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## On the informal sector\*

*Lawrence B. Dacuycuy\*\**

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### **Abstract**

Defining the informal sector in terms of household enterprises, the study highlights an alternative investigative approach to the study of the informal sector. It contends that one way of analysing the informal sector is to closely examine what is happening within households that drive enterprises. Combined with other definitions, this approach would prove superior in understanding the dynamics of the informal sector.

The paper has two objectives. First, using various rounds of the Family Income and Expenditures Survey (FIES) conducted by the National Statistics Office (NSO), profiles of households are constructed by examining sources of income and household heads' demographic, occupational, and locational characteristics. Second, we employ empirical methodologies to verify the results presented by the various profiles. These methodologies are concerned with the estimation of family income functions, which can be used to model household income inequality and structural decision functions pertaining to household entrepreneurial decisions.

*JEL classification:* O17

*Keywords:* Informal sector, household enterprises, family income functions

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### **1. The concept of informal sector: a brief historical survey**

In a pioneering mission to Kenya in 1972, the International Labour Organization/United Nations Development Programme (ILO/UNDP) presented what has been thought as the definition of the informal sector. In the Kenya report entitled "Employment, Incomes and Equality", the characteristics of informal-sector activities were cited: (a) ease of entry, (b) reliance on indigenous resources, (c) family ownership of enterprises, (d) small scale of operation, (e) labor-intensive and adaptive technology, (f) skill acquired outside of the formal school system, and (g) unregulated and competitive markets [Bangasser 2000:17].

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\*\*The author is Assistant Professor of Economics at De La Salle University - Manila. The author expresses gratitude to Dr. E. de Dios, Dr. Edita Tan, Dr. E. Esguerra, Dr. J. Lim, and Dr. M. Alba for sharing their views concerning the informal sector; Mr. G. Ducanes for technical advice; the PCPS for valuable administrative assistance; and HDN for financial support but takes responsibility for remaining errors.

Some of these definitions are apparently impossible to capture empirically. Sethuraman [1981] noted that each of the informal-sector features in the Kenya report could create a universe of its own. Should the informal sector be measured by relying on individual worker characteristics? Or should production units be used instead? How is enterprise size to be decided? What degree of labor intensity to use? How are indigenous materials to be identified? The data requirement to indicate some of these features is horrendous, perhaps not even meaningful. Most of the characteristics are continuous in nature—labor intensity, degree of regulation, and size. Even a large and modern corporate firm may be evading some laws and regulations. Casual observation shows that many large trades in the old commercial district of Manila called Divisoria avoid many laws.<sup>1</sup> They maintain a very modest physical façade that conceals the scale of their operation. From the initial characterization of the informal sector in the Kenya report, it was apparent that production units should become the unit of choice. However, which unit qualifies as an informal-sector firm remains a contentious question. Sethuraman [1981] defined the informal sector as consisting of small-scale units engaged in the production and distribution of goods and services with the primary objective of generating employment and incomes to their participants notwithstanding the constraints on capital, both physical and human know-how.

While these definitions depart from individual employment characteristics and move closer to enterprise-based definitions, the absence of an international consensus led to statistical discrepancies in method and results. In 1991, the ILO organized a conference on the Dilemma of the Informal Sector. Hailed as the best general treatment of the topic at that time [Bangasser 2000:17], the report of the director-general emphasized two points: namely, informal sector would not spontaneously disappear with economic growth and the necessary shift to the analysis of the urban informal sector. While rural informal sector is still recognized in its own right, its causes and context are different [Bangasser 2000:18]. In 1993, during the 15th International Convention of Labor Statisticians, the informal sector was defined in terms of enterprise characteristics, sidestepping the individual worker-based definition. Informal-sector firms are production units that are unincorporated household enterprises operating on a small scale. In 1995, the Philippines, in partnership with the ILO, conducted the Urban Informal Sector Survey (UISS). Under the supervision of ILO statisticians, it incorporated critical definitional features. Informal enterprises are household unincorporated enterprises that employ less than ten workers and had operated during the reference period of one year. The UISS also included informal firms that are not household enterprises. These samples were collected by adopting a multistage stratified sampling procedure.

About two decades earlier, Jurado et al. [1981] studied informal-sector subsectors within Metro Manila. Adopting the sample frame used in establishment surveys, informal-sector firms were defined as those employing less than ten workers. To qualify into the sample, each enterprise must have a fixed location, thereby excluding

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<sup>1</sup>Dr. Edita Tan suggested these important insights.

some household-based enterprises or those that are mobile. Sample selection was based on stratified random sampling. In the said survey, the following were found: (a) low salaries of informal-sector workers relative to their formal counterparts; (b) inferior quality of capital, mostly recycled; (c) lack of access to credit; (d) many female informal-sector workers owing to the high proportion of trade activities to overall sample; and (e) small firm size.

The informal sector does not in any way represent an aberration of or divergence from the existing economic way of life. Sprouting with or without locational preference and engaging in informal activities is a dynamic response to market opportunities. Not all of those engaged in informal-sector activities are poor because the informal sector is not the domain of those in poverty. Some entrepreneurs make a living better in the informal sector than in its formal counterparts.

Specific organizational agreements in the form of subcontracting give rise to the creation and development of formal and informal production linkages. Households are tapped by formal business entities to perform services or produce raw materials previously undertaken by the former. Nor are informal-sector units domestically focused. In fact, some informal-sector households in Marikina and Davao target export markets.<sup>2</sup>

A practical basis for studying the informal sector is household enterprises, which form a significant portion of the country's total establishments as shown by estimates based on the Annual Poverty and Expenditures Survey (APIS) and Family Income and Expenditures Survey (FIES). While some of them might have assumed a corporate identity they are not registered with the Securities and Exchange Commission (SEC).

Table 1 reports the national estimates of household population and households with entrepreneurial activities. Results highlight the role of enterprises in strengthening the domestic economy. From 1988 to 1999, the average number of households with entrepreneurial activities is above 60 percent.

**Table 1. National estimates of the number of households and household enterprises (000)**

<i>Year</i>	<i>No. of households</i>	<i>No. of households with entrepreneurial activities</i>	<i>% of entrepreneurial households</i>
1988	10,533.9	6,685.4	63.5
1991	11,975.4	7,921.1	66.1
1994	12,754.9	8,486.2	66.5
1997	14,192.5	9,175.0	64.7
1998	14,370.7	8,839.8	61.5
1999	14,746.0	8,973.6	60.9

Source: NSO reports and author's calculations based on the FIES and the APIS.

<sup>2</sup>For interested readers, take a look at the report written by Dejillas [2000].

Besides the FIES and APIS, establishment censuses and surveys provide estimates of the number of enterprises. The NSO defines an establishment as an economic unit engaged in predominantly one kind of economic activity at a single fixed location. From this definition, reference to location is a critical criterion for exclusion from the sample. In 2000, the total number of establishments was estimated at 820,960. Of these, micro establishments (less than ten workers) represented 91.1 percent, followed by small enterprises (10-99 workers) at 8.2 percent. Medium-sized establishments (with more than 100 workers but less than 200) comprised less than 1 percent of the total. Note that the NSO population of enterprises forms less than 10 percent of households with entrepreneurial activities.

Even in Labor Force Surveys (LFS), the magnitude of employed persons deemed belonging to family enterprises could not be ignored. Table 2 reports the distribution of employed persons for selected years. The share of wage and salary workers is lower in rural areas than in urban areas where salaries and wages are relatively more important sources of income.

