-0.0406	-3.15 **
Age square	0.0007	4.47 **	0.0008	5.08 **
Male	0.0197	0.16	-0.0204	-0.19
Age of mother	-0.0057	-0.97	-0.0063	-1.32
High School	0.4202	2.37 *	0.3799	2.68 **
College	0.4903	3.37 **	0.3783	2.47 *
Urban	0.3967	1.72	0.1962	0.77
Region 2	0.2502	0.70	0.1565	0.56
Region 7	-0.1908	-1.11	-0.2698	-1.70
Region 10	-0.2282	-1.00	-0.2154	-1.21
Constant	-1.9638	-5.42 **	-0.9529	-0.98
Independent private clinic				
Severe	0.3461	1.16	0.5585	1.76
Moderate	0.2390	1.97 *	0.1921	1.72
Priv. Insurance	-0.0744	-0.34	0.0056	0.03
Age	-0.0758	-8.56 **	-0.0668	-6.13 **
Age square	0.0011	7.82 **	0.0010	6.80 **
Male	-0.0008	-0.01	-0.0392	-0.40
Age of mother	0.0016	0.32	-0.0023	-0.41
High School	0.4676	3.11 **	0.4088	3.00 **
College	0.2980	2.34 *	0.2627	2.34 *
Urban	-0.0081	-0.05	-0.0392	-0.26
Region 2	0.4757	1.85	0.3087	1.10
Region 7	-0.3942	-2.52 *	-0.3921	-2.98 **
Region 10	-0.0719	-0.38	-0.1256	-0.73
Constant	-0.7471	-2.47 *	-0.2381	-0.45
Public/Charity clinic				
Severe	0.3891	1.17	0.5835	1.82
Moderate	-0.2808	-1.82	-0.0969	-0.48
Priv. Insurance	0.2820	1.07	0.2208	1.03
Age	-0.0477	-4.29 **	-0.0515	-5.65 **
Age square	0.0006	3.25 **	0.0007	4.18 **
Male	-0.3481	-2.62 **	-0.2356	-1.61
Age of mother	-0.0264	-3.86 **	-0.0184	-2.03 *
High School	0.0293	0.18	0.1561	0.88
College	-0.3884	-2.30 *	-0.1232	-0.44
Urban	-0.4777	-2.38 *	-0.3040	-1.35
Region 2	-0.4173	-1.31	-0.2260	-0.74
Region 7	-0.6018	-3.10 **	-0.5031	-2.98 **
Region 10	-0.2896	-1.30	-0.2605	-1.48
Constant	0.9041	2.57 **	0.7108	2.13 *
Dissimilarity			0.5728	1.47
Log Likelihood		-2763.94		-2763.54
Number of observations		2,427		2,427

** significant at 5 percent*
*** significant at 1 percent*

Table 4
Average Elasticities

Item	**Average**	**1**	**2**	**Quintile** **3**	**4**	**5**
Own-price elasticities						
Home care	-0.0011	-0.0020	-0.0028	-0.0024	-0.0015	0.0030
Hospital OP clinic	-0.0758	-0.1533	-0.1487	-0.1130	-0.0638	0.0828
Independent private clinic	-0.0570	-0.1464	-0.0984	-0.0777	-0.0406	0.0593
Public/Charity clinic	-0.0160	-0.0364	-0.0318	-0.0254	-0.0147	0.0244
Cross-price elasticities*						
Wrt** price of home care	0.0029	0.0028	0.0038	0.0038	0.0030	0.0011
Wrt price of hospital OP	0.0204	0.0159	0.0239	0.0248	0.0265	0.0094
Wrt price or indep. private	0.0241	0.0311	0.0272	0.0279	0.0257	0.0098
Wrt price of public/charity	0.0045	0.0067	0.0060	0.0049	0.0038	0.0014
Income elasticities						
Home care	-0.0517	-0.0061	-0.0163	-0.0302	-0.0560	-0.1403
Hospital OP clinic	0.0858	0.0137	0.0405	0.0657	0.1013	0.1918
Independent private clinic	0.0474	0.0150	0.0246	0.0393	0.0539	0.0971
Public/Charity clinic	-0.0246	-0.0014	-0.0052	-0.0120	-0.0259	-0.0738
Ave. per capita expenditure (000)	12.2498	2.1497	5.2433	8.5986	13.7640	29.3381
Number of observations	2427	402	485	500	545	495

