

**HOUSEHOLDS' UNPAID WORK BY IMMIGRATION STATUS
IN CANADA**

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ABSTRACT

This thesis looks at the 'immigration status differentials' in time allocation to household work, value of household work, and determinants of participation rate in household work. In determining the time allocated to household work by immigration status, the data provided by General Social Survey (GSS) Circle 12 Individual Information Survey, on time spent on household work in Canada 1998 with about 6,944 respondents was used. Two methods of valuation of household unpaid work were used which were opportunity cost (before and after tax) and replacement cost. In deciding which method is best I recommend the use of replacement cost of valuing household work since GNP itself measures actual output produced.

In the study, I anticipated that an average immigrant spends more time in household work than an average Canadian and that an average female generally allocates more time to household work than an average male based on socio-economic factors determining household unpaid work as seen in Gronau (1977) and Becker (1965). As expected, the results show that an average female allocates more time to household work than an average male and the difference is statistically significant. An average immigrant and Canadian allocate the same amount of time to household work. However, in maintenance and repairs, the results show that males' participation rate is higher than females' and an average Canadian participation rate in maintenance and repairs is higher than the immigrant with statistically significant difference. When other variables were introduced into the model using probit method of estimation, it was observed that there is no significant difference in participation rates between Canadians and immigrants.

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CHAPTER 1

Introduction

Economists, statisticians and policy-makers are increasingly aware of the need to account for non-monetary activities such as household unpaid work. According to Statistics Canada (1995), people spend as much time in unpaid work as they do in paid work in Canada and other countries. In addition, many resources are utilized in unpaid work; hence, trying to attach monetary value to household work becomes imperative.

This study tries to estimate the value of unpaid work. Since measurement of household unpaid work requires the knowledge about how people spend their time, this study also examines the pattern of time use. According to Statistics Canada (1995), the first study of the measurement of household unpaid work in Canada was based on the information obtained from surveys in Halifax and Toronto in 1971 and 1972. Since that time a number of time use surveys have been carried out in Canada. According to Hawrylyshyn (1971, preface page), “arriving at a set of numbers was not the primary objective of this research; rather, it was to investigate how this can be done in practice, considering all the procedures required and the concomitant pitfalls that one must struggle with in the estimates.” It is in this direction that this study is based.

The main objectives of this thesis are to examine the allocation of time and to measure and value household unpaid work by Canadians and immigrants. In this thesis, the term Canadian refers to someone who was born in Canada and immigrant means someone who was born outside Canada even if they later became citizens.

Since one of the factors in deciding whether to participate in market work or household work is real wage rate and past studies suggest that Canadians have higher wage rate than their

fellow immigrant counterparts, it is expected that immigrants will allocate more time to household work than Canadians. It is also expected that the time allocation to and value of household work would be higher for immigrants than it would be for Canadians unless there is a great difference between the imputed wages for both groups.

Empirical studies show that females generally do more household work compared to males. It should be expected that though women spend more time in household work than men, over the years this difference will decline because over time women are acquiring more education which increases their real wage rates and in turn have a negative effect on house work and a positive effect on market work. Women's use of birth control pills and delay in getting married will also contribute to this change.

In order to compare this thesis findings with those of Statistics Canada, the population was divided into male and female respondents with and/ or without children. The findings on average time spent on unpaid work and the average value of unpaid work for an average person in Canada were compared with other representative literature. The population considered in this study was restricted to people who are 25 years to 64 years since it is expected that people who are between that age range can (to a greater or lesser extent) freely choose between paid and unpaid work. The same applies to the valuation of unpaid work with opportunity cost of time method. A young person usually allocates a significant part of his/ her time in acquiring human capital and does not have a lot of opportunity cost in terms of forgone current income; hence this study ignores the youth. For this population group (25 years to 64 years), a total sample of 5,779 Canadians and 1,165 immigrants was obtained from General Social Survey (1998). This comprised of 2,669 and 3,110 Canadian males and females and 585 and 580 immigrant males and females respectively.

Though Statistics Canada has done something similar to this work, they did not compare Canadians and immigrants regarding household work; this thesis fills that gap. Statistics Canada also did not measure the effect of certain factors on household work using econometric analysis and their population coverage were people 15 years and over. To the best of my knowledge, no other past study used econometric analysis to study household work. This study used the data obtained to test the hypothesis and after determining the variables that affect household unpaid work, find out if such effects are statistically significant at given levels of significance. I am constrained in my comparison to previous studies since none have used an econometric approach to test for factors that determine household unpaid work.

Hence, the main objectives of this study are:

- 1) to measure household unpaid work in Canada 1998 by immigration status, gender and presence of children.
- 2) to value household unpaid work in Canada in 2002 with the assumption that the time allocated to household work in 2002 is the same as that allocated to household work in 1998.
- 3) to ascertain factors which might play important role(s) in determining how allocation of time between household and market work is done.
- 4) to find out whether immigrants allocate more/ less time to household work than Canadians.

With the use of recent micro data, this study attempts to find answers to these questions. It focuses on measurement and valuation of various goods and services produced in the household in Canada 1998. The goods and services to be measured and valued are the ones that can be delegated to someone else without a reduction in the utility value. Two methods of

valuation are used in this study: opportunity cost (before tax and after tax) and replacement cost method. The study is based on measurement and valuation of time/ labor inputs to household production, without including non-labor inputs. Measuring of activities such as leisure and volunteer work are beyond the scope of this study.

The organization of this thesis is as follows: Chapter 2 reviews the literature on the topic. Chapter 3 presents the pattern of time use in market and household work. Chapter 4 estimates value of unpaid household work using three methods of valuation. Chapter 5 explains factors that determine whether households should participate in work at home or work in the market. Model specification and regression results are also presented in this chapter. Finally, the summary and conclusion are presented in chapter 6.

CHAPTER 2

Literature Review

This section reviews the literature on the definition of unpaid work. Arguments as to whether households work hours are to be included in national income or not, and various studies on the valuation of household work are also dealt with here.

2.1 Definition of Unpaid Work

Goldschmidt-Clermont (1990) in her studies of economic measurement of non-market household activities differentiated between three different kinds of activities: (a) personal activities (b) productive non-market activities and (c) productive market-oriented activities. She started by asking, “Is housework work?” She gave different scenarios of housework and asked if they can be regarded as work. She indicated that the difference between personal activities and productive non-market activities is defined by the third person criteria. Third person criteria state that an activity is productive if it can be done by someone other than the person benefiting from it without a reduction in utility value (Reid, 1934). The difference between productive non-market activities and productive market-oriented activities is as defined in the Nations System of National Account (SNA) (United Nations Statistical Office, 1968). According to Goldschmidt-Clermont, SNA referred to the concept “economic” as activities that give rise to monetary transactions plus a small number of non-monetized production items.

Ironmonger (1989) stated that household work is different from other kinds of work by the fact that it is done within the household, usually unpaid, done by women most times, invisible, repetitive, undervalued, often undone shortly after being completed, likely to expand to fit the time available, oddly difficult to pass on to others and resistant to change.

Hawrylyshyn (1971, p.19) defined household work as “those economic services produced in the household and outside the market, but which could be produced by a third person hired on the market without changing their utility to the members of the household.” From Hawrylyshyn’s definition, an activity that cannot be delegated to a third person without reduction in the utility value to members of the household (like watching the T.V., resting, exercising, attending a symphony concert, etc) is not regarded as work. Work in the household is usually done by and for others in the family. Hawrylyshyn (1977, p.89) also opined that housework “consists of non-market activities which produce goods or services for the members of the household not desired in and of themselves, but rather for the utility which they yield.”

Baker (1980, p.31) viewed the concept of household production as “activities not directly in the market sector but with direct (and sometimes indirect) economic value. That is, household production combines or creates family inputs to satisfy wants, builds up want-satisfying power in something or somebody, or yields products, services or knowledge (both within and between families).” Baker thus classified household work as activities that have both direct and indirect economic value. By direct economic value he means benefits one gets from doing certain work/something like relaxation, enjoyment, experience, pride and so on. Indirect economic value is based on what has been done such as cooked meal, cleaned floor, washed clothes, etc.

Gates and Murphy (1982, p.8) opined that “Activities are classified as household work when two criteria are satisfied: (1) the activities result in the production of goods and services that could be purchased in the market-place, and (2) the activities could be done by a ‘third person’ without any reduction in the household’s utility.” Household work according to Murphy (1982, p.30) is defined as “non-market uses of time that result in the production of

good or service that could be purchased in the market.” Reid (1934, p.11) defined household production as “consists of those unpaid activities which are carried on, by and for the members, which activities might be replaced by market goods, or paid services, if circumstances such as income, market conditions, and personal inclinations permit the service being delegated to someone outside the household group.” Beutler and Owen, (1980, p.17) defined home production as “by and for household members with the output having use value rather than exchange value. Household production is by and for household members and it is market replaceable in the sense that it could conceivably be delegated to a paid worker.”

From the definitions given by various authors, it was observed that they share some common line of thoughts. For instance, they all believed that market work can be substituted for household work and that household work is done by and for members of household.

Beutler and Owen made a further distinction between home production and household production. According to them, home production has use value (that is it cannot be delegated to someone else) while household production has exchange value i.e. it can be delegated to someone else. This follows that home production is not be measured or valued in this study. This study is concerned with measuring and valuing only household production because it can be easily delegated to someone else without reduction in utility value.

Gates and Murphy’s definition of household work is quite similar to Hawrylyshyn’s definition. They believe that it is market replaceable and that even if it is done by a third person, utility derived should not change. From their definitions, activities that give rise to leisure (or any direct utility) should not be considered as household work.

Based on all the definitions provided above, my definition of household work is any work that is done by members of the household with indirect utility derived from it, which

could be market replaceable if economic conditions allow it, with no change in the utility to be derived. From my definition, the activities regarded as household work in this study are those economic services produced in the household and outside the market, which could be produced by a third person hired on the market without changing their usefulness to members of the household.

2.2 Unpaid Work and National Accounts

National income, as defined by Studenski (1958, p.176), “includes (a) all goods and services produced for the market (b) all services produced by government for collective use (c) all goods and services produced by non-profit-making organizations and, finally (d) certain goods and services produced by members of the household for their own and one another’s use outside the market mechanism.” Studenski’s last point made, recognized the fact that economic values can be created outside the market, but as is well known, the items so included by imputation are few (farmers’ own-consumed food and imputation of rental-value for self-use residences are the usual ones) and small in relative value.

Debates on the inclusion or exclusion of household unpaid work in national accounting have been on for sometime now. Morgan, Sirageldin and Barewaladt (1966) and Sirageldin (1969) argued that household work should be included in GNP as a measure because very substantial services are provided by this non-market activity and that since market substitutes exist, exclusion of the non-market activities from GNP underestimates growth in GNP. They went ahead to say that apart from the economic reasons for estimating value of household unpaid work, there is a very important social reason for deriving a good estimate of the absolute value of household services in the total GNP. Morgan (1966, p.5) projected that the inclusion of unpaid work in the national accounts would have increased gross national product

in 1964 by 38 percent. Sirageldin (1969, p.55), using the same data as Morgan stated that if the value of household work is measured, the average family's disposable income would increase by 43 percent.

Despite the arguments for its inclusion, national accounts guidelines recommend its exclusion. Though some argued that unpaid work should be excluded from national accounts, it should be stated here that the arguments are not against measuring and valuing unpaid work but to maintain a distinction between measures of households' unpaid work and market activities.

The measurement of unpaid work is hampered by both conceptual and technical difficulties. For example, valuing or measuring services such as childcare, cleaning the home and cooking for the family rendered by a housewife is difficult. Even the total number of hours worked is not easy to estimate. Resorting to the usual method applied in the national accounts where the evaluation of output of non-market is done results in two major obstacles: the absence of data on physical inputs and the difficulties of allocating prices to them¹. Even if we arrive at a way of assigning prices to various duties performed in the household, how do we get the records of activities that take place in the household? Usually people do not keep records of activities done at home, so measuring such activities becomes relatively difficult. With the help of time use survey carried out by Statistics Canada, estimated records are now made available.

Kuznets (1941, p.431) a pioneer and early critic of modern national accounts explained the reason for excluding household unpaid work from the national income calculations and said that although services rendered by households serve as compliments to the market eventuating process it should, be excluded because of difficulties one encounters in evaluating domestic

¹ *Statistics Canada (1995)*

service. Lindahl, Dahlgren & Karin in (1937) and Derksen (1941) further indicated that since problems are usually encountered in valuing unpaid services, it should be excluded from the computation of national income.

The exclusion of household unpaid work was well recognized by Studenski (1958, p.177); he rationalized by saying that “the difficulty consists in finding a fair measure of the economic value of the housewife’s services”. To include such a suspicious computation in the national income would significantly lower the reliability of the total.

Alfred Marshall felt that “income-in-kind” such as own consumption of agricultural product should be included in the national account.² This means that whatever subsistence farmers’ produce should be accounted for and that the products should have economic value.

The arguments on the inclusion of unpaid work in GDP have been revived in recent years. Since women do most volunteer and household work, the contribution to production and economic welfare if these two activities are not included in GDP will be understated in women’s contributions to the major economic aggregates.³ In the United Nations report on the Decade for Women (1985, p.120), much emphasis was placed on the “unremunerated contributions of women to agriculture, food production, reproduction, and household activities”. In particular, they suggested that “efforts be made to reflect these contributions in national accounts and economic statistics”.