The preceding observations allow us to use entrepreneurial activities in defining the informal sector. Entrepreneurial activities may be used to analyse the informal sector since household enterprises constitute a major portion thereof. The informal sector forms a subset of the population of household enterprises. Moreover, the use of data on entrepreneurial activities makes the analysis tractable and makes up for the general unavailability of pertinent data. At the same time, such approach avoids the imposition of multiple criteria to define the informal sector, an approach that leads to definition-sensitive estimates.

The paper is organized as follows: section 2 reviews literature on home production and discusses the implications of including entrepreneurial activities in a simple joint utility maximization model of the household. Section 3 mentions the limitations and enumerates the objectives of the study. The next section focuses on selected profiles of Philippine households using data on FIES from 1988 to 1997. Section 5 provides empirical methodologies to determine the significant factors that influence household income generation (the family income function) and the probability that a household decides to engage in entrepreneurial activity (the decision function). Section 6 discusses the results and section 7 summarizes and concludes the paper.

## **2. The theory of home production and the informal sector**

Entrepreneurial activities are a form of response to market opportunities. In exploring the allocation of time and members to activities, models of home production are briefly discussed.

**Table 2. Distribution of employed persons by class of worker and urbanity (%)**

	Urban			Rural		
	1998	1999	2000	1998	1999	2000
Wage and salary workers	54.29	54.13	54.64	32.65	33.44	34.30
Category 1: Employers/owners	3.60	4.02	3.75	3.68	5.71	5.8
Employer in agricultural enterprises	0.86	1.14	1.12	3.13	5.07	5.04
Employer in non-agricultural enterprises	2.74	2.88	2.63	0.55	0.63	0.75
Category 2: Self-employed	26.21	26.11	26.68	40.30	37.44	37.59
Self-employed in agriculture	6.45	6.42	6.05	27.58	25.26	24.64
Self-employed in sectors other than agriculture	19.76	19.69	20.63	12.73	12.18	12.95
Category 3: Paid and unpaid family workers and domestic helpers	15.90	15.73	14.92	23.37	23.41	22.32
Unpaid family worker in agriculture	2.72	2.99	2.4	16.99	17.33	15.31
Unpaid family worker in non-agricultural enterprises	4.00	4.40	4.04	2.21	2.17	2.23
Domestic helpers	8.32	7.58	7.62	3.68	3.42	4.07
Paid family workers	0.85	0.77	0.87	0.49	0.50	0.70
All employed	100.00	100.00	100.00	100.00	100.00	100.00

Source: Labor Force Survey; author's calculations.

### *2.1. Becker's theory of household consumption*

Becker's [1965] new consumption theory emphasizes the household as a decision-making unit. Departing from the neoclassical paradigm wherein production is in the domain of profit-maximizing firms, welfare is affected by the household's production and consumption of  $Z$  goods.  $Z$  goods are the result of combining market goods and time. In this new theory on consumption, a household derives utility from consuming  $Z$  goods. At the optimum, combination of inputs is determined by input price ratio, which is equal to the marginal rate of substitution. As shown, MRS depends on the shadow price of time and market price. Gronau [1977] notes that Becker's theory does not distinguish between activities and leisure. One way of distinguishing work at home and leisure is that the former is a close substitute for work in the market while the latter has no close substitutes. Goods used to make  $Z$  commodities can be sourced either through the market ( $X_m$ ) or produced at home ( $X_H$ ). When sourced through the market, the individual can purchase by using both his nonlabor ( $V$ ) and labor ( $w_N$ ) incomes. Home production technology is assumed to exhibit diminishing marginal returns. The constraint now incorporates home production time ( $H$ ), labor time ( $N$ ), and consumption time ( $L$ ).

### *2.2. Gronau's theory of home production*

In the analysis of home production, Gronau's model has richer applications. Empirical investigation involving inputs and outputs is cumbersome, if not impossible since very few surveys follow a low level of disaggregation. A more practical empirical approach in the investigation of time allocation is to employ time use surveys.

Based on Gronau's [1977] theory, at the optimum, the marginal product of home production is equal to the wage rate,  $w$ . In this model, the equilibrium for employed is different from the unemployed. For the unemployed, the marginal product exceeds the wage rate. For the employed, they are equal.

Gronau [1977] distinguishes the value of time for one employed in the market as the wage rate. Otherwise, his value of time exceeds the wage rate. Work in the market expands the individual's opportunity set or production possibilities. An increase in the real wage rate reduces the profitability of work at home, thereby resulting in reduced hours of home production. Increases in sources of nonlabor income exert a neutral effect on marginal productivity of work at home. The same study notes that interpersonal differences in education might be associated not only with differences in wage rate but also with differences in home productivity. However, he has cautioned that it is important to specify the nature of production and consumption technology to ascertain its effects on leisure and market time.

This model predicts that a rise in real wage rate does not affect the allocation of time of the unemployed but reduces home time on the part of the employed. Nonwage income and leisure are positively correlated. However, the effects are



different between employed and unemployed. An increase in nonwage income for the unemployed reduces work at home. On the contrary, it does not reduce work at home for the employed.

2.2.1. Allocation of members using Gronau's model

The object of time allocation among members is to optimize home production and at the same time exploit market opportunities. As seen in the Gronau [1977] model, participation in the labor market by selling labor time expands the household's opportunity set. However, in the real world, a household can engage in entrepreneurial activities, a subset of market production. The household combines time and market goods to be sold in the market, thereby realizing gains from the activity. In a way, time allocation of members can be interpreted as a strategy to maximize household income. Differences in time allocation may also arise from diversity of member characteristics. Interpersonal differences in terms of human capital result in differential valuation of home production vis-à-vis market time. In a market wherein real wage rates are rising, the opportunity cost of spending more time for home production also rises. In effect, this reduces time spent in home production for the employed.

Changing household composition affects the time allocation of members. The relative valuation of home time vis-à-vis market time is altered as one member is added to the family. Over time, the need to care for a child diminishes, thereby increasing the chance to engage in market activities.

2.2.2. A simple model of an entrepreneurial household

Consider a multiperson household. We assume that this household has only one source of entrepreneurial income in sector *i*. The preferences of this household is given by the following joint utility function:

$$U = U(X_M, X_H, T_L, T_W, T_E, T_H) \tag{1}$$

where  $X_M, X_H$  and  $T_L, T_W, T_E, T_H$  denote market good, home-produced good, and time spent for leisure, work in the market, work in a household enterprise, and work at home, respectively.

The home production technology is given by the following:

$$X_H = f(T_H) \tag{2}$$

Collectively, the household maximizes (1) subject to the following constraints:

$$T = T_E + T_W + T_L + T_H \tag{3}$$

$$p(f(T_H) - \theta f(T_H)) + wT_W + V = sX_M \tag{4}$$

where  $p$ ,  $s$ , and  $w$  refer to the prices of the entrepreneurial good, market good, and labor. Note that  $\theta = 1$  if the household is not entrepreneurial or strictly produces for home consumption; 0 otherwise.  $V$  is nonlabor income.