** Cross-price elasticity for provider i wrt price of any other provider is the same*
*** With respect to*

Table 5
Econometric Estimates of Own Price Elasticities of the Demand for Medical Care in Developing Countries

Country	Data	Service Type	Own Price Elasticity Overall	Low Income	High Income	Source
Burkina Faso	1985	Public Provider				Sauerborn et al. (1994)
	All ages		-0.79	-1.44	-0.12	
	Age 0-1		-3.64			
	Age 1-14		-1.73			
	Age 15+		-0.27			
Cote D'Ivoire	1985	Health Clinic		-0.61	-0.38	Gertler & Van der Gaag (1990)
		Hospital Outpatient		-0.47	-0.29	
Cote D'Ivoire	1985-87	Health Clinic	-0.37			Dow (1996)
		Hospital Outpatient	-0.15			
Ghana	1987	Hospital Inpatient	-1.82			Lavy & Quigley (1993)
		Hospital Outpatient	-0.25			
		Dispensary	-0.34			
		Pharmacy	-0.20			
		Health Clinic	-0.22			
Kenya	1980-81	Government Provide	-0.10			Mwabu et al. (1993)
		Mission Provider	-1.57			
		Private Provider	-1.94			
Indonesia	1991-93					Gertler & Molyneaux (1997)
	Children	Health Center	-1.07			
		Health Subcenter	-0.35			
	Adults	Health Center	-1.04			
		Health Subcenter	-0.47			
	Elderly	Health Center	-0.47			
		Health Subcenter	-0.11			
Mali	1982		-0.98			Birdsal et al. (1983)
Pakistan	1986					Alderman & Gertler (1997)
	Female	Traditional Healer		-0.43	-0.24	
	Children	Public Clinic		-0.43	-0.23	
		Pharmacist		-0.44	-0.25	
		Private Doctor		-0.17	-0.09	
	Male	Traditional Healer		-0.60	-0.26	
	Children	Public Clinic		-0.61	-0.27	
		Pharmacist		-0.63	-0.27	
		Private Doctor		-0.25	-0.10	
Peru	1985	Private Doctor		-0.44	-0.12	Gertler & Van der Gaag (1990)
		Hospital Outpatient		-0.67	-0.33	
		Health Clinic		-0.76	-0.30	
Philippines	1981	Public Provider		-2.26	-1.28	Ching (1995)
		Private Provider		-3.93	-2.23	
Philippines	1981	Prenatal Care	-0.01			Akin et al. (1986)
Philippines	1983-84	Urban Maternity	-0.24			Schwartz et al. (1988)
		Rural Maternity	-0.05			

Source: Gertler and Hammer (1997)

Table 6a
Impact of the 1990-1995 Tariff Reform Program:
An Illustrative Simulation

		Quintile				
	Average	**1**	**2**	**3**	**4**	**5**
Home Care						
Base	0.5208	0.5777	0.5500	0.5345	0.4912	0.4647
Policy	0.5256	0.5882	0.5599	0.5433	0.4964	0.4555
% Change	0.922	1.823	1.787	1.648	1.048	-1.978
Hospital OP Clinic						
Base	0.1467	0.0911	0.1233	0.1390	0.1664	0.2008
Policy	0.1441	0.0862	0.1167	0.1332	0.1627	0.2087
% Change	-1.732	-5.380	-5.314	-4.159	-2.253	3.929
Independent Private Clinic						
Base	0.2077	0.1694	0.1871	0.2052	0.2316	0.2351
Policy	0.2037	0.1596	0.1804	0.1996	0.2287	0.2388
% Change	-1.926	-5.780	-3.597	-2.734	-1.227	1.578
Public/Charity Clinic						
Base	0.1249	0.1618	0.1396	0.1213	0.1108	0.0994
Policy	0.1266	0.1659	0.1431	0.1239	0.1123	0.0970
% Change	1.394	2.572	2.471	2.135	1.299	-2.439
Memo Items from tariff reform (Coraraton 1998)						
% Change in income		-0.5	0.1	0.3	0.6	0.9
% Change in prices of:						
Home Care	-18.6					
Hosp. OP	46.6					
Indep. Private	46.6					
Pub./Charity	-18.6					