Having seen all the concomitant pitfalls of including household unpaid work in the national income account, I would recommend that it should not be included in the main account but that there should be a subsidiary account to take care of unpaid work since by definition, national income account takes care of real exchange and not money in-kind. Unless

² Ibid

³ Statistics Canada (1995)

the National Income account is re-defined and general agreement as to what constitutes household unpaid work is reached, including such an activity will pose a great problem especially comparing one country's GDP to another's.

2.3 Valuation of Household Unpaid Work

In recent years, there has been renewed interest, particularly among women's groups, in placing monetary value on non-market work. The 1995 United Nations Fourth World Conference stated in its Platform for Action (item 206) that "national, regional and international statistical agencies should measure, in quantitative terms, unremunerated work that is outside the national accounts and work to improve methods to assess and accurately reflect its value in satellite or other official accounts that are separate from but consistent with core national accounts".

Apart from assigning a dollar value to household work, accounting for this unpaid work will give a clearer picture of aggregate output, income and productivity in Canada and other countries. For example, the continuous increase of the labor force participation among women has led to the shift from non-market work to market work. This sort of shift caused the measured gross national product to rise, resulting in somewhat imprecise picture of the trends in aggregate production and income because the associated decrease in non-market work was never accounted for.

In valuing household unpaid work, there are two main methods used from past literature and these include: opportunity cost and replacement cost. Depending on the objective of the research and availability of data, either or both methods can be used. The opportunity cost method, assumes that time spent in doing paid work could as well be spent on any other

activities. Opportunity cost method presumes that households incur a certain cost for doing household work rather than market work.

Households, in deciding on whether to prefer a certain activity, usually weigh the benefits and costs involved. This means that if households choose to do household unpaid work rather than market work, it will infer that the benefits of doing household work outweigh the costs i.e. the wage one would have earned if he/ she worked in the market is lower than the benefit of working at home.

There are however some problems associated with this method. For example, how do we truly measure opportunity cost for the unemployed? Supposing this person is doing household job simply because he/ she could not gain employment in the market place? For the purpose of this thesis, we will just assume that everyone can work in the market if they want.

Replacement cost is concerned with the cost incurred by the household if someone else outside the household is paid to do the job. If members of the household decide to do it themselves, such cost is not incurred. It is also important to note that in deciding whether to do household work, households usually weigh the benefits and costs involved. If employing someone else to do the household job is cheaper than doing it themselves, they would rather employ the services of this person. There are two ways of measuring replacement cost, we have replacement cost—specialist and replacement cost—generalist. That of the specialist is concerned with imputation of the hourly wage rate of people employed in a similar occupation for the unpaid work. The generalist method is concerned with the imputation of the hourly wage rate of a domestic employee or housekeeper.

2.4 Value of Household Work in Canada and the United States

Canada

Hawrylyshyn (1971) used three methods to estimate the value of household work. He used the opportunity cost method (HOC), the individual-function-cost method (HFC) and the housekeeper-cost method (HHK). The source of data used for his survey was the 1971 census (Halifax and Toronto surveys) with the average of the two surveys applied to other provinces. He made certain assumptions in estimating the value of other types of family units to the contribution of households since the initial survey was based on a family with two parents present. From his estimate, using the opportunity cost the value of household work was \$37,633 million, the value of household work using individual function cost was \$38,447 million and the value of household work using housekeeper cost was \$31,935 million. He observed that the three methods of estimating the value of household work were respectively equivalent to 39%, 40% and 33% of GNP. He further observed that the housekeeper cost estimate was considerably lower than the other two methods of estimation and gave a reason for this kind of outcome. He said that the low value of housekeeper cost as compared to other estimates is associated with the fact that 'professional housekeepers' are more efficient in household work than men and women who do the jobs themselves. He however favored the housekeeper method of estimation based on its efficiency. He showed that women's contribution to value of household work is slightly above two-third and that household work represents approximately one-third of GNP.

Adler & Hawrylyshyn (1978) estimated the value of household work for Canada in 1961 and 1971, from data for 1971 from Census Division of Statistics Canada. They obtained wage rates used for their valuation from Census data on income of full time employees and

assumed a 50-week year for the estimates. In estimating the value of household work, they used the replacement cost method, and opportunity cost method. The results obtained are shown below:

Table 2.1 Value of Household Work (HW), Canada 1961 and 1971

	1961		1971	
	\$Million	(%)	\$Million	(%)
GNP	39,646	(100.0)	94,115	(100.0)
Market Replacement Method				
Females	10,537	(26.6)	26,102	(27.7)
Males	5,124	(12.9)	12,656	(13.5)
Total	15,661	(39.5)	38,758	(41.1)
Opportunity Cost Method				
Females	11,551	(29.1)	25,644	(27.2)
Males	5,759	(14.5)	11,989	(12.8)
Total	17,310	(43.6)	37,633	(40.0)

Source: Adler & Hawrylyshyn (1978, p. 338)

They observed that the bulk of household work is produced by women giving a share of household work close to two-third. From their results, Opportunity cost and replacement cost approach yielded similar results.

Chandler (1994) used three methods: opportunity cost before tax, opportunity cost after tax and replacement cost. He based his estimates on the population 15 years of age and older and used a sample of 9,000 respondents as provided by the General Social Survey (1992). In his result, the opportunity cost after tax estimate of value of household work was \$210.8 billion which represents about 30.6% of GDP or 44.2% of personal disposable income in 1992. Annual average net opportunity cost of the value of household work was \$9,870 per person (\$11,920 for women and \$7,730 for men). The opportunity cost estimate value of household work before tax was given as \$318.8 billion, which was about 46.3% of GDP in 1992. The annual average gross opportunity cost of value of household work was \$14,930 per person, or \$16,860 for women and \$12,920 for men. With the replacement cost method, he obtained an estimate value of household work of \$284.9 billion which represents about 41.4% of GDP and

59.7% of personal disposable income. On per capita basis, annual average replacement cost value of household work was \$13,340: \$16,580 for women and \$9,960 for men. He noted that women performed about 65.9 percent of household work.

Statistics Canada (1995) in measuring and valuing household unpaid work based its population coverage on people aged 15 and over in private households. They used the opportunity cost and replacement cost methods. The opportunity cost was further sub-divided into opportunity cost before taxes and opportunity cost after taxes while the replacement cost was sub-divided into replacement cost-generalist and replacement cost-specialist. The study covered selected years over the period from 1961 to 1992. Statistics Canada based the estimates for 1961 and 1971 on modeling and extrapolation procedures. Statistics Canada showed that Canadians aged 15 and over spent 15 billion hours on unpaid work in 1961 and 25 billion hours in 1992. The increase in number of hours in 1992 was attributed to population growth. Canadians on average spent 1,220 hours on unpaid work in 1961 and 1,160 hours in 1992. Though women spent less time on unpaid work, two-third of the time spent for unpaid work is contributed by women. The value of unpaid work at replacement cost-generalist approach yields the lowest estimate at current prices, \$14 billion for 1961 and \$235 billion for 1992. Value of unpaid work at opportunity cost-before tax based on average hourly earnings, yields the highest estimates, \$26 billion for 1961 and \$374 billion for 1992. Statistics Canada's results of value of unpaid work relative to GDP are shown in the table below:

Table 2.2 Value of Unpaid Work Relative to Gross Domestic Product

Year	Opportunity cost		Replacement cost	
	Before tax (Percentage)	After tax (Percentage)	Specialist (Percentage)	Generalist (Percentage)
1961	63.6	52.4	55.6	34.2
1971	57.5	40.5	50.1	30.5
1981	47.6	31.3	39.5	25.6
1986	44.6	28.0	37.5	26.1
1992	54.2	32.0	43.0	34.0

Source: Statistics Canada (1995)

United States

Murphy (1978) based his value of non-market production estimates for the United States 1960 and 1970, on the civilian non-institutionalized population 16 years of age and over. He further divided this population under three groups: (a) husband-wife family, (b) single women, and (c) single men. He used two methods for the valuation of non-market production: opportunity cost method and market cost method. According to his results, the opportunity cost valuation of home production exceeded the market cost in 1960 by \$4.2 billion or 2.3 per cent and the difference had increased to \$26.9 billion or 8.0 per cent in 1970. These results are below:

Table 2.3 Household Production by the Civilian Non-institutionalized Population 16 Years of age and over in 1960 (Billions of current dollars except last Column)

Population subgroup and method of valuation	Food preparation	House upkeep	Clothing maintenance	Family care	Other	Total Dollar value	Dollar Value as a percent of GNP
Opportunity costs							
Housewives	34.4	24.9	19.0	18.5	15.8	112.6	22.4
Married men	2.6	12.9	0.0	2.6	10.3	28.4	5.6
Single women	8.0	15.4	5.0	5.6	5.9	39.9	7.9
Single men	2.1	2.2	1.1	0.0	3.2	8.6	1.7
Total	47.1	55.4	25.1	26.7	35.2	189.5	37.6
Market cost							
Housewives	29.3	27.2	17.0	15.3	19.4	108.2	21.5
Married men	2.4	13.7	0.0	1.8	11.5	29.4	5.8
Single women	6.7	16.4	4.4	4.5	7.1	39.1	7.8
Single men	2.0	2.2	0.9	0.0	3.5	8.6	1.7
Total	40.4	59.5	22.3	21.6	41.5	185.3	36.8

Source: Murphy (1978 p. 248)

Table 2.4 Household Production by the Civilian Non-institutionalized population 16 years of age and over in 1970 (Billions of current dollars except last Column)

Population subgroup and method of valuation	Food preparation	House upkeep	Clothing maintenance	Family care	Other	Total Dollar value	Dollar Value as a percent of GNP
Opportunity cost							
Housewives	62.3	45.1	34.2	31.1	28.9	201.6	20.7
Married men	4.9	24.6	0.0	4.9	19.6	54.0	5.5
Single women	17.1	34.1	11.1	12.3	13.0	88.2	9.0
Single men	4.7	4.7	2.3	0.0	7.0	18.7	1.9
Total	89.6	108.5	47.6	48.3	68.5	362.5	37.1
Market cost							
Housewives	57.1	41.6	33.1	20.7	33.6	186.1	19.0
Married men	4.9	23.3	0.0	2.9	21.5	52.6	5.4
Single women	15.6	30.3	10.3	7.9	14.6	78.7	8.0
Single men	4.5	4.3	2.0	0.0	7.4	18.2	1.9
Total	82.1	99.5	45.4	31.5	77.1	335.6	34.3

Source: Murphy (1978 p. 249).

Murphy observed that the ratio of home production to GNP appears to decline slightly between 1960 and 1970 but that in the long run, this may tend towards stability. He favored the use of market cost in evaluating home production, since GNP is itself an index of production.

Murphy (1982) in his studies of comparative estimates of the value of household work obtained data from the nationally reliable sample of households representing the civilian non-institutional population 18 years of age and over in the contiguous United States. The sample size was 1,519 respondents and 887 spouses treated as supplemental respondents. The period of survey was between October 1975 and September 1976. Murphy used five different methods of valuation: two methods under market cost approach and these are replacement cost estimate (RCE) and service cost estimate (SCE) and three methods under opportunity cost approach which are compensation estimate (CE), after-tax compensation estimate (ATCE) and net compensation estimate (NCE). By market cost he meant “the cost to the household of substituting paid market labor for its own labor as an input to household work; opportunity cost is the actual or potential earnings forgone by allocating time to household work” (Murphy, p.31). Replacement cost involves employing the service of a housekeeper to replace a particular family member. It uses the wage rate for a market replacement. Service cost involves employing the services of a variety of specialists to replace the specific services of a family member. It uses wage rates for a variety of market specialists. Average compensation or simply compensation is defined as average hourly wages plus supplements to wages and salaries. After tax compensation is defined as compensation minus marginal tax while net compensation is defined as after tax compensation minus certain work-related costs. Below are his findings:

Table 2.5 Aggregate Estimates of the Value of Household Work in 1976

Population Group	Annual Hours of Household work (billions)	Market Cost		Opportunity Cost		
		Replacement Cost Estimate (RCE) (billions of dollars)	Service Cost Estimate (SCE) (billions of dollars)	Compensation Estimate (CE) (billions of dollars)	After-Tax Compensation Estimate (ATCE) (billions of dollars)	Net Compensation Estimate (NCE) (billions of dollars)
All persons	188.8	540.0	752.4	1015.4	865.0	751.8
Men	53.7	153.6	237.4	407.3	342.5	318.6
Women	135.1	386.4	515.0	608.1	522.5	433.2
Percentage of GNP						
All persons		31.6	44.1	59.5	50.7	44.1
Men		9.0	13.9	23.9	20.1	18.7
Women		22.6	30.2	35.6	30.6	25.4

Source: Murphy (1982, p.34).

As shown above, the total hours of household work for all persons were 188.8 billion in 1976 and the value of work ranged from \$540 billion to \$1,015.4 billion or 31.6 per cent to 59.5 per cent of GNP respectively. The hours of work for men was 53.7 billion and the value for this work ranged from \$153.6 billion to \$407.3 billion or 9 per cent to 23.9 per cent of GNP. In the same vein, annual hours of household work for women were 135.1 billion and the value ranged from \$386.4 billion to \$608.1 billion or 22.6 per cent to 35.6 per cent of GNP. Women do more household work than men. In addition, the value of household unpaid work using opportunity cost for men is higher than the market cost approach. This is not true for all persons and women as the service cost is higher than net compensation and for all group and women. He noted that men's relative share is about one-third of household work.