From the set of constraints, the following are observed:

- a. Household produces a marketable product of homogenous quality, in the sense that home production is determined by the production technology in (2). The production technology depends on the level of hours spent in home production activities.
- b. The model assumes that the production technology possesses desirable properties.
- c. The model assumes that the household does not act as an employer. In short, members work for general family welfare.
- d. Note that the budget constraint expands if the household decides to join the entrepreneurial sector.  $\theta$  may be interpreted as the intensity of home production. If it is equal to 1, then the household is purely engaged in home production. If it is between 0 and 1, the household becomes entrepreneurial. The household becomes purely entrepreneurial if  $\theta = 0$ .
- e. Constraint (4) is an endogenous budget constraint since it is conditional on the level of wage income and nonlabor income, as well as on that of entrepreneurial income if any.
- f. The model implicitly assumes the existence of markets for the entrepreneurial good.

Given (1) to (4), the Lagrangean is formulated as follows:

$$L = U(X_M, f(T_H), T_L, T_W, T_E, T_H) + \lambda_1 (T - T_E - T_W - T_L - T_H) + \lambda_2 (p(1 - \theta)f(T_H) + wT_W + V - sX_M) \quad (5)$$

The first order conditions are the following:

$$\frac{\partial L}{\partial X_M} = U'_M(\bullet) - \lambda_2 s = 0 \quad (6)$$

$$\frac{\partial L}{\partial T_L} = U'_L(\bullet) - \lambda_1 = 0 \quad (7)$$

$$\frac{\partial L}{\partial T_E} = U'_E(\bullet) - \lambda_1 = 0 \quad (8)$$

$$\frac{\partial L}{\partial T_W} = U'_W(\cdot) - \lambda_1 + \lambda_2 w = 0 \tag{9}$$

$$\frac{\partial L}{\partial T_H} = \frac{\partial L}{\partial X_H} f'(T_H) - \lambda_1 - \lambda_2 p(1-\theta) f'(T_H) = 0 \tag{10}$$

Equations (7) and (8) imply that

$$U'_E(\cdot) = U'_L(\cdot) = \lambda_1 \tag{11}$$

$$\frac{U'_L(\cdot) - U'_W(\cdot)}{w} = \lambda_2 \tag{12}$$

Equations (10), (11), and (12) imply that

$$\frac{\partial U}{\partial X_H} f'(T_H) - U'_L(\cdot) - \frac{U'_L(\cdot) - U'_W(\cdot)}{w} p(1-\theta) f'(T_H) = 0 \tag{13}$$

$$\left[ \frac{\partial U}{\partial X_H} - \frac{U'_L(\cdot) - U'_W(\cdot)}{w} p(1-\theta) \right] f'(T_H) = U'_L(\cdot) \tag{13'}$$

$$f'(T_H) = \frac{U'_L(\cdot)}{\left[ \frac{\partial U}{\partial X_H} - \frac{U'_L(\cdot) - U'_W(\cdot)}{w} p(1-\theta) \right]} \tag{13''}$$

(13'') gives the expression for marginal product. If the household does not engage in entrepreneurial activities, equation (13'')

$$f'(T_H) = \frac{U'_L(\cdot)}{\left[ \frac{\partial U}{\partial X_H} \right]} \tag{14}$$

Equation (14) gives the value of the marginal product for a non-entrepreneurial household. It can be observed that marginal product as shown in (13'') may actually exceed that of (14).

This implies that an additional increase in the production of the home good in (14) is actually smaller than in (13''). Some remarks can be made. The form of the utility function indicates that activities have direct impact on the utility

of the household. A minor, yet important, variation of (1) is to form a composite commodity  $X$  being equal to home and market goods instead of separating the two. In this case, the household is not concerned with the individual composition of  $X$ . Another implication that is related to the form of the utility function is the relatively complicated form of equilibrium conditions. Equations (13'') and (14) are not easy to interpret unless a value of the parameter is assumed. The above model simply highlights a household that is engaged in multiple activities. Finally, from the budget constraint alone, we can infer that an examination of the household's income components is critical in arriving at a characterization of the household's behavior.

### **3. Objectives and limitations of the study**

How members allocate themselves to activities cannot be recovered from the FIES as data are not disaggregated to the member level. Without time use data, determining the number of hours spent in entrepreneurial activities, for instance, is impossible. An alternative is to use income sources, ignoring time use and valuation of homework. The income approach explains how the household as a collective unit fares in terms of income diversification.

This paper has two objectives: (a) to analyse profiles of households in terms of income sources, educational attainment, industry affiliation, and entrepreneurial activities; and (b) to construct empirical methodologies that would verify the observations presented by the various profiles.

### **4. Household profiles**

This section presents profiles by household categories, income sources, educational attainment, and industry affiliation. Profiles of poor households will also be reported immediately thereafter.

#### *4.1. Household categories*

A household is composed of members who may decide to engage in productive market activities, housework, and wage work. We assume that household members allocate themselves to economic activities in order to maximize income. How members allocate themselves to activities involves intra-household decisions, and these decisions are partly affected by production opportunities.

Differences in resources, abilities, and household composition give rise to different income profiles. The FIES allows both the creation of household categories based on income profiles and analysis of income patterns for each category.

Households are categorized by income components. There are households that rely primarily on wage income—the so-called wage-earning families. No member

therein operates household-based enterprises but the family has other sources of income aside from wages, specifically rentals, interest, dividends, and pensions. Another category is entrepreneurial families, i.e., those with members engaged in household enterprises. There are also families whose members consist of wage earners and family enterprise operators. In these families, all three major income components are present. Minor categories are formed by families that depend on nonlabor income and thereby do not benefit from wages and entrepreneurial income. The last category involves households that do not rely on nonlabor income. Table 3 breaks up family income into its three major components: wage and salaries, entrepreneurial income, and income from other sources or nonlabor income. Across categories, the importance of each income source varies. It is evident that the relative shares are somewhat maintained throughout the period 1988-1997. Close to three-fourths of total income in wage-earning households come from wages and salaries while the rest is accounted for by other sources of income. This observation holds regardless of location of household. Entrepreneurial income comprises about 75 percent of total family income in entrepreneurial families. About 25 percent of total income comes from nonlabor income. Households that do not rely on other sources of income have relatively higher incomes from entrepreneurial activities than wages and salaries.

In light of the preceding discussion, is it possible to establish the basis of the household's decision to adopt a particular category? Theoretically it would be possible to identify determinants of household category choice given models of household decision making. However, given the nature of the dataset, such inference is clearly impossible to undertake.

Selecting a category to which a household belongs is a complex issue. It is assumed that category choice is an optimal strategy to maximize income given resource constraints. This strategy is not a one-step process—that is, a household may actually change categories over time depending on the expected advantages each category presents. Household dynamics are unobservable in household surveys. But based on observations, we can assert that household composition influences the decision to be a part of a particular category. Since it involves a decision, we can only infer about the probability of being a part of any category conditional on household characteristics pertaining to composition and other relevant profiles. For instance, if the education profile of members is deemed exceptional, the probability that they may decide to form a wage-earning household is high since they might get good returns on their education and skills in the formal labor market.

Endowments also play an important role. A poorly endowed household that has a poor education profile and situated in an urban area may choose to engage in entrepreneurial activity. Other factors affecting the probability are location-specific opportunities.