Table 6b
Impact of the 1996-2000 Tariff Reform Program:
An Illustrative Simulation

		Quintile				
	Average	**1**	**2**	**3**	**4**	**5**
Home Care						
Base	0.5208	0.5777	0.5500	0.5345	0.4912	0.4647
Policy	0.5210	0.5844	0.5554	0.5381	0.4910	0.4514
% Change	0.031	1.149	0.969	0.679	-0.039	-2.860
Hospital OP Clinic						
Base	0.1467	0.0911	0.1233	0.1390	0.1664	0.2008
Policy	0.1471	0.0882	0.1197	0.1366	0.1664	0.2113
% Change	0.300	-3.251	-2.880	-1.748	-0.042	5.249
Independent Private Clinic						
Base	0.2077	0.1694	0.1871	0.2052	0.2316	0.2351
Policy	0.2065	0.1635	0.1836	0.2028	0.2315	0.2403
Public/Charity Clinic						
Base	0.1249	0.1618	0.1396	0.1213	0.1108	0.0994
Policy	0.1254	0.1640	0.1414	0.1225	0.1112	0.0970
Memo items from tariff reform (Coraraton 1998)						
% Change in income		10.5	11.3	11.2	11.1	10.7
% Change in prices of:						
Home Care	-4.0					
Hosp. OP	30.1					
Indep. Private	30.1					
Pub./Charity	-4.0					

Table 6c
Impact of the 1990-2000 Tariff Reform Program:
An Illustrative Simulation

		Quintile				
	Average	**1**	**2**	**3**	**4**	**5**
Home Care						
Base	0.5208	0.5777	0.5500	0.5345	0.4912	0.4647
Policy	0.5246	0.5944	0.5647	0.5462	0.4949	0.4397
% Change	0.732	2.882	2.660	2.183	0.755	-5.382
Hospital OP Clinic						
Base	0.1467	0.0911	0.1233	0.1390	0.1664	0.2008
Policy	0.1455	0.0835	0.1136	0.1313	0.1635	0.2216
% Change	-0.825	-8.421	-7.846	-5.526	-1.767	10.344
Independent Private Clinic						
Base	0.2077	0.1694	0.1871	0.2052	0.2316	0.2351
Policy	0.2031	0.1541	0.1771	0.1976	0.2294	0.2449
% Change	-2.206	-9.003	-5.360	-3.675	-0.950	4.156
Public/Charity Clinic						
Base	0.1249	0.1618	0.1396	0.1213	0.1108	0.0994
Policy	0.1268	0.1680	0.1447	0.1249	0.1123	0.0939
% Change	1.578	3.876	3.624	2.935	1.299	-5.573
Memo Items from tariff reform (Coraraton 1998)						
% Change in income		10.1	11.4	11.5	11.7	11.5
% Change in prices of:						
Home Care	-22.6					
Hosp. OP	76.7					
Indep. Private	76.7					
Pub./Charity	-22.6					

8. References

Akin, J., C. Griffin, D. K. Guilkey and B. M. Popkin (1986). The Demand for Health Care Services in the Bicol Region of the Philippines, *Economic Development and Cultural Change*, 34(4), 755-782.

Börsch-Supan, A. (1987). *Econometic Analysis of Discrete Choice: With Applications on the Demand for Housing in the U.S. and West- Germany.* Lectures Notes in Economics and Mathematical Systems, Springer-Verlag.