This chapter has briefly discussed the meaning of household unpaid work; unpaid work and National Accounts, the methodology used in valuing unpaid work and household work in Canada and the United States studies. Next chapter will look at time use in market and household work in Canada.

CHAPTER 3

Time Use in Market and Household Work

Previous chapter dealt mainly with past work done and definitions of some basic concepts behind household unpaid work. This chapter presents a descriptive pattern of time allocation to paid work and unpaid work by gender and immigration status. The first two sections discuss the data source and the methodology used respectively while the last sections present the descriptive data and thereafter the summary of our results and comparison with representative literature.

3.1 Sources of Data

The main source of the data used for this paper is from General Social Survey, 1998 (GSS 1998 cycle 12: Time Use.) The estimates are based on individual-level information (micro data) collected in 1998 time use survey. The data covered from February 1998 to January 1999 (twelve months) with about 10,749 respondents. The survey provides a representative sample of non-institutionalized population of 15 years of age and over, from ten provinces in Canada. According to the GSS, the information was collected each day of the week and each month of the year. This was done in order to take care of the seasonality that might arise. And also all the respondents were contacted by phone, meaning that households without telephone were excluded. According to the source of the data, this percentage is less than 2% of the target population. The survey estimates was adjusted to account for persons without telephone.⁴

⁴ 1998 GSS Cycle 12: Time Use page 2

3.1.1 Target Population and Activities

The target population for this thesis includes all persons 25 to 64 years of age residing in Canada, but excludes residents of Yukon and Northwest Territories, foreigners residing temporarily in Canada and full-time residents of institutions.

Unpaid work is to some extent broadly defined. Some activities that can be termed productive (like educating oneself, personal care etc.) are excluded from the sample while other activities viewed as leisure (e.g., playing with children and taking a dog for a walk) are included in the sample. The inclusion of activities as leisure is derived from the fact that unpaid work that could be regarded as leisure to an individual may not be leisure to another person. Someone may enjoy baby-sitting while another person may not see it as leisure.

An individual who allocates zero hours to an activity is considered to be a non-participant. The participation rate was obtained by dividing the total participants by the total population. Hours allocated by all individuals were added and then divided by the total population to derive the average number of hours allocated by the population. Similarly, ignoring the non-participants, the calculated average hours are presented under participants.

Though there was data available for persons 15 years and over, only those people who are within the age of 25 to 64 years were considered in this thesis based on the fact that people in this age range can freely choose between time allocation to household work and market work. The population was divided into two groups by gender and immigration status (Canadians and immigrants). For immigration status, all individuals born outside Canada were considered to be immigrants while those who were born in Canada were considered to be Canadians. The total number of Canadian born was 5779 while the total number of immigrants was 1165 respondents. This was further sub-divided into Canadian born male and female and

immigrant male and female. The total number of male Canadians was 2669 and the number of female Canadians was 3110. For the immigrants, the total male population is 585 and that of women is 580.

3.2 Paid Work and Related Activities

Paid work includes all work done for exchange of money, which usually has a market value attached. Table 3.1 below shows the average time per day allocated to paid work and related activities by Canadians and immigrants. The values in the brackets are the percentage difference, which shows the gap between the statistics for immigrants and Canadians. A positive entry indicates higher number for immigrants. The total number of participants and population for paid work and related activities are as shown in the appendix Table A.14.

Table 3.1: Participation Rates and Average Time Spent on Paid Work and Related Activities

	Participation Rate			Participants			Population		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
	(Percent)			(Hours per day)			(Hours per day)		
Canadians	52.4	60.9	45.2	8.4	8.9	7.8	4.4	5.4	3.5
Immigrants	55.9	63.6	48.1	8.7	9.2	8.1	4.9	5.9	3.9
% Diff. ⁵	(6.7)	(4.4)	(6.4)	(3.6)	(3.4)	(3.9)	(11.4)	(9.3)	(11.4)
Z-values ⁶	-1.35	-1.36	-1.33	-1.63	-1.62	-1.63	-2.07	-2.14	-1.99
P-values ⁷	0.18	0.17	0.18	0.10	0.11	0.10	0.04	0.03	0.05

⁵ In calculating the percentage difference, immigrants are taken as the base group.

⁶ Calculated Z statistic assuming standard normal sampling distribution. The formulas for calculating Z-values for participant, population and participation rate are as shown in the appendix.

⁷ P-values give the probability that the two means are the same. For instance, a P-value of 0.18 indicates that there is only 18% probability that the two means are equal. Hence we could reject the hypothesis that the means are identical at 18% of the time. Typically, we fail to reject the hypothesis that the means are the same if the P-values exceed 0.05 and conclude that there is no difference between the two groups studied.

Figure 3.1 Participation Rate with Respect to Immigration Status and Gender-Paid Work and Related Activities

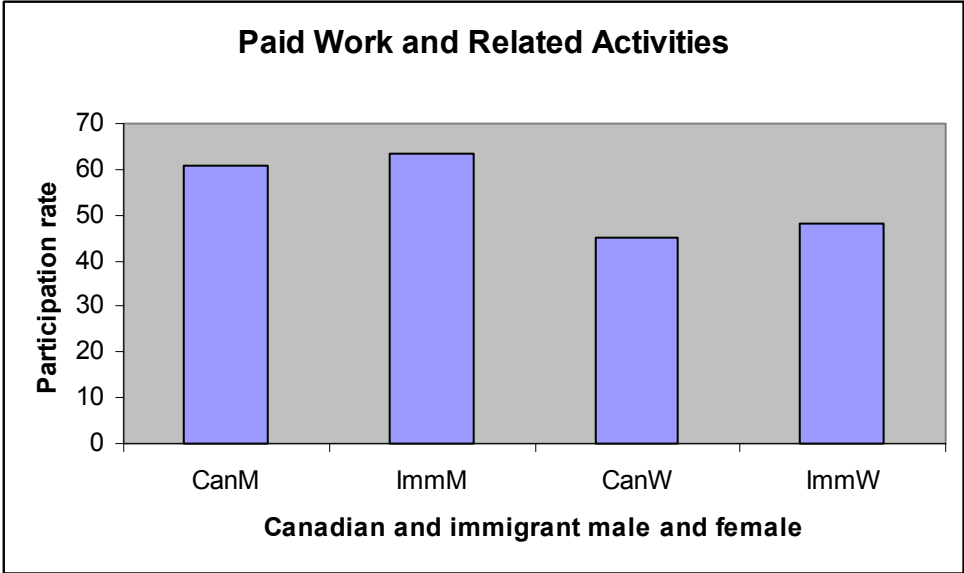
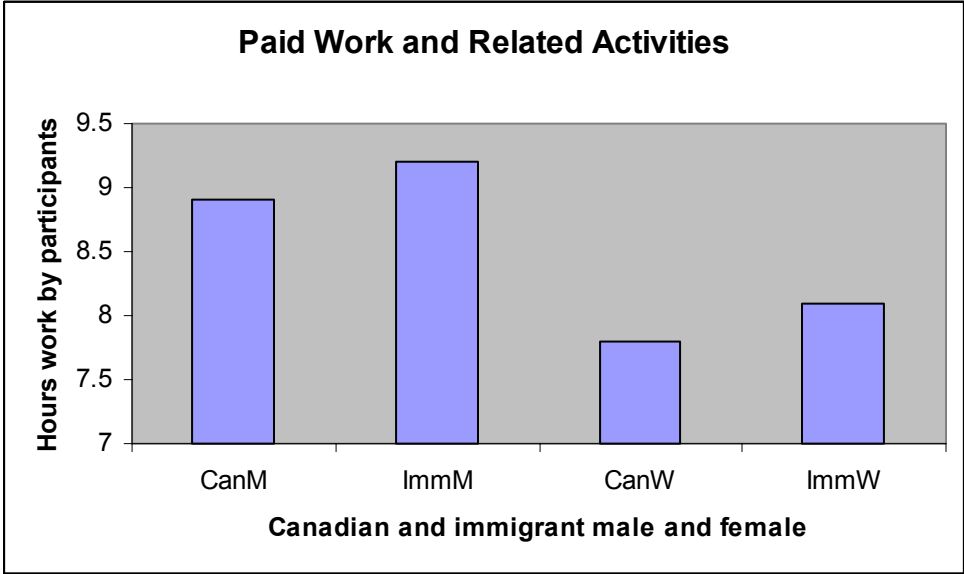


Figure 3.2 Hours of Work with Respect to Immigration Status and Gender-Paid Work and Related Activities



In paid work and related activities, the differences between Canadians and immigrants participation rates and hours per participant are statistically insignificant. Figure 3.1 above shows that immigrant male and female participation rates are higher than Canadian male and female participation rates respectively. For those who participated in paid work and related

activities, average hours for Canadian men is 8.9 per day while that for immigrant men is 9.2 hours per day. The corresponding hours for women are 7.8 hours for Canadians and 8.1 for immigrants.

Figure 3.2 above shows the average allocation of time for market activities by gender and immigration status. On average both Canadian male and female population allocate less time to paid work and related activities compared to their immigrant counterparts and the difference is statistically significant. Comparing male to female (see Appendix Table A.6), it can be seen that on the average, participation rate, average hours per population and hours per participant are statistically higher for men than for women.

Other components of market work, such as commuting time for paid work and related activities are not dealt with in this study since the main focus of this study is concerned with time allocation to household unpaid work.

One possible explanation of the observed gender difference in allocation of time is the fact that women's wage rate in general is lower than that for men, and the male member in a household allocates more time to market activities. Traditional division of work, where women specializes in household work, is another reason for the observed difference.

Since immigrants wage rates are lower than their Canadian counterpart, we expected immigrants to allocate less time to market activities and do more household production. Note that there is no observed statistical difference in market work time and participation rate by immigration status and this is not consistent with our prior expectation. This requires further examination in future extension of this study.

3.3 Household Work and Related Activities

The work considered as household work refers to activities that can be delegated using third person and utility equivalence criteria. This means that any activity that cannot be delegated to someone else without reduction in utility value is not considered in this section and such includes biological needs, market activities and leisured-pleasurable activities. Table 3.2 and Figures 3.3 and 3.4 below show various time allocated to household work and related activities. The total number of participants and population for unpaid work and related activities are as shown in the appendix (Table A.14).

Table 3.2 Participation rate and average time spent on Household Work and Related Activities

	Participation Rate			Participants			Population		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
	(Percent)			(Hours per day)			(Hours per day)		
Canadians	92.5	87.0	97.3	3.9	3.0	4.6	3.6	2.6	4.4
Immigrants	92.1	88.6	95.6	3.9	3.0	4.8	3.6	2.6	4.6
% Diff.	(-0.4)	(1.8)	(-1.8)	(0)	(0)	(4.4)	(0)	(0)	(4.6)
Z-values	-0.12	-1.38	1.15	-0.65	0	-1.3	-0.65	0	-1.3
P-values	0.90	0.17	0.25	0.52	1.0	0.19	0.52	1.0	0.19

Figure 3.3 Participation Rate with Respect to Immigration Status and Gender- Household Work and Related Activities

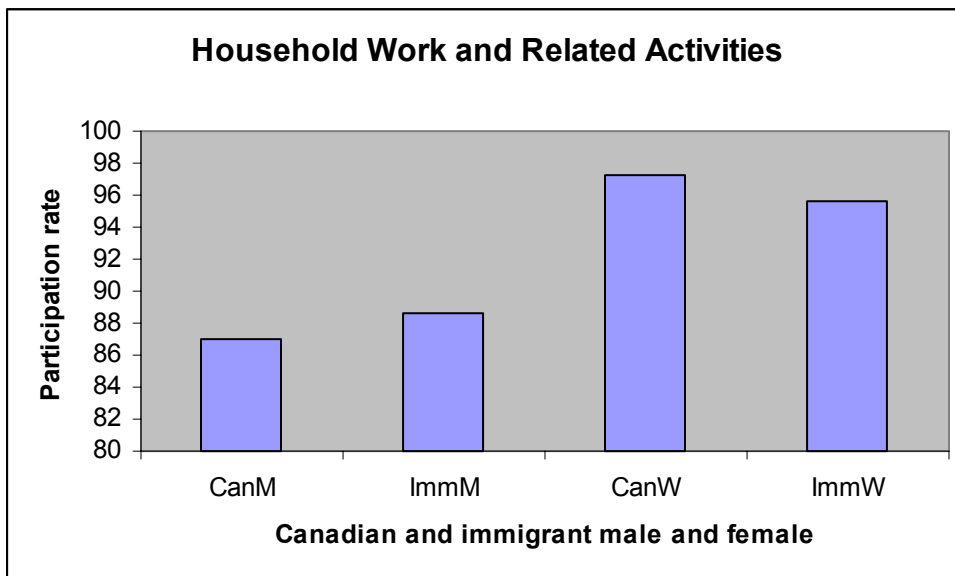
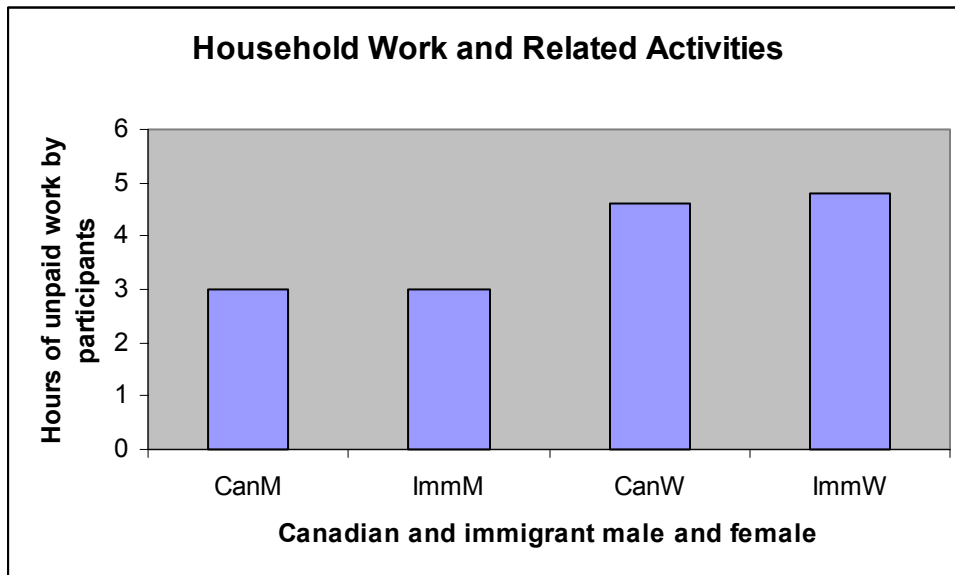