Table 3. Relative importance of income components, by household categories (proportion of total family income)

Income sources	1988		1991		1994		1997	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Entrepreneurial households	Wages	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Entrepreneurial	0.76	0.76	0.76	0.76	0.75	0.77	0.75
	Others	0.24	0.24	0.24	0.24	0.25	0.23	0.25
Wage-earning households	Wages	0.71	0.72	0.70	0.72	0.68	0.67	0.71
	Entrepreneurial	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Others	0.29	0.28	0.30	0.28	0.32	0.33	0.29
Mixed wage and entrepreneurial with other income sources	Wages	0.33	0.4	0.33	0.4	0.31	0.31	0.38
	Entrepreneurial	0.46	0.38	0.47	0.38	0.47	0.48	0.40
	Others	0.21	0.22	0.2	0.21	0.22	0.22	0.22
Households relying on other sources	Wages	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Entrepreneurial	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Others	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Mixed wage and entrepreneurial without other income sources	Wages	0.27	0.15	0.22	0.25	0.29	0.25	0.08
	Entrepreneurial	0.73	0.85	0.78	0.75	0.71	0.75	0.92
	Others	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Source: Family Income and Expenditures Survey; author's calculations.

Expectations also shape the general orientation of decision making. A household would consider becoming entrepreneurial if it expects to have access to credit and attain profitability. A household may also decide on the basis of expected economic conditions. Category choice may also be affected by the household's attitude to risk.

The trends are clear in Table 4. Wage-earning households are numerically larger in urban than in rural areas. Agriculture is essentially a family enterprise. There are also fewer families who earn nonlabor income in rural than in urban areas, supporting the observation that rural households tend to have extensive social networks brought about by close family ties. Rural households can engage in activities that some urban households cannot. For instance, they can engage in gardening to sustain family consumption. They may also receive net crop shares from other households. Positive entries in the last category prove that some households do not earn wages and have no entrepreneurial activities at the same time.

#### *4.2. Sources of income*

In this subsection, we focus on mixed households. Entries in Table 5 state that most wage earners are in urban areas where the larger and industrial firms are located. Temporal movements of relative proportions are also evident. Prior to 1994, the share of entrepreneurial income to total exceeded that of wages. In 1994, there were shifts in relative importance, with wages continuing to gain importance in rural areas. We also observe the importance of nonlabor income, accounting for more than 20 percent of urban and rural incomes.

#### *4.3. Education and industry affiliation*

In this subsection, we examine the heads' educational attainment profiles. As noted in the conceptual framework, human resources are enriched by education, which makes people more responsive to opportunities that enhance income generation.

In Table 6, close to half of household heads that did not finish any grade in elementary school belong to households engaged in entrepreneurial activities. In contrast, for the same level of education, less than 15 percent of heads represent wage-earning families. This observation indicates that at low levels of education, the likelihood of participating in the labor market may be low. At higher levels of education, the proportion of wage-earning families is high. Heads who are graduates of elementary education represent mixed wage and entrepreneurial families. About 40 percent of those who are high school graduates head wage-earning families. Close to 50 percent of all college graduates represent wage-earning families.

Table 4. Distribution of households, by category (%)

	1988		1991		1994		1997	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Entrepreneurial households	46.82	23.22	40.36	18.89	39.68	19.36	43.95	20.60
Wage-earning households	18.25	36.15	21.07	37.64	19.37	34.91	17.10	31.70
Mixed wage and entrepreneurial with other income sources	26.57	37.85	31.80	40.86	34.84	43.13	33.16	45.18
Household relying on other sources	4.80	2.71	4.89	2.52	4.65	2.57	4.33	2.47
Mixed wage and entrepreneurial without other income sources	3.56	0.07	1.88	0.09	1.45	0.03	1.47	0.05
All households	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Family Income and Expenditures Survey; author's calculations.

Table 5. Income sources of mixed wage and entrepreneurial households (% of total household income)

	Urban			Rural		
	Entrepreneurial	Wages	Others	Entrepreneurial	Wages	Others
Mixed households in 1988	32.7	46.24	21.06	40.22	33.02	21.76
Mixed households in 1991	32.99	46.72	2.029	40.24	38.29	21.47
Mixed households in 1994	31.48	46.64	21.88	38.72	39.93	21.35
Mixed households in 1997	30.63	47.36	21.52	38.23	39.55	22.22

Source: Family Income and Expenditures Survey; author's calculations.



**Table 6. Distribution of heads by household category and educational attainment, 1997 (in percent)**

	No grade attained	Grades I to III	Grade IV	Grade V	Elem grad	1st to 3rd year high school	High school grad	College undergrad	College grad
Wage-earning families	14.69	21.91	21.04	23.88	27.47	32.57	39.97	39.39	48.85
Entrepreneurial families	45.96	30.76	32.00	29.91	26.03	23.08	20.28	18.64	13.50
Mixed wage and entrepreneurial with other income sources	32.97	43.85	43.36	43.58	43.72	41.75	35.38	35.79	30.67
Household relying on other sources	6.29	3.38	3.54	2.58	2.35	1.89	3.04	4.89	5.41
Mixed wage and entrepreneurial without other income sources	0.10	0.10	0.06	0.06	0.43	0.72	1.33	1.30	1.56
All households	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Family Income and Expenditures Survey; author's calculations.

Table 7 reports the income as well as the number of families that operate enterprises. In urban areas, trade is the largest entrepreneurial sector, followed by agricultural activities. In rural areas, agricultural activities supplement the incomes of more than 3.5 million households. Trade activities expand the market opportunities of more than one million households. Across urban areas, income gaps are evidently wide; mean incomes here are twice as large as rural incomes. Those relying on agriculture have mean entrepreneurial incomes that are close to their mean household income. This implies that, on average, these families have limited access to labor markets and therefore concentrate more on entrepreneurial activities.

#### *4.4. Poor households*

The preceding section laid the groundwork for focusing on the bottom 40 percent of the total household population. This section tackles the comparison of those at the lowest 40 percent against those at the top 30 percent. For our purposes, the lowest 40 percent are assumed to constitute the poor. This approach has a primary advantage. Enterprises maintained by households in the lower 40 percent are most likely informal firms relative to enterprises owned by the rich.

As expected, the number of activities is highest in extended families, as they can address the manpower problem, thereby paving the way for multiple entrepreneurial activities. Relative to higher deciles, poor households have the highest number of entrepreneurial activities.

Table 8 shows that in urban areas, more than 40 percent of total urban poor are into agriculture, fishery, and forestry. Trade, manufacturing, transport, and community enterprises are also important among the poor. Few poor households engage in mining and construction. Regardless of location, poor households tend to concentrate in two sectors: agriculture and trade.

As income increases, participation in either agricultural or trading activities is marked with significant differences. As incomes increase, the importance of agricultural enterprises declines. Forty-four percent of rich rural families have agricultural enterprises. Among rich households, trade activities are the most prominent, followed by transport and community services.

Table 9 shows the gaps in mean entrepreneurial incomes between poor and rich households. In terms of mean entrepreneurial incomes across decile categories, the differences are astounding. A case in point is community, social, and private services. In urban areas, the mean income of the said sector is almost eight times that of those belonging to poor households in 1997. For the same sector and decile category, differences based on urbanity are also evident. Enterprises in trade, which registered the second-highest number, have higher mean incomes in urban compared to rural areas. In agriculture, the mean entrepreneurial income in rural areas is higher than that in urban areas.