Börsch-Supan, A. (1990). On the compatibility of nested logit models with utility maximization, *Journal of Econometrics*, 43, 373-388.

Brownstone, D. and K. Small (1989). Efficient Estimation of Nested Logit Models, *Journal of Business and Economic Statistics*, 7(1), 67- 74.

Ching, P. (1995). User Fees, Demand for Children's Health Care and Access Across Income Groups: The Philippine Case, *Social Science and Medicine*, 41(1), 37-46.

Cororaton, C. (1996). "Simulating the Income Distribution Effects of the 1982-1992 Tariff Reduction Using the APEX Model," PIDS Discussion Paper Series No. 96-01.

Daly, A and S. Zachary (1979). Improved multiple choice models, in D. Henser and Q. Dalvi (eds.) *Identifying and measuring the determinants of mode choice*, pp. 335-357.

Dor, A. and J. van der Gaag (1993). "Quality Rationing and the Demand for Medical Care in Rural Cote d' Ivoire," in A. Mills and K. Lee. *Health Economics Research in Developing Countries.* Oxford: Oxford University Press.

Dow, W. (1995a). Unconditional Demand for Curative Health Inputs: Does Selection on Health Status Matter in the Long Run?, RAND Labor and Population Program Working Paper Series 95-22.

Dow, W. (1995b). Discrete Choice Estimation of Price-Elasticities: The Benefits of a Flexible Behavioral Model of Health Care Demand, RAND Labor and Population Program Working Paper Series 95-20.

Ellis, R., D. K. McInnes, and E. Stephenson (1994). Inpatient and Outpatient Health Care Demand in Cairo, Egypt," *Health Economics*, 3, 183-200.

Gertler, P., L. Locay and W. Sanderson (1987). Are User Fees Regressive? The Welfare Implications of Health Care Financing Proposals in Peru, *Journal of Econometrics*, 36(supp.), 67-88.

Gertler, P and J. Hammer (1997). "Strategies for Pricing Publicly Provided Health Services," World Bank Policy Research Working Paper 1762.

Gertler, P. and J. van deer Gaag (1990). *The Willingness to Pay for Medical Care: Evidence from Two Developing Countries*. John Hopkins Unversity Press.

Henser, D. (1986). Sequential and Full Information Maximum Likelihood Estimation of a Nested Logit Model, *The Review of Economics and Statistics*, 68(4), 657-667.

Herriges, J. and C. Kling (1996). Testing the consistency of nested logit models with utility maximization. *Economic Letters*, 50, 33- 39.

Lamberte, M., G. Llanto, and A. Orbeta (1992). "Micro Impact of Macroeconomic Policies: Integrative Report," PIDS Working Paper Series 92-13.

McFadden, D. (1981). Econometric models of probabilistic choice, in C. F. Manski and D. McFadden (eds.) *Structural analysis of discrete data with econometric applications*.

McFadden, D. (1973). Conditional Logit Analysis of Qualitative Choice Behavior, in P. Zarembka (ed.) *Frontiers in Econometrics*. Academic Press.

Orbeta, A. and M. Alba (1999). "A Probit Model of School Attendance for Children 7 to 14 Years Old," MIMAP Research Paper.

Quising, F., M. Alba and O. Solon (1994). "Determinants of Health Seeking Behavior," Paper presented at the "Pesos for health Part Two: Emerging Results from Current Research on Health Care Reform," 8-9 December 1994, Sulo Hotel, Quezon City.

Reyes, C. and Cororaton (1996). "Micro Impacts of Macroeconomic Adjustment Policies (MIMAP): The Philippine Case," Philippine Insitute for Development Studies No. 96-02.

Solon, O. et al. (1995). "The Challenge of Health Care Financing Reforms in the Philippines: Integrative Report of the Joint Department of Health and Philippine Institute for Development Studies 'Baseline Research on Health Care Financing Reforms' Project," Processed.

Train, K. (1983), *Qualitative Choice Analysis: Theory, Econometrics, and an Application to Automobile Demand,* Cambridge, Massachusettes: MIT Press.