Figure 3.4 Hours of Unpaid Work with Respect to Immigration Status and Gender-Household Work and Related Activities



The differences in time allocation to household unpaid work by Canadians and immigrants are statistically insignificant. From the table above, it can be seen that immigrant male participation rate is about 88.6 percent and female is about 95.6 percent, while the Canadian male participation rate is 87 percent, the female participation rate is as high as 97.3 percent. On average both Canadian and immigrant male participants spend an average of 3.0 hours per day for household work, an average female Canadian (immigrant) spend about 4.6 (4.8) hours per day for the same activities. The average hours per day devoted to household work by Canadian female participants are 53.3 percent higher than that spent by their male counterpart. As shown in Table A.7 in the appendix for the gender difference, we found the higher values for women (both immigrants and Canadians) to be statistically significant.

The rest of the section presents different kinds of household unpaid work which are cooking/washing up, housekeeping, maintenance and repairs, other household work, shopping for goods and services, and child care activities.

3.3.1 Cooking/ Washing Up

This activity comprises meal preparation; baking and preserving food; home brewing, et cetera; and food or meal cleanup. This activity is mostly done by women in most countries. Table 3.3 below shows different time allocated to different activities of cooking/washing up and various significance levels. Male and female Z-values and P-values are as shown in the appendix (Table A.8).

Table 3.3 Participation rate and average time spent on Cooking/Washing Up

	Participation Rate			Participants			Population		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
	(Percent)			(Hours per day)			(Hours per day)		
Canadians	77.0	65.4	87.0	1.1	0.7	1.2	0.8	0.5	1.1
Immigrants	77.1	66.7	87.6	1.2	0.8	1.4	0.9	0.5	1.3
% Diff.	(0.1)	(2.0)	(0.7)	(9.1)	(14.3)	(16.7)	(12.5)	(0)	(18.2)
Z-values	-0.78	-0.90	-0.65	-2.99	-2.38	-3.59	-1.88	0	-3.76
P-values	0.44	0.37	0.52	0.00	0.02	0.00	0.06	1.0	0.00

The differences in participation rate between an average Canadian and immigrant are statistically insignificant; but for the participants, the above result shows that average immigrant male and female hours per day are higher than those of Canadian male and female participants respectively and this difference is statistically significant.

Table 3.3 shows that the total average number of hours male and female participants spend in a day for cooking/ washing up is very small. While a Canadian male participant spend an average of 0.7 hours per day for cooking/ washing up, the female Canadian spend an average of 1.2 hours per day for the same activities. Though the Canadian female and male participants spend few hours for cooking/ washing up the difference between the two groups is statistically significant being about 71.4 percent higher for female participants (see Appendix A.8 for details).

Canadian male and female participants spend more time on baking, preserving food, home brewing, etc, than on other activities under cooking/washing up (see Appendix for details). Canadian male participation rate in cooking/washing up is about 65.4 percent while the female participation rate is as high as 87.0 percent. This shows that Canadian women participate more in cooking/washing up than the men by about 33 percent. In summary, for all the activities under cooking/washing up, Canadian women participate more than the men and the difference is statistically significant.

In the same vein immigrant female participant average hours per day are higher than those of the male by about 75 percent for cooking/washing up. Male immigrant participants spend more time on baking, preserving food, home brewing, et cetera than they do in other activities under cooking/washing up. On the other hand, immigrant female participants spend more time on meal preparation than they do in any other activities. While the immigrant female participation rate is 87.6 percent for cooking/ washing up, the male is 66.7 percent leading to female participation rate to be 31.3 percent higher than male.

3.3.2 Housekeeping

Housekeeping includes activities such as indoor cleaning, outdoor cleaning, laundry, ironing, folding, mending/ shoe care and dressmaking and sewing. Canadians and immigrants allocate different hours to housekeeping. Table 3.4 below shows these values. In the appendix, we have a table showing Z-values and P-values for men and women.

Table 3.4 Participation rate and average time spent on Housekeeping

	Participation Rate			Participants			Population		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
	(Percent)			(Hours per day)			(Hours per day)		
Canadians	45.7	24.9	63.4	1.8	1.5	1.9	0.8	0.4	1.2
Immigrants	39.6	25.1	54.1	1.7	1.4	1.8	0.7	0.4	1.0
% Diff.	(-13.3)	(0.8)	(-14.7)	(-5.6)	(-6.7)	(-5.3)	(-12.5)	(0)	(-16.7)
Z-values	2.0	0	4.02	0.95	0.79	1.11	1.55	0	3.1
P-values	0.05	1.0	0.00	0.34	0.43	0.27	0.12	1.0	0.00

There is no statistically significant difference in time allocation to housekeeping between immigrant and Canadian participants and population. Though there exist a statistically significant difference in participation rate between Canadians and immigrants, there is no significant difference among the males. Canadian participation rate is higher than that of the immigrants. The reason why Canadians participation rate is higher than that of immigrants might be that Canadians mainly live in bigger houses as compared to immigrants. The average numbers of hours per day Canadian male participants spend for housekeeping is 1.5 while that of female is about 1.9 hours per day. Canadian female participants spend more hours on average than do the male and the participation rate for Canadian females is about 155 percent higher than that of males and this is statistically significant. While Canadian female participation rate for housekeeping is about 63.4 percent the male is only 24.9 percent. Canadian men do not even participate in dressmaking and sewing while the female participation rate is very low (see Appendix Table A.2 for details).

Immigrants' female participation rate for housekeeping is about 54.1 percent while that of the male is about 25.1 percent. This means that immigrant female participation rate is more than twice the male participation rate and this sum up to about 116 percent difference. In general, there exists a statistical significant difference between men and women in housekeeping activities as shown in the appendix table.

3.3.3 Maintenance and Repairs

Interior maintenance and repairs, exterior maintenance and repairs, vehicle maintenance and other home improvements all add up to what we call maintenance and repairs. Table 3.5 below shows the results for the hours spent by Canadians and immigrants on maintenance and repairs. In the appendix, we have a table showing male and female Z-values and P-values.

Table 3.5 Participation rate and average time spent on Maintenance and Repairs

	Participation Rate			Participants			Population		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
	(Percent)			(Hours per day)			(Hours per day)		
Canadians	8.0	11.8	4.7	2.6	2.8	2.1	0.2	0.3	0.1
Immigrants	4.7	6.8	2.6	2.7	2.9	2.2	0.1	0.2	0.1
% Diff.	(-41.3)	(-42.4)	(-44.7)	(3.9)	(3.6)	(4.8)	(-50)	(-33.3)	(0)
Z-values	3.28	4.07	2.48	-0.22	-0.25	-0.19	1.06	2.12	0
P-values	0.00	0.00	0.01	0.83	0.80	0.85	0.29	0.03	1.0

Canadian male and female participation rates are statistically higher than those of immigrant men and women by about 42.4 percent and 44.7 percent respectively. However, there was no significant difference observed in the hours allocated by Canadian and immigrant participants and population. One of the reasons why we have higher participation rate for Canadians as compared to immigrants might be associated with the possibility that immigrants have a lower home ownership rate. It is expected that if you are on a rented apartment or house, the probability of your doing more maintenance than the owner will be very low.

Male participants spend more time on maintenance activity than the female participants do and the difference is statistically significant for Canadian and statistically insignificant for immigrants (the appendix shows the Z-values and P-values by gender).

3.3.4 Other Household Work

There are several components of other household work such as pet care, care of house plants, household management, stacking and cutting firewood, other domestic/household work, unpacking groceries, packing and unpacking luggage and/or car, packing and unpacking for a move of the household and travel: domestic. Time allocated by the groups under study is as shown in Table 3.6 below. In the appendix, we have a table showing Z-values and P-values.

Table 3.6 Participation Rate and Average Time Spent On Other Household Work

	Participation Rate			Participants			Population		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
	(Percent)			(Hours per day)			(Hours per day)		
Canadians	34.4	30.3	37.9	1.3	1.5	1.1	0.4	0.5	0.4
Immigrants	30.1	26.5	33.8	1.3	1.4	1.3	0.4	0.4	0.4
% Diff.	(-12.5)	(-12.5)	(-10.8)	(0)	(-6.7)	(18.2)	(0)	(-20)	(0)
Z-values	1.67	1.47	1.86	-0.75	0.08	-1.58	1.02	2.03	0
P-values	0.10	0.14	0.06	0.45	0.94	0.11	0.31	0.04	1.0

The differences in time allocation between Canadians and immigrants are statistically insignificant. Seeing the number of hours spent by both Canadian and immigrant participants above, one can conclude that though Canadian men spend more time than immigrant men by 6.7 percent, in the aggregate, both Canadian and immigrant men spend little or no time in this activity since the difference between the two groups is statistically insignificant at 5 percent level. For women, both Canadian and immigrant, the average number of hour per participant is equally very low.

It should however be noted that though the Canadian male and female participation rates for the activities under “other household work” are low, there tend to be higher number of hours per participant in packing and unpacking for a move of the household. It seems to be an infrequent but time consuming chore for both Canadians and immigrants. While immigrant male and female participants spend more time on packing and unpacking for a move of household as compared to other activities under other household work, their participation rate is lowest among other activities in this category.

It should be noted that immigrant women do not devote any hours to stacking and cutting firewood and as such their participation rate is zero, whereas the Canadian women have a low participation rate: as low as 0.9 percent. In conclusion, an average immigrant participant spends the same time on other household work as an average Canadian. An average Canadian

male participant allocates more hours to other household work than the average Canadian female with statistically significant difference but, for immigrants, the differences between males and females are statistically insignificant.

3.3.5 Shopping For Goods and Services

This category is broken into 14 sub-categories (for details, please, refer to Appendix). Table 3.7 below shows time allocated to shopping for goods and services. In the appendix, we have a table showing Z-values and P-values between male and female.

Table 3.7 Participation rate and average time spent on Shopping for Goods and Services

	Participation Rate			Participants			Population		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
	(Percent)			(Hours per day)			(Hours per day)		
Canadians	44.7	39.2	49.4	1.7	1.6	1.8	0.8	0.6	0.9
Immigrants	44.6	41.0	48.1	2.1	1.9	2.2	0.9	0.8	1.1
% Diff.	(-0.2)	(4.6)	(-2.6)	(23.5)	(18.8)	(22.2)	(12.5)	(33.3)	(22.2)
Z-values	-0.23	-0.89	0.44	-3.35	-2.85	-3.84	-3.11	-3.36	-2.86
P-values	0.82	0.38	0.66	0.00	0.00	0.00	0.00	0.00	0.00

Canadian and immigrant participation rates are statistically insignificant as seen from the table above; but the number of hours an average immigrant participant allocates to this activity is higher by about 23.5 percent and this difference is statistically significant even at 1 percent level of significance.

Females generally do more ‘shopping for goods and services’ than males and the difference is statistically significant. Canadian male participation rate is 39.2 percent while female is 49.4 percent. These participation rates are very low and indicate that Canadians allocate more of their time to other activities rather than shopping for goods and services.

Immigrant male participants allocate most of their shopping time to everyday goods and products which results to average of 1.3 hours per day and females on the other hand spend most of their shopping time in durable goods amounting to average of 1.9 hours per day (see

Appendix for details). The immigrant male participation rate is lower than the female and the difference is statistically significant.

3.3.6 Childcare Activities

Our final major category under household work and related activities has to do with care of children, comprising sub-activities such as: child care, putting children to bed, getting children ready for school, personal care of children in the household, and so on.⁸ Care of children can be discussed somewhat independent of the other more ubiquitous household demands since such time allocations barely occur except where children are present in the household. Table 3.8 below shows time allocation to childcare by an average Canadian and immigrant male and female. In the appendix, there is a table showing Z-values and P-values between male and female.