**Table 7. Mean household income, mean entrepreneurial income, and number of households by enterprise and urbanity (000), 1997**

	Urban			Rural		
	Mean household income	Mean entrepreneurial income	No. of households	Mean household income	Mean entrepreneurial income	No. of households
Agriculture, fishery and forestry	93.40	59.10	701.90	29.60	27.40	3632.70
Mining and quarrying	140.50	119.10	10.30	55.20	46.70	28.70
Manufacturing	205.50	70.10	268.20	107.80	34.20	405.90
Construction	311.70	80.00	47.20	167.60	45.00	29.20
Trade	178.30	85.70	1391.50	74.10	40.40	1012.40
Community	248.20	87.20	426.30	113.00	35.90	207.90
Transport	202.10	125.80	497.50	86.10	64.50	359.40
Entrepreneurial activities not elsewhere classified	275.00	151.50	98.30	127.60	88.40	57.80
All households	179.70	71.70	3441.10	77.00	33.60	5733.90

Source: Family Income and Expenditures Survey; author's calculations.

Table 8. Distribution of household enterprises by deciles and industry, 1997

	Urban			Rural		
	Bottom 40%	Second 30%	Top 30%	Bottom 40%	Second 30%	Top 30%
Agriculture, fishery and forestry	41.30	18.64	10.20	71.00	54.91	43.90
Trade	29.70	42.88	44.60	14.00	22.00	26.00
Manufacturing	8.50	8.01	7.40	7.30	7.07	6.20
Community	9.00	12.87	13.90	2.80	4.80	5.00
Transport	8.50	13.90	18.10	3.10	9.25	15.30
Mining and quarrying	0.30	0.30	0.30	0.60	0.27	0.70
Construction	1.30	0.90	1.70	0.50	0.59	0.40
Entrepreneurial activities not elsewhere classified	1.20	2.53	4.00	0.60	1.13	2.60

Source: Family Income and Expenditures Survey; author's calculations.

**Table 9. Mean entrepreneurial income by activity, deciles, and urbanity**

	Urban			Rural		
	Bottom 40%	Second 30%	Top 30%	Bottom 40%	Second 30%	Top 30%
Agriculture, fishery and forestry	20,093	30,481	41,202	21,254	33,047	54,200
Poultry raising	19,100	21,621	37,326	21,684	29,743	47,386
Fishery	29,818	45,341	102,125	28,594	40,865	96,940
Forestry	20,292	24,132	59,167	21,651	32,261	54,392
Trade	25,739	40,809	114,956	25,075	37,918	86,294
Manufacturing	21,670	43,117	213,775	20,440	41,687	95,146
Community	23,230	43,384	191,718	21,631	31,734	85,591
Transport	35,631	59,423	11,316	33,493	56,453	106,337
Mining and quarrying	27,807	46,530	81,857	21,661	20,339	176,632
Construction	30,728	57,685	267,347	30,882	53,990	105,032
Entrepreneurial activities not elsewhere classified	37,864	51,509	178,462	29,852	55,786	193,562

Source: Family Income and Expenditures Survey; author's calculations.

Table 10 presents the distribution by educational attainment of households. Heads of poor households tend to have finished lower levels of education compared to those in the top 30 percent. Most of them have not gone beyond high school, with college graduates representing less than 1 percent of total rural poor in 1997. Although the said proportion is close to 2 percent in urban areas, which is higher than that in rural areas, it is way too low compared to those in the top 30 percent. Close to 40 percent of poor urban households have heads that did not finish elementary education. In rural households, more than 40 percent of their respective heads did not finish elementary.

To summarize, the profiles have provided a glimpse of how each major household category fared in income generation given selected profiles. Comparisons among households based on economic status provided explanations as to why poor households performed no better than their nonpoor counterparts. The results highlighted the importance of human capital in income generation and the ability of the household to diversify income sources as a way of mitigating risks.

## 5. Empirical framework

This section presents the empirical procedures to model income generation and the decision to engage in any entrepreneurial activity. The methodologies attempt to explain the observed profiles presented in section 4 of this paper. Using FIES for the years 1988, 1991, 1994, and 1997 the study will attempt to assess how well each model explains the variation in its respective dependent variables.

### 5.1. Family income functions<sup>3</sup>

Family income functions are natural empirical extensions of the extensively used individual earnings functions. By construction, these functions still subscribe to the basic theoretical predictions of human capital theory. They are of use especially in modeling income generation.

The following semi-logarithmic income function is estimated using ordinary least squares (OLS):

$$\log Y_i = \alpha + \sum \beta_i X_i + \lambda U + \sum_{j=1}^{J-1} X_j r_{ij} + \sum_{k=1}^{K-1} \delta_k i_{ik} + \sum_{l=1}^{L-1} \gamma_l o_{il} + \sum_{m=1}^{M-1} \varphi_m g_{im}$$

where  $r_{ij}$ ,  $i_{ik}$ ,  $o_{il}$  and  $g_{im}$  refer to region of residence, industry affiliation, occupation, and schooling level, respectively. Note that these dummy variables left one category out. The National Capital Region (NCR) is the left-out dummy for region; agriculture is the left-out dummy for industrial affiliation and occupation; and heads that did not finish elementary represent the left-out category for grade attained. Household head characteristics or variables are included in the x vector.  $U$  represents the urbanity dummy and is the error term.

<sup>3</sup>Important insights were provided by Dr. Balisacan's specification.

**Table 10. Distribution of heads by urbanity and grade attained in 1997**

	Urban			Rural			All Deciles
	Bottom 40%	Second 30%	Top 30%	Bottom 40%	Second 30%	Top 30%	
No grade attained	4.86	2.05	0.81	7.75	5.62	3.03	4.37
Grades I to III	11.79	6.49	2.83	18.28	12.23	7.02	10.64
Grade IV	8.81	4.72	2.15	11.80	8.78	4.97	7.30
Grade V	6.70	4.00	1.82	7.59	6.24	4.17	5.20
Elementary graduate	28.00	23.60	11.26	29.71	27.53	20.67	23.43
1st to 3rd year high school	14.91	13.88	8.00	11.03	11.40	8.59	11.02
High school graduate	16.77	27.80	24.99	10.38	16.61	18.75	18.50
College undergraduate	6.75	12.94	20.91	2.89	8.34	16.31	10.67
College graduate	1.42	4.53	27.22	0.58	3.24	16.48	8.87
All entrepreneurial households	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Family Income and Expenditures Survey; author's calculations.

Estimation of income functions makes numerous assumptions on the dependent variable, its determinants, and other relevant exogenous variables. From the OLS equation, distributional assumptions made on the error structure affect the distribution of log of  $Y$ .

$$\log Y_i \sim N \left( \alpha + \sum \beta_i X_i + \lambda U + \sum_{j=1}^{J-1} X_j r_{ij} + \sum_{k=1}^{K-1} \delta_k i_{ik} + \sum_{l=1}^{L-1} \gamma_l o_{il} + \sum_{m=1}^{M-1} \varphi_m g_{im}, \sigma^2 \right)$$

This is the case since log of  $Y$  is a random variable. Hence, it is also normal. A misspecification of the error structure would lead to inconsistent and biased estimates.

Most of the demographic variables pertain to household head. We assume that the household is a collective unit represented by a household head. The FIES compiles no information on individual members, rendering impossible the extraction of relevant information about them. The head is deemed the breadwinner, indicating the importance thereof in income-generating activities as well as decision making.

Dummy variables on educational attainment are constructed with heads that did not finish elementary relegated as the control. The use of dummy variables avoids the inherent difficulty with respect to the treatment of the education variable in FIES. Log of income is seen to increase with educational attainment—that is, families whose heads have finished college have higher productivities relative to the other categories, holding other factors constant. This result is standard in individual earnings functions. Moreover, a significant coefficient would also mean that it is in accord with Schultz's hypothesis which states that educated individuals adapt more easily as economic circumstances change, using assets more efficiently, obtaining better credit arrangement, and exploiting new income opportunities more quickly [Glewwe and Hall 1998:186].

### 5.2. Age proxies for experience

Normally, it is hypothesized that age is positive and significant while age square is negatively significant. As the head ages, the growth in log of income diminishes. However, this may not be the case for family income functions. As the head grows older, his income growth diminishes. To surpass or maintain the same level of income, the family must compensate for the expected slowdown in the head's earnings by participating in economic activities. For instance, over the years, members become able workers or garner sufficient education to gain entry into the labor market. Thus, the coefficient should be positive, indicating the changes in employment profiles of members over time.

Locational variables, like urbanity and regional residence, incorporate factors that affect the log of income. Glewwe and Hall [1998:185] noted that most household



incomes are sensitive to regional, national, and international economic conditions as they become more exposed to shocks emanating therefrom.

Many household heads rely on wage work. The level of wages varies with occupation even for the same industry. The relative importance of each occupational category can be seen from their respective coefficient estimates. Other variables that positively affect the ability of households to respond to opportunities are as follows: (a) access to electricity, (b) tenure status, (c) toilet facilities, (d) water supply, and (e) family size. Access to electricity enables the household to use modern technologies such as electrical machinery. Tenure status is important in that a household may engage in more activities. Toilet facilities and potable water supply are seen to complement the household's ability to respond to opportunities. Lastly, family size shows how important large families are in income generation. It is hypothesized that family size is positive.

### 5.3. Decision functions

To predict the probability that a household engages in any entrepreneurial activity, we adopt the probit model. This model is estimated using maximum likelihood.

The estimated equation is of the following form:

$\Pr(E_j | x_j) = \Phi(\beta'x)$ , where  $\Phi(\bullet)$  is the standard cumulative normal.  $E_j$  is a dummy variable that attains a value 1 if the household engages in any entrepreneurial activity at any time during the reference period; 0 otherwise. The equation simply means that the probability of an event E conditional on  $x$  is just the cumulative distribution evaluated at  $\beta'x$ .

In this model, we are concerned with both direction of causation and marginal effects. Direction of causation is based on the magnitudes and signs of coefficient estimates in the probit model. However, the coefficients by themselves do not represent the marginal effects. This means that in interpreting marginal effects we would need another estimation procedure. We will only discuss how the probability changes given an infinitesimal change in the continuous variables.

To get the marginal effects, a probit model was estimated. The reported coefficients correspond to changes in the probability of engaging in entrepreneurial activities given a small change in a continuous independent variable.

$$b_i = \left. \frac{\partial \Phi(xb)}{\partial x_i} \right|_{x=\bar{x}} \phi(\bar{x}b) b_i$$

$b$  refers to the vector of estimated coefficients in the probit model.  $b_i$  represents the marginal effect of an infinitesimal increase in variable  $x_i$ .  $\phi(\bullet)$  denotes the normal density. The marginal effect is evaluated using the means of independent variables.

The determinants of the said probability are grouped in the following categories: (a) household characteristics, (b) household head characteristics, and (c) locational variables.

Household composition is an important determinant. This is represented by various age categories. In labor-intensive activities, large families can meet manpower requirements. Families with large number of young children might not participate in entrepreneurial activities because child care becomes a primary concern. On the other hand, if there are more adults in a family, the more likely a family may engage in entrepreneurial activities.

Education categories are also incorporated. A head that finished a high level of education is not likely to engage in entrepreneurial activities. On the other hand, those with poor educational profiles may have a higher probability of engaging in any entrepreneurial activity.

We follow Alba [2002] by including occupational categories into the probit specification. A negatively significant coefficient means that households with heads belonging to a particular category are not likely to engage in entrepreneurial activities.

Locational variables are important because they indicate the extent of opportunities prevalent in the household's place of residence. A significantly positive estimate means that in that particular area, the likelihood of a household engaging in entrepreneurial activity is high.

## **6. Results and interpretation**

### *6.1. Family income functions*

Appendix Table 1 reports the income function coefficients. Variations in the independent variables explain no less than 57 percent of total variation in total household income for all years. All the models are significant, indicating that all variables are not jointly equal to zero. Coefficient estimates of regional dummies are negative relative to NCR, the left out dummy. NCR is the most urbanized region. Based on reported estimates of mean household income, households in NCR have the highest national average (see *Philippine Statistical Yearbook*).

The urbanity variable is positive, indicating that urban households are in a better position to have higher incomes. This explains the highlighted discrepancies between urban and rural incomes in this study. Relative to agricultural occupation, all of the occupation dummies are positive. This means that incomes of families whose heads are not in agriculture are higher, holding other factors constant. The industry dummies merely confirm the fact that relative to agriculture, employment of heads in other industries tends to provide higher incomes. This confirms what the various

income tables have depicted. In all quintiles regardless of urbanity, households belonging to agriculture have the lowest income relative to other industries.

Returns to a head's education are reflected by coefficient estimates on schooling dummies. Over the years, estimates on heads finishing college are consistently the highest relative to heads that were not able to finish elementary. Thus in comparing incomes by educational attainment we would expect that a household represented by a college degree holder has higher income than that headed by a high school graduate. The high returns to college education may partly reflect what Schultz had hypothesized. Being more educated, college graduates are in a better position to take advantage of market opportunities by utilizing resources efficiently and quickly.

The head's age is positively related to family income. Its square is positively related to income. As mentioned, the positive sign of age square can be interpreted in terms of household composition transitions over time. Since it is significant, the observed family income patterns are not likely to diminish over time given changes in income-earning potentials of members, holding other factors constant.

Family size is also a positively significant factor in income generation. This is the case since total income is an aggregation of household members' economic activities. The number of entrepreneurial activities also has a positive impact on log of income. The larger the number of activities, the higher the log of income becomes, holding other factors constant. Access to electricity, water supply, and toilet facilities are positively related, indicating that households with access thereto have higher incomes. Housing tenure is also positively related to log of income. This means that relative to those who do not own their own houses and lots, they earn more.

## *6.2. Predicted incomes under two scenarios*

Based on coefficient estimates, the model predicts levels of incomes for a household based on locational and other characteristics of the household head. Appendix Table 6 shows how a household fares in terms of income generation given locational and the head's characteristics. There are two scenarios—best and worst. Representing the best scenario is the following: a household situated in Metro Manila whose head is a male professional in the finance, insurance, real estate, and business services and has a college degree is predicted to have more than Php 400,000 mean annual income. On the other hand, a household in Bicol represented by a head who has not finished elementary and a male agricultural worker has only Php 35,000 predicted mean income. This exercise confirms the synergistic impact of locational opportunities and the household head's human capital on household income generation.

### *6.3. Decision functions*

Appendix table 5 reports the estimation results of the probit model. Households in regions other than NCR are more likely to engage in entrepreneurial activities. If located in urban areas, these households are less likely to engage in entrepreneurial activities. In essence, this is consistent with the findings on the regional dummy coefficients.