Table 3.8 Participation Rate and Average Time Spent On Child Care

	Participation Rate			Participants			Population		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
	(Percent)			(Hours per day)			(Hours per day)		
Canadians	27.1	20.4	33	2.1	1.7	2.3	0.6	0.4	0.8
Immigrants	26.6	21.5	31.7	2.4	2	2.6	0.6	0.4	0.8
% Diff.	(-1.9)	(5.4)	(-3.9)	(14.3)	(17.7)	(13)	(0)	(0)	(0)
Z-values	-0.3	-1.06	0.47	-1.81	-1.92	-1.71	0	0	0
P-values	0.76	0.29	0.64	0.07	0.06	0.09	1.0	1.0	1.0

In participation rate, hours per participants and hours per population, no significant difference is observed in time allocation between Canadians and immigrants as seen above. But generally female time allocation to childcare activities is higher than male and the difference is statistically significant (please, refer to the appendix for significant levels).

Immigrant female participant average hours per day for childcare are 30 percent higher than the immigrant male participant. Among the components of childcare activities, immigrant female participants spend more time on childcare (Infant to 4 years old) than they do in other

⁸ Please, refer to Appendix Table A.5 for more detailed sub-categories and results

child care activities. In the same vein, immigrant male participants spend more time on unpaid babysitting than they do on other child care activities.

From the results in Table 3.8 above, one can say that both Canadian males and females and immigrant males and females allocate a small proportion of their time to child care services and the reason might be traced to the fact that the number of children that need child care services is relatively small. And also, though an average immigrant participant spend more time on childcare activities than the average Canadian the difference is statistically insignificant.

3.5 Summary of Our Findings

- In general, no statistical difference is found in time allocation to both paid work and household work between Canadians and immigrants for both male and female sample. However, men generally allocate more (less) time to paid work (household work) than women and the difference is statistically significant.
- Immigrant participants allocate more time to cooking/ washing up activities than an average Canadian and an average female participant allocates more time to cooking/ washing up activities than a male with statistically significant differences.
- In housekeeping activities, there is no significant difference in time allocation between Canadian and immigrant participants and population but Canadian participation rates are higher than immigrant participation rate with statistically significant difference.
- On average, male participation rate in maintenance and repair is significantly higher than female and Canadian participation rate is statistically higher than immigrant participation rate.

- In the activity shopping for goods and services, an average immigrant participant allocates about 23.5 percent more time than Canadians and the difference is statistically significant. An average female allocates more time than male.
- There is no statistical difference in time allocation to childcare activities between Canadian and immigrant men and women but higher time allocation by women than men with a statistically significant difference.

3.6 Comparison of our findings with previous Statistics Canada studies

The following Table 3.9 and 3.10 shows the comparison of our findings and the representative literature from Canada and U.S.A.

Table 3.9 Comparisons of Our findings With Statistics Canada (1986) (Average Hours per Day Spent On Various Activities)

	Our findings			Statistics Canada (1986)		
	Total	Male	Female	Total	Male	Female
Paid Work						
Work for pay at main job	7.6	8.0	7.1	7.4	7.7	7.0
Coffee, other breaks	0.4	0.4	0.4	0.9	0.9	0.9
Commuting						
Travel: to/from work	0.9	0.9	0.8	0.8	0.9	0.8
Cooking/washing up						
Meal preparation	0.9	0.6	1.0	1.1	0.7	1.2
Food (or meal) clean up	0.5	0.4	0.5	0.6	0.5	0.6
Housekeeping						
Indoor Cleaning	1.4	1.2	1.5	1.6	1.5	1.6
Outdoor Cleaning	1.5	1.7	1.0	1.4	1.3	1.4
Laundry, Ironing, Folding	1.0	0.8	1.0	1.4	1.3	1.4
Mending/Shoe Care	1.0	0.3	1.1	1.7	0.0	1.7
Other household work						
Other Domestic/Household Work, n.e.s.	0.8	1.0	0.7	1.1	1.4	1.0
Travel: Domestic Work	0.7	0.9	0.4	0.6	0.6	0.6
Shopping for goods and services						
Everyday Goods and products (Clothing, Gas, etc.)	1.4	1.2	1.5	1.8	1.8	1.7
Other Shopping and Services	1.0	1.0	1.1	1.0	1.2	1.0
Travel: Shopping for Goods and Services	0.7	0.6	0.7	0.7	0.7	0.7
Child care activities						
Child Care (Infant to 4 Years Old)	1.7	1.2	2.0	1.7	1.2	1.8
Helping/Teaching/Reprimanding	1.0	1.0	1.0	0.9	1.1	0.8
Reading/Talking/Conversation with Child	0.7	0.7	0.7	0.8	0.8	0.8
Play with Children	1.4	1.4	1.4	1.4	1.5	1.3
Travel: Household Child	0.7	0.7	0.7	0.6	0.5	0.6

In comparing the results of this thesis with those of Statistics Canada, please note that Statistics Canada study is based on people who are 15 years and over whereas in this thesis the population range is within people who are 25 to 64 years.

For mending/shoe care activities, while an average person in Canada spends about 1 hour from this study, the hours spent by an average person in Canada in 1986 were 1.7 hours. Time allocated to shopping for goods and services (everyday goods and products), time allocated to it fell from about 1.8 hours per day to about 1.4 hours per day for all group (male and female). Time allocated to various activities is approximately the same in this study and that of Statistics Canada with little or no variation in time allocated to the activities.

Table 3.10 Comparisons of Our findings With Statistics, Canada (1995) (Average Hours per Annum Spent on Various Activities)

Various findings	Population age	Total	Male	Female
Our findings	25-64 years	1,334	976	1,662
Statistics Canada	15 years & over	1,164	831	1,482

From Table 3.10 above, in 1992 (Statistics Canada, 1995) while an average Canadian male spend about 831 hours on unpaid work, female spent about 1,482 hours in the same activities. But from this study’s results, hours spent by an average Canadian male and female are 976 and 1,662 hours respectively. We can see from the results that time spent on household unpaid work has changed only marginally over the years. The reason for this marginal increment might be associated with increase in household equipment and probably population increase. The difference might also be as a result of different population range: in this study the sample of population is based on those who are 25 years to 64 years while that of Statistics Canada is based on people who are 15 years and over. A similarity between our findings and

those of the representative literature is that women generally allocate more time to household work than the men.

CHAPTER 4

Value of Unpaid Work

Valuing household unpaid work in this study is based on the one that yields “indirect utility” and not “direct utility”. For example going to a symphony concert yields a direct utility as this cannot be delegated to someone else without a reduction in the utility derived from the activity. Washing a floor, cooking, childcare et cetera, however can be delegated to someone else without a reduction in the utility value. The utility derived from this can be regarded, as “Indirect Utility” and this is what that is measured in this thesis. This aspect of utility is referred to as “economic activity”. As defined by Hawrylyshyn (1971, p.17), “An economic activity of an individual is one which may be done by a third person (generally hired at a market-price), without affecting the utility value of the individual.” It follows that all activities that may be replaced by market-based ones (under some imaginable form of social arrangements) should be measured in dollar terms by imputing values to the activities.

To value household work, one has to impute its value from the market equivalent of the work done in the household. Most economic valuation of unpaid work relies on opportunity cost and replacement cost methods of valuation; I used both methods in this study. Among the two methods used, I will recommend replacement cost method of valuation because it reflects the value of output produced. And also, since GNP is a measure of output, i.e. it is concerned with counting of output and not utility or disutility associated with market production (Murphy, 1978), measuring household work is only fair if replacement method is used.

Opportunity cost will be subdivided into: opportunity cost—before tax and opportunity cost—after tax. This section is subdivided into section 4.1 Estimation Formula, section 4.2

Replacement Cost, section 4.3 Opportunity Cost and section 4.4 compares our results with representative literature.

4.1 Valuation Formulas

To obtain the aggregate average value of unpaid work, series of procedure are followed. The imputed per unit time cost for activity ‘s’ by people in group ‘g’ is denoted as ‘ $C_{s,g}$ ’. The cost here is the relevant opportunity cost or replacement cost. The average time spend by people in group ‘g’ on activity ‘s’ is denoted as ‘ $AHUV_{s,g}$ ’

The average value of time spent on activity ‘s’ by an average person in group ‘g’ is denoted as $AVUV_{s,g} = AHUV_{s,g} * C_{s,g}$

Thus the total estimated value of unpaid work per person for all activities is:

$$VUW_g = \sum_{s=1}^n (AHUV_{s,g} * C_{s,g})$$

Where:

VUW_g = Value of Unpaid Work by group ‘g’

Table 4.1 below shows the number of people in each group comprising immigrants, Canadians, male, female, group with children and without children.

Table 4.1 Total Population in Each Group of Study

	All		With Children		Without Children	
	Male	Female	Male	Female	Male	Female
Canadians	2669	3110	926	1265	1743	1845
Immigrants	585	580	210	242	375	338

4.2 Replacement Cost

The fundamental idea behind this cost method is that household could actually decide not to participate in unpaid work and instead purchase comparable goods and services from the market. These cost are economically significant in that they influence households’ decision on

whether to do these work themselves or to get them supplied by the market by delegating it to a third person.

Replacement cost of a given type of unpaid work is imputed based on the hourly earnings of people employed in a similar occupation or that of domestic employees. From futurejob.ca, I obtained various classes/occupation of work and their average wage rates. I matched these occupations with their wages to the type of work performed at home in this study. For this research all types of unpaid work except the broad categories of childcare and other unpaid work are matched with **personal service occupations**. Childcare to **childcare occupation** and other household work matched according to their occupation, which entails similar types of work. The entire hourly wage charged under replacement cost of valuation is derived from jobfutures.ca⁹ and it is based on information on hourly rate as at November 27, 2002. The assumption here is that time allocated to household unpaid work for 2002 is the same as that for 1998. For the **personal service occupation**, the activities included are those under cooking/washing up (COOKDOMS), housekeeping (HSKPDOMS), maintenance and repairs (MAINDOMS), shopping for goods and services (SHOPDOMS) and some activities under other household work (OTHRDOMS) as pet care, stacking and cutting firewood and other domestic/household work. **Childcare and home support workers occupation**, include all the activities under childcare (CHLDDOMS). Other activities under other household work are matched with specific occupation such as: gardening/grounds maintenance and care of plants matched with **nursery and greenhouse workers (code 8432)**, household management matched with **managers in food service and accommodation (code 063)**. Unpacked groceries, packing and unpacking luggage and/or car, packing and unpacking for move of the household

⁹ See www.jobfutures.ca

matched with **food counter attendants, kitchen helpers and related occupations (code 664)** and Travel: domestic work matched with **other occupations in travel, accommodation, amusement and recreation (code 667)**. Table 4.2 below presents a clearer picture of various housework activities, the corresponding occupation and the hourly rates applied.

Table 4.2 Various Occupations, Job Matched and Hourly Wage Applicable

Category of Household Work	Job futures Occupation match	Hourly wage
Cooking/Washing up	Other Occupation in Personal services	\$10.25
Housekeeping	Other Occupation in Personal services	\$10.25
Maintenance and Repairs	Other Occupation in Personal services	\$10.25
Shopping for goods and services	Other Occupation in Personal services	\$10.25
Child Care activities	Child care and home support workers	\$10.25
Gardening/Grounds Maintenance	Nursery and Greenhouse workers	\$10.33
Pet care	Other Occupation in Personal services	\$10.25
Care of house plants	Nursery and Greenhouse workers	\$10.33
Household management	Managers in food service and accommodation	\$14.55
Stacking and cutting firewood	Other Occupation in Personal services	\$10.25
Other Domestic/Household work	Other Occupation in Personal services	\$10.25
Unpacking Groceries	Food counter Attendants, Kitchen Helpers and Related Occupations	\$8.45
Packing and unpacking luggage and/or car	Food counter Attendants, Kitchen Helpers and Related Occupations	\$8.45
Packing and unpacking for a move of the household	Food counter Attendants, Kitchen Helpers and Related Occupations	\$8.45
Travel: Domestic	Other Occupations in Travel, Accommodation, Amusement and Recreation	\$11.27

Yearly hours for Canadians and immigrants, male and female with and without children are as presented in Table 4.3 below. The yearly hours are obtained by multiplying hours per day by 365 days a year.

Table 4.3 Average Annual Hours Spent on Household Work and Related Activities, 1998

Activities	Canadians				Immigrants			
	With Children		Without Children		With Children		Without Children	
	Male	Female	Male	Female	Male	Female	Male	Female
Number of participants	926	1265	1743	1845	210	242	375	338
Cooking/Washing up	186.2	459.9	167.9	350.4	200.8	587.7	186.2	368.65
Housekeeping	154.03	475.6	124.2	405.2	120.5	402.6	131.4	324.9
Maintenance and Repairs	146	29.2	113.2	43.8	94.9	13.9	62.1	27
Other Household work	168.6	135.8	168.6	173.0	89.1	135.9	161.7	171.2
Shopping for goods and serv.	216.1	325.6	249	342.7	265.7	412.5	290.9	386.9
Child care	365	683.7	0	1.1	449	713	0	9.86
Total	1,235.9	2,109.7	823.2	1,316.2	1,219.8	2,265.7	832.2	1,288.5

Table 4.4 below shows the average total number of hours per annum allocated to household work by gender and immigration status. The value in the brackets shows the percentage differences between Canadians and immigrants with a negative sign indicating a higher percentage for Canadians.

Table 4.4 Average Annual Hours Spent on Total Household Work (1998)

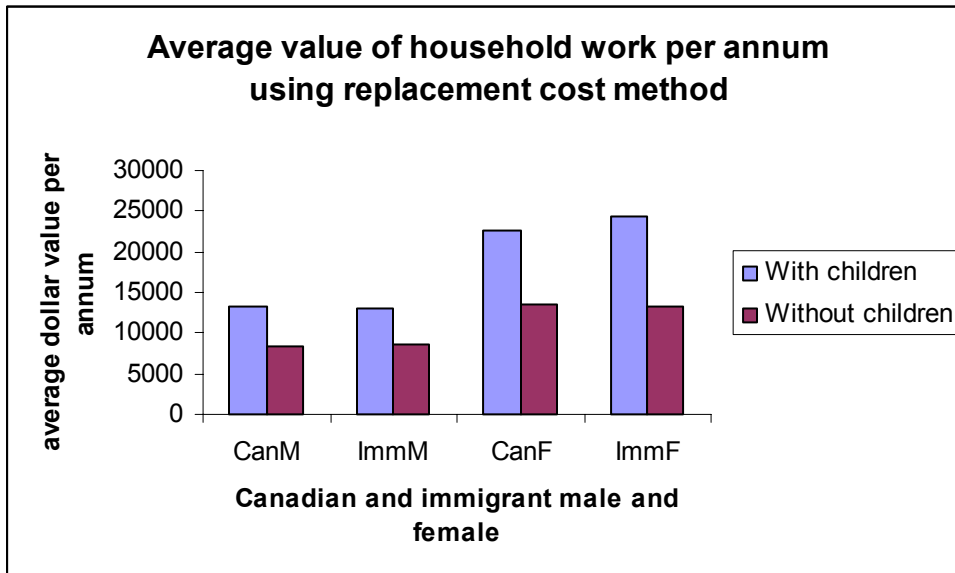
	With Children		Without Children	
	Male	Female	Male	Female
Canadians	1,235.9	2,109.7	823.2	1,316.2
Immigrants	1,219.8	2,265.7	832.2	1,288.5
% Difference	(-1.3)	(7.39)	(1.09)	(-2.11)
Standard error	100	111	75	94

In arriving at Table 4.5 below, the hourly rate from Table 4.2 is multiplied with the applicable activities in Table 4.3 to arrive at dollar value of unpaid work per annum.

**Table 4.5 Average Annual Dollar Value of Household Work and Related Activities
2002-Replacement Cost**

Activities	Canadians				Immigrants			
	With Children		Without Children		With Children		Without Children	
	Male	Female	Male	Female	Male	Female	Male	Female
Number of participants	926	1265	1743	1845	210	242	375	338
Cooking/Washing up	1,908	4,714	1,721	3,592	2,058	6,023	1,908	3,779
Housekeeping	1,579	4,875	1,273	4,153	1,235	4,127	1,347	3,330
Maintenance and Repairs	1,497	299	1,160	449	973	142	636	277
Other Household work	1,784	1,374	1,769	1,787	917	1,395	1,714	1,862
Shopping for goods and serv.	2,215	3,337	2,555	3,513	2,724	4,228	2,982	3,966
Child care	4,252	7,965	0	13	5,230	8,309	0	115
Total	13,234	22,564	8,478	13,506	13,136	24,223	8,587	13,328

Figure 4.1 Average Annual Dollar Value of Household Work with Respect to Immigration status, Presence of Children and Gender –Replacement Cost



Since there is no difference in time allocation on household work between Canadians and immigrants in this study and since the same hourly wage rates applies to both Canadians and immigrants; using replacement cost one can conclude that there is no statistically significant difference between Canadians and immigrants value of household work. However,

the value of household work by females is higher than that of the males and the difference is statistically significant. This was the same result that was obtained in chapter three.

Average annual value of household unpaid work for Canadian male and female, immigrant male and female with children are \$13,234, \$22,564, \$13,136 and \$24,223, while that of Canadian male and female, immigrant male and female without children are \$8,478, \$13,506 \$8,587 and \$13,328 respectively.

From Table 4.5 above, notice that while the value of household work done by an average immigrant male with children is about 0.74 percent less than that their Canadian counterpart, an average immigrant female with children value of household work is about 7.4 percent higher than their Canadian counterpart. The differences are reversed for people without children: the value of household work done by immigrant men is higher than that done by Canadian men; but the value of work done at home by immigrant women is lower than that done by Canadian women (in both case by 1.3 percent).

For Canadian male population with and without children on average value of household work is about \$1,908 and \$1,721 per annum for cooking/washing up activities respectively. The value of household work by immigrant with and without children is approximately the same as that by Canadian with and without children (Figure 4.1 and Table 4.5 above). In all household work and related activities, average Canadian women with children tend to have higher value in all household work (cooking/ washing up, housekeeping and childcare activities) than men. Also, average immigrant women have higher value of household work (in all household work except for maintenance and repairs and other household work) than men.

Immigrant men with children show higher value of household work in activities such as cooking/washing up, shopping for goods and services and child care activities than Canadian

men. Immigrant female with children value of household work is higher in activities like cooking/ washing up, other household work, shopping for goods and services and child care activities than for an average Canadian female with children.

For Canadians without children, the value of work done by women is higher than that of work done by men for all activities except maintenance and shopping. The value of maintenance work done by Canadian women with children is 61.29 percent less than that their male counterpart.

Immigrant female without children value of household work is about \$3,779 per annum for cooking/ washing up. This value is higher than the immigrant male without children for the same activity with about 98.06 percent.

Looking at Table 4.5 above, one will notice that Canadian and immigrant male and female population with children have higher value of household work on childcare than they do on other activities. This high value on childcare is as a result of the number of hours allocated to it by the concerned group as it is clear from Table 4.3 above. For the group without children, while immigrant male and female and Canadian male population value of household work is highest for shopping for goods and services, Canadian female value is highest in housekeeping activities.

4.3 Opportunity Cost Method of Valuation

This approach recognizes that time spent on unpaid work could be spent on other activities. This means that the value associated with household unpaid work is the forgone benefit of doing something else instead. As in the case of replacement cost, this value also has an economic significance in the sense that it can affect household decision on whether to participate in an unpaid household work or that of the market. With this approach, one cost

applies to unpaid work as a whole and it varies by market opportunities (for example by gender and immigration status).

It is usually assumed that households allocate time to those uses where the benefit outweighs the cost. This implies that time allocated to household unpaid work is worth at least its opportunity cost. For the employed, the opportunity cost of any use of time is the net marginal benefit from paid work, while for the unemployed, the opportunity cost of any use of non-market time is assumed to exceed the net marginal benefit from paid work. Overall, households as suppliers of labor may feel that the market price is too low (or working conditions to be unattractive) and withhold the supply of labor from the market. On the other hand, households as consumers of goods and services may feel that the market price is too high (or the quality of the product too low) and decide to produce the goods by themselves so as to save cost (or to get better quality). In addition, households may be engaged in household unpaid job because he/ she could not gain employment in the market. In any case, the implication is that the price imputed based on market prices is not necessarily relevant for household who have rejected the market or who could not gain employment in the market.

However, household member(s) do household unpaid work not only because he/she could not gain employment in the labor market, but because he/she chooses to do it based on other socio-economic factors. These factors will be dealt with in chapter five. Accordingly, household time is valued at the market wage rate. Canadian male and female wage rates are obtained from Labor Force Information for the year 2002. Again, as assumed in replacement cost, average time allocation for 2002 is same as that for 1998. This assumption is made because of unavailability of average wage rate data for 1998. The Canadian average male wage rate is **\$19.37/hr** while that of Canadian average female wage rate is **\$15.81/hr** as obtained

from Labor Force Information. An average male immigrant earn an average of about 25 percent less than Canadian-born, while the immigrant female on average earn 24 percent less than those of the Canadian-born¹⁰. From this percentage differences, immigrant male average hourly wage rate is calculated as **\$14.53** and that of immigrant female average hourly wage rate as **\$12.02**. These wages are opportunity cost before tax wage rates. To obtain the opportunity cost – after taxes, I had to use tax rates as provided by Canada Custom and Revenue Agency for the year 2002. Table 4.6 shows clearly the tax rates applied to household work and the hourly rates imputed for the various groups.

Table 4.6 Average Hourly Rates in Percentage and per Hour Dollar Imputed for Household Work and Related Activities Using Opportunity Cost Approach

	Canadian			Immigrant		
	Rates Applied	Before Tax	After Tax	Rates Applied	Before tax	After tax
	(Percent)	\$/hour	\$/hour	(Percent)	\$/hour	\$/hour
Male	31.15 ¹¹	19.37	13.34	22.05	14.53	11.33
Female	22.05 ¹²	15.81	12.32	22.05	12.02	9.37

Table 4.6 above shows that an average Canadian have higher opportunity cost in working at home than an average immigrant and that an average male have higher opportunity cost of working at home than an average female. It follows that if an average Canadian and an average immigrant male and female allocate same number of hours to household work, the value of household work for an average Canadian should be higher than that of immigrant male and female. The remaining part of the section deals with the two methods under opportunity cost of valuing household work.

¹⁰ Statistics Canada Census (2001 Page 12).

¹¹ This tax rate was obtained by adding federal tax rate (22 %) to provincial (Ontario) tax rate (9.15 %)

¹² This tax rate was obtained by adding federal tax rate (16 %) to provincial (Ontario) tax rate (6.05 %)

4.3.1 Opportunity Cost – Before Tax Approach

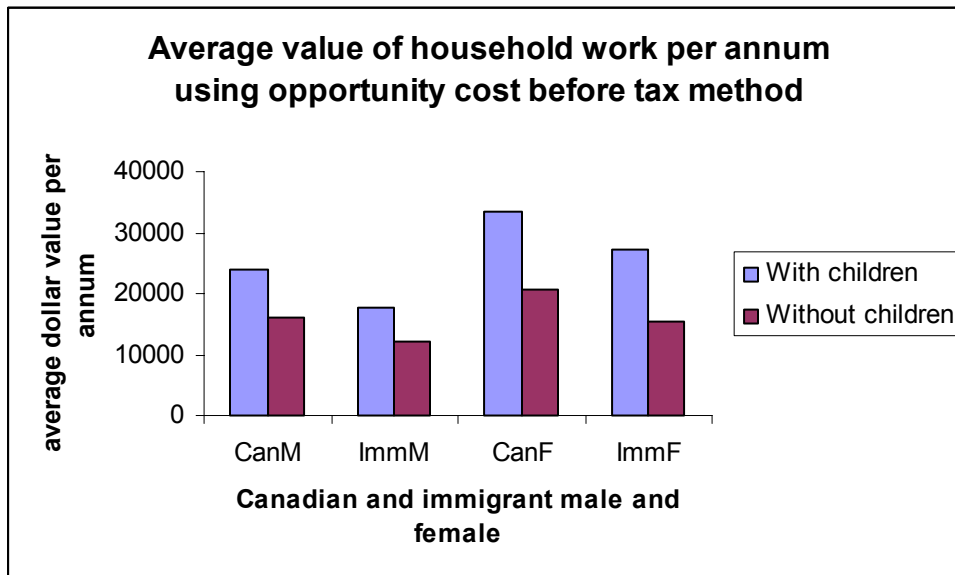
This section consist the opportunity cost before tax based on average hourly earnings of people aged 25 years to 64 years old, by gender and immigration status (Canadians and immigrants are the two groups studied). It is assumed that employers’ social contributions are already added to the opportunity cost –before tax wage rate as given above to arrive at opportunity cost before tax (this is in accordance with previous work done by Statistics Canada, 1995). The table below shows the value of unpaid work using this approach.

**Table 4.7 Average Annual Dollar Value of Household Work and Related Activities
2002-Opportunity Cost before Tax**

Activities	Canadians				Immigrants			
	With Children		Without Children		With Children		Without Children	
	Male	Female	Male	Female	Male	Female	Male	Female
Number of participants	926	1265	1743	1845	210	242	375	338
Cooking/Washing up	3,606	7,271	3,252	5,540	2,917	7,064	2,705	4,431
Housekeeping	2,984	7,519	2,405	6,405	1,750	4,839	1,909	3,905
Maintenance and Repairs	2,828	462	2,192	693	1,379	167	902	325
Other Household work	3,266	2,147	3,266	2,735	1,294	1,634	2,349	2,058
Shopping for goods and serv.	4,186	5,147	4,829	5,419	3,861	4,958	4,227	4,651
Child care	7,070	10,808	0	17	6,523	8,573	0	119
Total	23,939	33,354	15,944	20,809	17,724	27,234	12,092	15,487
Standard error	644	508	469	421	984	951	736	805

To arrive at the values shown in Table 4.7 above, hours per annum in Table 4.3 was multiplied by the corresponding wage rates shown in Table 4.6 above.

Figure 4.2 Average Annual Value of Unpaid Work with Respect to Immigration, Presence of Children and Gender –Opportunity Cost Before Tax Method



The various values shown in Table 4.7 are the various average value of household work by household members if they choose to do the work themselves rather than employing someone else to do it thereby forgoing the benefit from doing market work with the assumption that benefit from work at home is greater or at least equal to the benefit gained from working in the market.