Relative to agricultural workers, all except sales workers are less likely to engage in entrepreneurial activities. This means that households with heads working in sales are more likely to engage in entrepreneurial activities. As expected, households with heads who finished college shy away from entrepreneurial activities, relative to those who did not finish elementary education. Most of the heads that finished college remained in the wage-earning categories. This is consistent with the findings that most heads who finished college are in the wage-earning category. Nuclear families are less likely to engage in entrepreneurial activities. Given a small family size, it would be hard to allocate work assignment to members.

As for household composition, households with large number of dependents (members less than one year old and members less than seven years old) are less likely to engage in entrepreneurial activities. Attending to the enterprise, providing child care, and doing household chores are difficult to undertake at the same time. Child care in families with large number of dependents demands great amounts of attention and limits substitution possibilities due to prioritization of such activities.

### *6.4. Marginal probit results*

The question on how to determine direction of causation has been answered by the probit equation. However, in determining marginal effects, we need to measure how the probability responds to changes in the continuous independent variables. It is also possible to determine how the probability responds to transitions in the independent dummy variables. However, the analysis would simply focus on continuous variables like age, family size, and household composition.

Household composition variables have varying levels of marginal effects, with the number of less than one-year-old household member being the most negative. If another child is born, the household is less likely to engage in entrepreneurial activity. The number of household members who are more than 25 years old have the only positive marginal effect. A new member who just turned 25 has a significantly positive effect on the probability.

The effect of increasing family size by one person is positive. Although consistently positive and significant, we should be aware that not all additions thereto should be interpreted in the same manner. There may be instances when the added member is a newborn, in which case the impact should be negative.

Table 11. Marginal effects of continuous variables

Variable	1988		1991		1994	
	dF/dx	Std. Err.	dF/dx	Std. Err.	dF/dx	Std. Err.
Age of household head	0.01	0.00	0.00	0.00	0.01	0.00
Square of age	0.00	0.00	0.00	0.00	0.00	0.00
Family size	0.02	0.01	0.01	0.01	0.02	0.01
No. of household members less than 1 year old	-0.04	0.01	-0.03	0.01	-0.02	0.01
No. of household members less than 7 year old	-0.03	0.01	-0.01	0.01	-0.03	0.01
No. of household members less than 15 year old	-0.01	0.01	0.00	0.01	-0.01	0.01
No. of household members less than 25 year old	0.00	0.01	0.00	0.01	0.00	0.01
No. of household members more than 25 year old	0.01	0.01	0.02	0.01	0.00	0.01

Note: dF/dx represents the magnitude of the marginal effect.

## **7. Summary and conclusion**

By employing income approach, the profiles of Philippine households with respect to different aspects were analysed. The study characterized the informal sector in terms of entrepreneurial activities, considering that a major portion of the informal sector is composed of household enterprises. Moreover, the inherent difficulty in defining the informal sector for empirical purposes was avoided. It was also shown that the number of establishments was way too low relative to the magnitude of household enterprises. This indicated that in using micro establishments, we might get estimates that are biased.

Besides displaying relevant results on income profiles, family categories, and other important variables like education and industry affiliation, the study employed simple econometric analysis to model income determination. Admittedly, static income functions fail to take into account the importance of household dynamics that are involved in decision making. The study also modeled participation in entrepreneurial activities. Results from both estimation procedures were in line with observations as shown in the profiles.

Many interesting insights were discovered. Income disparities can be explained by appealing to income-generating functions. The generality of form allows someone to use an expanded human capital-based income function. There is no doubt that human capital variables, notably education, still play important roles in income determination. Locational variables and other household characteristics that support the household's objectives are also important. Overall, the results provide important support to the observation that households with varying degrees of characteristics are most likely to display different profiles.

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Appendix Table 1. OLS results for the income function

	1988		1991		1994		1997	
Constant	8.57	0.05 **	9.15	0.05 **	9.29	0.05 **	9.61	0.04 **
HOUSEHOLD CHARACTERISTICS								
Age of household head	0.02	0.00 **	0.02	0.00 **	0.03	0.00 **	0.03	0.00 **
Age squared	0.00	0.00 **	0.00	0.00 **	0.00	0.00 **	0.00	0.00 **
Single house	0.08	0.02 **	0.03	0.01 **	0.03	0.01 **	-0.01	0.01 **
Owner of land and house	0.11	0.01 **	0.06	0.01 **	0.09	0.01 **	0.08	0.01 **
Water supply	0.19	0.01 **	0.22	0.01 **	0.21	0.01 **	0.23	0.01 **
Toilet facility	0.17	0.01 **	0.19	0.01 **	0.22	0.01 **	0.19	0.01 **
No. of entrepreneurial activities	0.06	0.01 **	0.07	0.00 **	0.05	0.00 **	0.06	0.00 **
Family size	0.09	0.00 **	0.09	0.00 **	0.09	0.00 **	0.09	0.00 **
Has electricity	0.29	0.01 **	0.32	0.01 **	0.32	0.01 **	0.37	0.01 **

Appendix Table 1. OLS results for the income function (continued)

	1988			1991			1994			1997		
Constant	8.57	0.05	**	9.15	0.05	**	9.29	0.05	**	9.61	0.04	**
HOUSEHOLD RESIDENCE												
Urbanity	0.10	0.01	**	0.07	0.01	**	0.07	0.01	**	0.10	0.01	**
Ilocos	-0.39	0.02	**	-0.47	0.02	**	-0.54	0.02	**	-0.45	0.02	**
Cagayan Valley	-0.34	0.03	**	-0.41	0.02	**	-0.41	0.02	**	-0.39	0.02	**
Central Luzon	-0.13	0.02	**	-0.18	0.02	**	-0.25	0.02	**	-0.22	0.01	**
Southern Tagalog	-0.23	0.02	**	-0.25	0.01	**	-0.29	0.01	**	-0.27	0.01	**
Bicol	-0.46	0.02	**	-0.60	0.02	**	-0.62	0.02	**	-0.57	0.02	**
Western Visayas	-0.31	0.02	**	-0.37	0.02	**	-0.39	0.02	**	-0.40	0.02	**
Central Visayas	-0.52	0.02	**	-0.59	0.02	**	-0.60	0.02	**	-0.56	0.02	**
Eastern Visayas	-0.47	0.02	**	-0.58	0.02	**	-0.60	0.02	**	-0.61	0.02	**
Western Mindanao	-0.27	0.02	**	-0.49	0.02	**	-0.58	0.02	**	-0.38	0.02	**
Northern Mindanao	-0.42	0.02	**	-0.63	0.02	**	-0.64	0.02	**	-0.60	0.02	**
Southern Mindanao	-0.25	0.02	**	-0.46	0.02	**	-0.42	0.02	**	-0.48	0.02	**
Central Mindanao	-0.12	0.02	**	-0.49	0.02	**	-0.51	0.02	**	-0.58	0.02	**
CAR	-0.32	0.03	**	-0.40	0.03	**	-0.37	0.03	**	-0.32	0.02	**
ARMM				-0.14	0.03	**	-0.24	0.02	**	-0.27	0.02	**
CARAGA										-0.70	0.02	**

Appendix Table 1. OLS results for the income function (continued)

	1988		1991		1994		1997	
Constant	8.57	0.05 **	9.15	0.05 **	9.29	0.05 **	9.61	0.04 **
OCCUPATION OF HOUSEHOLD HEAD								
Professionals	0.23	0.04 **	0.23	0.03 **	0.26	0.03 **	0.27	0.03 **
Administrative	0.87	0.05 **	0.65	0.04 **	0.63	0.04 **	0.50	0.03 **
Clerical	0.12	0.04 **	0.17	0.03 **	0.15	0.03 **	0.19	0.03 **
Sales	0.24	0.04 **	0.24	0.03 **	0.25	0.03 **	0.23	0.03 **
Service	0.12	0.04 **	0.13	0.03 **	0.15	0.03 **	0.08	0.03 **
Production	0.10	0.03 **	0.09	0.03 **	0.14	0.03 **	0.07	0.03 **
INDUSTRY AFFILIATION OF HOUSEHOLD HEAD								
Mining and quarrying	0.14	0.05 **	0.24	0.05 **	0.18	0.06 **	0.12	0.05 **
Manufacturing	0.10	0.03 **	0.13	0.03 **	0.09	0.03 **	0.13	0.03 **
Utilities	0.17	0.06 **	0.21	0.05 **	0.25	0.05 **	0.31	0.04 **
Construction	0.00	0.04	0.07	0.03 **	0.01	0.03	0.05	0.03
Wholesale and retail trade	0.03	0.04	0.02	0.03	0.00	0.03	0.02	0.03
Transportation, communications and storage	0.08	0.04 **	0.10	0.03 **	0.06	0.03 **	0.11	0.03 **
Finance, insurance, real estate	0.21	0.04 **	0.15	0.04 **	0.16	0.04 **	0.16	0.03 **
Community and social services	0.02	0.03	0.03	0.03	0.01	0.03	0.11	0.03 **

Appendix Table 1. OLS results for the income function (continued)

	1988		1991		1994		1997	
Constant	8.57	0.05 **	9.15	0.05 **	9.29	0.05 **	9.61	0.04 **
HOUSEHOLD HEADS' EDUCATIONAL ATTAINMENT								
Elementary graduate	0.09	0.01 **	0.09	0.01 **	0.07	0.01 **	0.08	0.01 **
1st to 3rd year high school	0.14	0.02 **	0.13	0.01 **	0.13	0.01 **	0.13	0.01 **
High school graduate	0.24	0.01 **	0.19	0.01 **	0.20	0.01 **	0.22	0.01 **
College under graduate	0.41	0.02 **	0.42	0.02 **	0.39	0.02 **	0.42	0.01 **
College graduate	0.78	0.02 **	0.78	0.02 **	0.78	0.02 **	0.81	0.01 **
Number of observations	15847		20559		20769		33086	
F-stat	500.16		719.86		789.29		1188.87	
Prob > F	0		0		0		0	
R-squared	0.5764		0.6014		0.6209		0.6129	
Adjusted R-square	0.5753		0.6006		0.6201		0.6124	
Root MSE	0.52977		0.52648		0.5074		0.5237	

Appendix Table 2. Coefficient estimates of the probit equation

	1988		1991		1994		1997	
Constant	-0.31	0.16 *	0.38	0.14 **	0.29	0.15 *	0.18	0.11
HOUSEHOLD CHARACTERISTICS								
Age of household head	0.02	0.01 **	0.00	0.01	0.02	0.01 **	0.01	0.00 **
Age squared	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Family size	0.06	0.03 *	0.03	0.02	0.05	0.02 *	0.05	0.02 **
Nuclear	-0.10	0.03 **	-0.07	0.03 *	-0.14	0.03 **	-0.04	0.02
HOUSEHOLD COMPOSITION								
Members less than 1 year old	-0.11	0.04 **	-0.08	0.04 *	-0.05	0.04	-0.10	0.03 **
Members less than 7 years old	-0.08	0.03 *	-0.04	0.02	-0.08	0.02 **	-0.06	0.02 **
Members less than 15 years old	-0.02	0.03	0.01	0.02	-0.03	0.02	0.00	0.02
Members less than 25 years old	-0.01	0.03	0.01	0.02	-0.01	0.02	-0.02	0.02
Members over 25 years old	0.03	0.03	0.06	0.02 *	0.01	0.02	0.04	0.02 *

Appendix Table 2. Coefficient estimates of the probit equation (continued)

	1988		1991		1994		1997	
Constant	-0.31	0.16	0.38	0.14	0.29	0.15	0.18	0.11
HOUSEHOLD RESIDENCE								
Urbanity	-0.15	0.03	-0.26	0.02	-0.20	0.02	-0.22	0.02
Ilocos	0.59	0.06	0.50	0.05	0.29	0.05	0.51	0.05
Cagayan Valley	0.60	0.07	0.35	0.06	0.21	0.06	0.27	0.05
Central Luzon	0.28	0.05	0.04	0.04	0.05	0.04	-0.03	0.03
Southern Tagalog	0.39	0.05	0.06	0.04	0.10	0.04	0.14	0.03
Bicol	0.55	0.06	0.41	0.05	0.32	0.05	0.47	0.04
Western Visayas	0.30	0.05	0.12	0.04	0.15	0.04	0.27	0.04
Central Visayas	0.65	0.06	0.28	0.05	0.05	0.05	0.29	0.04
Eastern Visayas	0.73	0.07	0.53	0.06	0.47	0.06	0.59	0.04
Western Mindanao	0.94	0.07	0.53	0.06	0.63	0.06	0.33	0.05
Northern Mindanao	0.66	0.06	0.41	0.05	0.45	0.05	0.49	0.04
Southern Mindanao	0.56	0.06	0.44	0.05	0.45	0.05	0.46	0.04
Central Mindanao	0.87	0.07	0.52	0.07	0.45	0.07	0.52	0.05
CAR	0.67	0.08	0.62	0.08	0.55	0.08	0.59	0.05
ARMM			1.07	0.09	0.99	0.09	0.98	0.06
CARAGA							0.54	0.05

Appendix Table 2. Coefficient estimates of the probit equation (continued)

	1988		1991		1994		1997	
Constant	-0.31	0.16 *	0.38	0.14 **	0.29	0.15 *	0.18	0.11
OCCUPATION OF HOUSEHOLD HEAD								
Professionals	-1.10	0.06 **	-1.11	0.05 **	-1.10	0.05 **	-1.13	0.04 **
Administrative	-0.61	0.09 **	-0.67	0.07 **	-0.64	0.06 **	-0.70	0.05 **
Clerical	-1.39	0.07 **	-1.40	0.06 **	-1.23	0.06 **	-1.40	0.05 **
Sales	0.22	0.05 **	0.22	0.04 **	0.19	0.04 **	0.13	0.03 **
Service	-1.22	0.05 **	-1.14	0.04 **	-1.22	0.04 **	-1.19	0.03 **
Production	-1.03	0.03 **	-1.04	0.03 **	-1.02	0.03 **	-1.03	0.02 **
HOUSEHOLD HEADS' EDUCATIONAL ATTAINMENT								
Elementary graduate	0.04	0.03	0.03	0.03	0.01	0.03	0.02	0.03
1st to 3rd year high school	0.07	0.04	0.08	0.04 *	0.08	0.04 *	-0.02	0.03
High school graduate	0.11	0.04 **	0.07	0.03 *	0.06	0.03	0.00	0.03
College undergraduate	0.03	0.05	0.06	0.04	0.02	0.04	0.01	0.03
College graduate	-0.25	0.05 **	-0.23	0.05 **	-0.26	0.05 **	-0.29	0.04 **

Notes: \*\* Significant at 0.01 level. \* Significant at 0.05 level.