For Canadian male and female with children on average value of household work and related activities is higher than that of their fellow immigrant counterparts as shown in Table 4.7 and Graph 4.2 above. The average value of aggregate unpaid work for male Canadians with children is \$23,939 while is \$17,724 for immigrant with children. The average value of unpaid work for male Canadians without children is \$18,377 while is \$13,790 for immigrants without children. Average value of household work for Canadian male (with or without children) is about \$19,942 per annum while that of an average immigrant male is \$14,908 the difference being statistically significant. In the same vein, an average Canadian female’s value

of household work is about 21.13 percent higher than that of an average immigrant female with statistically significant difference.

The value of cooking/washing up for immigrants with children as shown in Table 4.7 above is \$2,917 and \$7,064 for average male and female respectively. Female immigrant with children value of cooking/washing up is about 142.16 percent higher than that of the immigrant male. In all the household activities from Table 4.7, one will observe that immigrant females with children generally have higher value of household work than males except for maintenance and repairs where an average male immigrant value is about 87.89 percent higher than the female.

An average Canadian male and female with children value of childcare activity is higher than any other activities as shown in Table 4.7 above. From the amount obtained in Table 4.7, it is clear that Canadian female value of household work is higher than the male and the difference statistically significant.

Canadian females without children will on average have higher value on 'housekeeping' than they will on other activities (see Table 4.7 above). The value of "other household work" done by immigrant women without children is about 24.8 percent less than the value of similar work done their Canadian counterpart and the difference is statistically significant.

For Canadian men and immigrant men and women, without children, the value of shopping for goods and services is higher than the value of other activities. Apart from childcare, an average Canadian woman without children, value of household work is higher on all other household work than the immigrant woman. Whereas, an average Canadian male value of household work is higher than an average immigrant male, it should be noted that both

Canadian and immigrant male without children have zero value of childcare activities because they do not participate in such activity (see Table 4.3 above).

In all, Canadian, with and without children, value of doing unpaid work is higher than that of immigrants by about 22 percent and 25 percent, respectively and an average Canadian value of household work is about 23 percent higher than an average immigrant.

4.3.2 Opportunity Cost – After Tax Approach

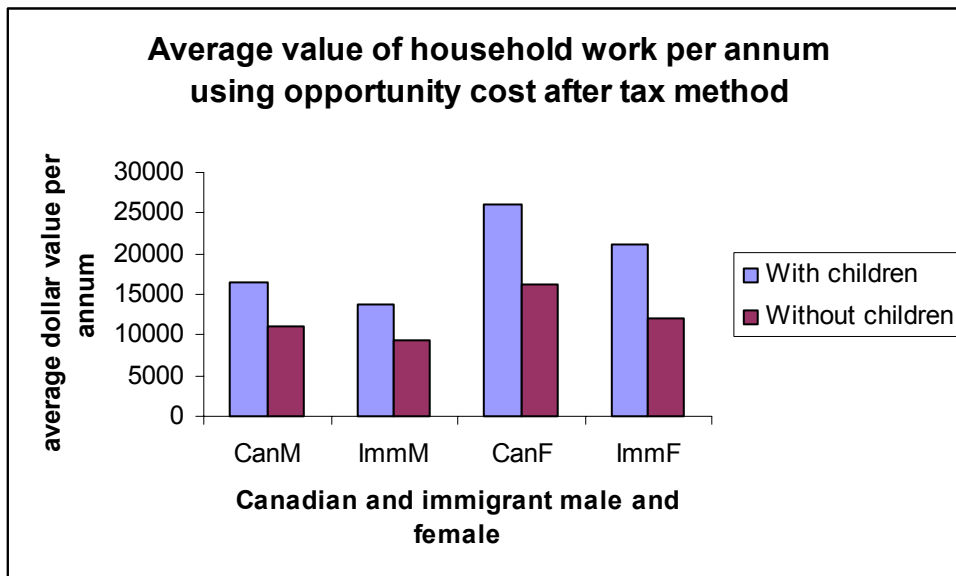
The opportunity cost after tax are also based on the average hourly earnings of people aged 25 years to 64 years old, who were employed at the time of the survey, by gender and immigration status from which employees' social contributions and estimate of the marginal tax rate are deducted¹³. As shown in the following tables, different group of people have different opportunity cost of doing household work.

Table 4.8 Average Annual Dollar Value of Household Work and Related Activities, 2002-Opportunity Cost After Tax

Activities	Canadians				Immigrants			
	With Children		Without Children		With Children		Without Children	
	Male	Female	Male	Female	Male	Female	Male	Female
	(Dollars per annum)		(Dollar per annum)		(Dollar per annum)		(Dollar per annum)	
Number of participants	926	1265	1743	1845	210	242	375	338
Cooking/Washing up	2,484	5,666	2,240	4,317	2,275	5,507	2,110	3,454
Housekeeping	2,055	5,859	1,657	4,992	1,365	3,772	1,489	3,044
Maintenance and Repairs	1,948	360	1,510	540	1,075	130	704	253
Other Household work	2,249	1,673	2,249	2,132	1,010	1,273	1,832	1,604
Shopping for goods and serv.	2,883	4,011	3,322	4,222	3,010	3,865	3,296	3,625
Child care	4,869	8,423	0	14	5,087	6,681	0	92
Total	16,487	25,993	10,977	16,217	13,822.6	21,229	9,430	12,073
Standard error	444	397	323	328	767	742	574	628

¹³ Employees' social contributions and an estimate of the marginal tax rate are assumed deducted since Statistics Canada (1995) also assumed that such deductions have been made.

Figure 4.3 Average Annual Value of Unpaid Work with Respect to Immigration Status, Presence of Children and Gender Composition – Opportunity Cost After Tax



An average Canadian male, with and without children, has higher value of household work than an average immigrant male of the same group by about 16 percent and 14 percent respectively. This is quite explicit in Table 4.8 above. For an average Canadian female (with or without children), the annual value of household work is higher than that of an immigrant counterpart by about 21 percent.

On average, the value of childcare for an average Canadian woman with children is about \$8,423 per annum, about 73 percent higher than that for her male counterpart. This can be interpreted by saying that the value of all housework for an average female Canadian with children is higher than that of male Canadian and the difference is statistically significant. In the same vein, immigrant women with children value of household work are higher than the men by 54 percent. Put in another way, immigrant female with children's value of household work is higher than that of males with about 54 percent, which is statistically significant.

Canadian and immigrant women without children show a higher value of household work than men by about 48 percent and 28 percent respectively.

In conclusion, Canadians (with or without children) value of household work is 19 percent higher than immigrants, which is statistically significant.

4.4 Summary of Our Results

4.4.1 Average Time Per Annum Spent by Various Groups on Household Work

- An average Canadian with children allocates 4 percent less time than an average immigrant with children to household work.
- An average Canadian without children allocates 0.9 percent more time than an average immigrant without children to household work.
- An average immigrant (with or without children) allocates 2.3 percent more time to household work than an average Canadian (with or without children), but the difference is statistically insignificant.

4.4.2 Average Dollar per Annum Value of Household Work Using Replacement

Cost Approach

- An average female (with or without children) value of household work is about 69 percent higher than that of an average male (with or without children).
- An average Canadian with children value of household work is about 4.4 percent less than that for an average immigrant with children, but the difference is statistically insignificant. We can conclude here that there is no statistical difference in value of household work by Canadians and immigrants.

4.4.3 Average Dollar per Annum Value of Household Work Using Opportunity Cost

Before Tax Approach

- An average Canadian's opportunity cost of working at home is about 25 percent higher than that of an average immigrant
- An average female (with or without children) value of household work is higher than that of an average male (with or without children) with statistically significant difference.
- An average Canadian with children (without children) value of household work is about 21.5 (25) percent higher than that of an average immigrant with children and the difference is statistically significant.

4.4.4 Average Dollar per Annum Value of Household Work Using Opportunity Cost

After Tax Approach

- An average Canadian male (female) opportunity cost of working at home is about 15 (24) percent higher than an average immigrant male (female).
- An average female value of household work is higher than an average male value of household work and there exists a statistically significant difference.
- The value of household work for an average Canadian (with or without children) is about 19 percent higher than an average immigrant (with or without children) and the difference is statistically significant.

4.5 Comparison of Our Results with Other Representative Literature

In comparing our results with previous studies, we had to deflate our prices using consumer price index (CPI) for all goods in 2002. The CPI for 2002 as obtained from Statistics Canada was \$119. The CPI was used to divide our values as shown in Table 4.4, 4.6 and 4.7 to arrive at values reported by our findings in Table 4.8 and Table 4.9 below. Please, note that while I use age range of 25 to 64 years, previous studies like Statistics Canada and Chandler used people who were 15 years and over.

Table 4.9 Comparisons of Our Findings with Statistics Canada (1995) and Chandler (1994)—Average Value of Unpaid Work Using Replacement cost approach

Various findings and year	Replacement cost					
	With children		Without children		(with or without children)	
	Male	Female	Male	Female	Total male	T/Female
	(\$/year)	(\$/year)	(\$/year)	(\$/year)	(\$/year)	(\$/year)
Our findings (2002) ¹⁴	11,080	19,659	7,170	11,275	9,125	15,467
Statistics Canada (1992)	—	18,322	—	11,586	—	14,954
Chandler (1992)	—	—	—	—	9,960	16,580

Note:

—: not applicable

Table 4.10 Comparisons of Our Findings with William Chandler (1994) — Average Value of Unpaid Work Using Opportunity Cost Before and After Tax Approach

Our findings with Chandler	Opportunity cost before tax			Opportunity cost after tax		
	Total	Male	Female	Total	Male	Female
	(Dollar per annum)			(Dollar per annum)		
Our findings (for 2002)	17,499	14,643	20,354	13,260	10,655	15,864
Chandler (for 1992)	14,930	12,920	16,860	9,870	7,730	11,920

¹⁴ In our findings, we combined Canadians and immigrant averages together so as to be able to compare with previous studies

The value of replacement cost used from Statistics Canada is that of replacement cost-generalist. This is so, since the replacement cost approach used in this study is close to the generalist approach used by Statistics Canada.

Using the replacement cost approach as shown in Table 4.5 above, it is evident that on average those with children have a higher value of unpaid work than those without children. This result from a higher number of hours allocated to household work by those with children. This study compared to Statistics Canada shows almost the same results for the average female in Canada, the difference resulting to about 3 percent lower from our result. The difference between this study and that of Statistics Canada might be as a result of differences in age range chosen. Statistics Canada in their studies did not differentiate between Canadians and immigrants. They also did not report the average value of household work by male but in this study, it is discovered that on average, immigrants (with or without children) value of household work is higher than Canadians. The value of household work done by immigrants using replacement cost method of approach is 3 percent more than the value of similar work done by Canadians. However, this difference is statistically insignificant.

Chandler, in his estimate, did not consider group of population (with or without children); hence, in comparing our results with his, it is the average population (with or without children) that is considered. While in his findings, an average male person in Canada value of household work is \$9,960 per annum using replacement method, the result from this study reports similar findings of the value being \$9,125 in 1992. While the value he reported for average male is relatively higher than the value reported by this study, the value reported by Chandler for females is slightly higher than our findings and that of Statistics Canada findings.

Comparing Table 4.9 and Table 4.10 above, it is obvious that opportunity cost—before tax of valuing household unpaid work gives a higher value of household work than the replacement cost method both in our studies, Statistics Canada studies and that of Chandler. Also note that in this study, opportunity cost after tax gives a higher value of unpaid work than the replacement cost, but in Chandler results, replacement cost have a higher average value of unpaid work than his results using opportunity cost after tax estimate.

From these results obtained, one would say that our findings are in line with Statistics Canada and Chandler’s findings though with a slight dissimilarity. The next chapter takes care of analysis of the results using econometric approach based on the various determinants of household unpaid work.

CHAPTER 5

Determinants of Unpaid Household Work

The previous section dealt with various valuation methods of estimating household unpaid work based on time allocated to it and the comparison of these findings with previous studies. Our main focus in this chapter is to explain the theory behind allocation of time to market and non-market activities. Econometric analysis is performed to find out the effects of different determinants of household work. The chapter is divided into three and they are 5.1 Theory of Allocation of Time, 5.2 Model Specification and 5.3 Regression Result

5.1 Theory of Allocation of Time

Allocation of time between various activities can be grouped into three groups such as: time allocated to work at home, work in the market and leisure. Work at home and work in the market can be view as perfect substitutes as far as the direct utility they generate is concerned. This means that one is indifferent to the composition of the goods and services he/she consumes (i.e. whether they are purchased in the market or produced at home makes no difference). Following Becker (1965) and Gronau (1977), a single person household maximizes utility which is assumed to depend on the consumption of a single commodity say $U(Z)$ composed of a combination of goods and services (X) and consumption time (L), $Z = Z(X, L)$.¹⁵

The goods (X) can either be purchased in the market or produced at home and whichever combination does not affect the commodity Z . These goods X are composed of home goods (X_h) and market goods (X_m),

$$X = X_m + X_h$$

¹⁵ Gronau, Reuben (1977)

Measuring home produced goods is best done in terms of their market equivalents. The more time is spent working at home, the greater the amount of home produced goods all things being equal and this can be mathematically represented as shown below:

$$X_h = f(H).$$

A person may choose good-intensive combination of X and L where he/she enjoys a small amount of leisure time, and spend the rest of the time on home and market work. The same person can decide to adopt leisure-intensive technology such that most of his/her time is spent on leisure activities and the remaining time on home and market work. A person may adopt good-intensive technology but may still be home-intensive if a larger part of the goods are produced at home.

The maximization of commodity (Z) is however bounded by two constraints: budget constraint (X_m) and time constraint (T)

$$X_m = W*N + V, \text{ and}$$

$$T = L + H + N;$$

where

W = the person's wage rate,

N = hours of market work,

V = non-wage income,

L = leisure time,

H = time spent on house work, and

T = total available time,

Re-writing commodity maximization

$$\text{Max}_{N,H,L} Z = Z(W.N + V + f(H), L),$$

subject to $T = L + N + H$

Time allocation between house work and market work depends on various factors and this boils down to maximization problem. For example, if the marginal productivity at home falls short of the real wage rate, this person should quit working at home and instead will devote his/her time to working in the market. Also, a change in non-wage income leaves the homework unaffected but, if the real wage changes, one begins to think of re-allocation of time between home and market work (obviously opting for the cheaper option of the two). This can be represented mathematically below from first order condition:

$$f'(H) = W,$$

given V , W , and home productivity = f' .

For an increase in non-wage income (V), and for someone who prefers goods-intensive consumption technology which makes him/her work in the market, the amount of time he spends working at home is not affected (i.e. no change), but the amount of leisure (assuming not inferior) will increase as a result of pure income effect. This will also have a negative effect on the amount of time he spends working in the market without having any effect on his work at home. If this person is unemployed, as a result of increase in non-wage income, this person will reduce his/her work at home, increase leisure and since commodity Z increases, consumption time will have to rise, leaving his work in the market unaffected since he is unemployed in the first place.

A rise in real wage should lower the price of goods in terms of time and this make home production less profitable to produce and thereby leading to a cut back on work at home,

while its effect on leisure is indeterminate depending on whether or not income effect dominates substitution effect. If the reduction in work at home exceeds the increase in leisure, the supply of work to the market should increase. It is imperative to state that an increase in real wage rate reduces the home work of the employed and increases his/her market work but does not affect the home work of the unemployed. In this thesis however, I assume that annual personal income of the respondents are their real wages. Household annual income should have a negative effect on work in the market, positive effect on leisure with no effect on work at home.

Another factor that determines how time should be allocated is the presence of children in the household. Especially in multi-person households with increase in the number of children in the household, it is expected that time be transferred to child-related activities. If this person is employed, it means that time allocated to child-related activities will be taken from time allocated to work in the market and leisure, meaning that this variable will have a negative effect on time spent on work in the market and leisure. But where this person is unemployed, as a result of this increase in the number of children at home, time allocated to home work and leisure will be reduced so as to make room for time allocated to childcare.

According to Gronau (1977), an increase in the number of children at the expense of other activities should reduce the person's leisure, since children are more good-intensive than other activities. This means that if for example someone participates in five household activities before the birth of a child or children, after the child birth with time fixed, for child-related activities to be done, one will have to give up more leisure, market work or/and less time for other household work.

The effect of child-related activities on work at home and in the market greatly depends on the profitability of home production. Generally, women are known to be offered lower wage rate than their husbands and may also be more productive at home. In fact since they are offered lower wage, it is efficient for them to produce home goods.

It follows that if the number of children increases, employed women should reallocate their services from the market sector to work at home. And for the unemployed women, the effect will be a reduction in leisure and increase in home work. The increase in the number of children at home will have a positive effect on employed men such that they work more in the market and may also increase their home work. If this is the situation, it means that men's leisure will be greatly reduced. The older the children at home, the higher the possibility of participating in the market of women and the fall the work at home. Also, one would expect that immigrants will generally do more household work than the Canadians since it is shown that Canadian real wage is higher and as such Canadians will allocate more time to working in the market than to working at home. If this is true, it means that immigrants will allocate more time to household work than their fellow Canadian counterparts. It follows that immigration status by gender, as a variable affecting household work will have a positive sign.

As one gets older the possibility of participating in household work should increase up to a point and then reach the maximum and decline. This can be as a result of the fact that older people have a higher tendency of staying more at home and entertaining visitors. With visitors at home it is expected that work at home should increase. But if one is young, the probability of eating outside increases, which invariably have a negative effect on time spent at home work since one cannot be outside and work at home at the same time. This means that age (as a

continuous variable) is expected to have a positive effect and thereafter a negative effect on household work.

It is expected that people who are living as common law partners or married couples, would do more of household work than single persons. Married people or couples will usually like to stay at home as compared to single persons since most things needed are at home. For a single person, he/she will always like to go out to either visit his/her partner or go out to socialize. But for couples, the probability of their going out often is expected to be low since they will generally be in each other's company and may likely have visitors coming to the house, which may mean that there will be more work at home. This follows that a positive relationship is expected since they will usually stay more at home and entertain visitors than single people. For the widowed, separated or divorced, one cannot predict their signs since this depend on whether or not child(ren) is/are present in the household.

On the average households with more members should do less of household work than households where the members are few. The sign of dwelling type of households cannot be determined since the base group is 'other group' which might be a bigger house as compared to these groups. The 'other group' might be those who live in a mansion, a room or any other kind of dwelling. But generally speaking, one would expect that people living in big houses do more household work than those in smaller houses.

As the number of rooms occupied by household increases, there is the possibility that house work will increase, which follows that a negative relationship is expected with this variable since the base group is six or more rooms.

The determinants of household work can be shown mathematically below as:

$$\text{Household work} = f(\text{Age}, \text{Age squared}, \text{Immigration status by gender}, \text{Marital status}, \\ \text{Children present}, \text{Number of Children present household}, \\ \text{Household size}, \text{Dwelling type}, \text{Number of rooms in the dwellings}, \\ \text{Annual personal Income}, \text{Household Annual Income})$$

(+) (-) (+) (?)
 (+) (+)
 (-) (?) (-)
 (-) (?)

5.2 Model Specification

Six different categories of household work are considered as dependent variables: cooking/washing up, housekeeping, maintenance and repairs, other household work, shopping for goods and services and childcare. Since a household either participates in an activity or not, this yields a binary choice model with dependent variable in either zero or one.

Dependent Variable(s):

HUW = 1 if the respondent participated in each of the Household activities and 0 for otherwise (this variable comprised of Cookdoms(cooking/ washing up), Hskpdoms(housekeeping), Maindoms(maintenance and repairs), Othrdoms(other household activities), Shopdoms(shopping for goods and services) and Chlddoms(chilcare activities) which means that six regressions will be run)

Independent variables are as shown where all the variables except Age are introduced in form of dummies

Age: age of the respondent

ChldR= 1 is assigned to the presence of Children of the respondent living in the household and 0 for other wise.

Nchld4 = 1 if the number of respondent Children aged 0 to 4 years is present and 0 for otherwise

Nchld5 = 1 if the number of respondent Children aged 5 to 12 years is present and 0 for otherwise

Nch1d13 = 1 if the number of respondent Children aged 13 to 14 years is present and 0 for otherwise

Immigration status by gender

We have four groups in this variable with three dummy variable introduced into the models.

The four groups are Canadian female Canadian male, immigrant female and immigrant male.

The base group is Canadian male. The three groups introduced are as shown below:

Canfemale= 1 if respondent is a Canadian female and 0 if otherwise

Immifemale = 1 if respondent is immigrant female and 0 if otherwise

Immimale = 1 if respondent is immigrant male and 0 if otherwise

Household size of the respondent

This variable is sub-divided into eight categories with the introduction of seven dummy variables in each model. The base group is household size with one member. The seven variables introduced are as shown below:

TwoM = 1 if the size of the respondent household is 2 member and 0 for otherwise

ThreeM = 1 if the size of the respondent household is 3 member and 0 for otherwise

FourM = 1 if the size of the respondent household is 4 member and 0 for otherwise

FiveM = 1 if the size of the respondent household is 5 member and 0 for otherwise

SixM = 1 if the size of the respondent household is 6 member and 0 for otherwise

SevenM = 1 if the size of the respondent household is 7 member and 0 for otherwise

EightmoreM = 1 if the size of the respondent household is 8 or more members and 0 for otherwise

Marital Status

This variable is divided into three groups with two dummy variables introduced the base group for this variable is single (never married). The two dummy variables introduced are:

LMarr = 1 if the respondent marital status is living common law partner or married and 0 otherwise

WDS = 1 if the respondent marital status is widowed, divorced or separated and 0 for otherwise

Dwelling type of the respondent (DTR)

This variable is subdivided into four (4) groups with three (3) dummy variables introduced into the model (the base group being other types of dwelling) as shown below:

Singled= 1 if the respondent live in a single detached house and 0 for others

Lowr = 1 if the respondent live in a low-rise apartment and 0 for others

Highr = 1 if the respondent live in a high rise apartment and 0 for others

Number of rooms in the dwelling (NRD)

For this variable we have six groups but with five dummies introduced into the model. The base group is six or more rooms. The variables introduced into the model(s) are as shown below:

OneRm = 1 if number of rooms in the dwelling is one room and 0 if otherwise

TwoRms = 1 if number of rooms in the dwelling is two rooms and 0 if otherwise

ThreeRms = 1 if number of rooms in the dwelling is three rooms and 0 if otherwise

FourRms = 1 if number of rooms in the dwelling is four rooms and 0 if otherwise

FiveRms = 1 if number of rooms in the dwelling is five rooms and 0 if otherwise

Annual personal income of the respondent (INCM)

This variable is further group into twelve with eleven dummy variables introduced. The base group is respondent annual personal income of \$0. The dummy variables introduced are as shown below:

AnnA = 1 if the respondent annual personal income is less than \$5,000 and 0 if otherwise

AnnB = 1 if the respondent annual personal income is between \$5,000 to \$9,999 and 0 if otherwise.

AnnC = 1 if the respondent annual personal income is between \$10,000 to \$14,999 and 0 if otherwise.

AnnD = 1 if the respondent annual personal income is between \$15,000 to \$19,999 and 0 if otherwise.

AnnE = 1 if the respondent annual personal income is between \$20,000 to \$29,999 and 0 if otherwise.

AnnF = 1 if the respondent annual personal income is between \$30,000 to \$39,999 and 0 if otherwise.

AnnG = 1 if the respondent annual personal income is between \$40,000 to \$49,999 and 0 if otherwise.

AnnH = 1 if the respondent annual personal income is between \$50,000 to \$59,999 and 0 if otherwise.

AnnI = 1 if the respondent annual personal income is between \$60,000 to \$79,999 and 0 if otherwise.

AnnJ = 1 if the respondent annual personal income is between \$80,000 to \$99,999 and 0 if otherwise.

AnnK = 1 if the respondent annual personal income is \$100,000 or more 0 if otherwise.

Income of the respondent household (INCMHSD)

This variable is also subdivided into twelve groups with eleven dummy variables introduced. The base group is respondent household income \$0 per annum. The eleven dummy variables introduced are as shown below:

HicA = 1 if the income of the respondent household is Less than \$5,000 and 0 if otherwise

HicB = 1 if the income of the respondent household is between \$5,000 to \$9,999 and 0 if otherwise.

HicC = 1 if the income of the respondent household is between \$10,000 to \$14,999 and 0 if otherwise.

HicD = 1 if the income of the respondent household is between \$15,000 to \$19,999 and 0 if otherwise.

HicE = 1 if the income of the respondent household is between \$20,000 to \$29,999 and 0 if otherwise.

HicF = 1 if the income of the respondent household is between \$30,000 to \$39,999 and 0 if otherwise.

HicG = 1 if the income of the respondent household is between \$40,000 to \$49,999 and 0 if otherwise.

HicH = 1 if the income of the respondent household is between \$50,000 to \$59,999 and 0 if otherwise.

HicI = 1 if the income of the respondent household is between \$60,000 to \$79,999 and 0 if otherwise.

HicJ = 1 if the income of the respondent household is between \$80,000 to \$99,999 and 0 if otherwise.

HicK = 1 if the income of the respondent household is \$100,000 and more and 0 if otherwise.

The household unpaid work model is as shown below:

$$\begin{aligned}
 HUW = & \beta_0 + \beta_1 \text{Age} + \beta_2 \text{Age}^2 + \beta_3 \text{Canfe} + \beta_4 \text{Immife} + \beta_5 \text{Immima} + \beta_6 \text{LMrr} + \beta_7 \text{WDS} + \beta_8 \text{Chldr} + \\
 & \quad (+) \quad (-) \quad (+) \quad (+) \quad (+) \quad (+) \quad (?) \quad (+) \\
 & \beta_9 \text{Nchld4} + \beta_{10} \text{Nchld5} + \beta_{11} \text{Nchld13} + \beta_{12} \text{TwoM} + \beta_{13} \text{ThreeM} + \beta_{14} \text{FourM} + \beta_{15} \text{FiveM} + \\
 & \quad (+) \quad (+) \quad (+) \quad (-) \quad (-) \quad (-) \quad (-) \\
 & \beta_{16} \text{SixM} + \beta_{17} \text{SevnM} + \beta_{18} \text{FEighmoreM} + \beta_{19} \text{Singled} + \beta_{20} \text{Lowr} + \beta_{21} \text{Highr} + \\
 & \quad (-) \quad (-) \quad (-) \quad (?) \quad (?) \quad (?) \\
 & \beta_{22} \text{OneRms} + \beta_{23} \text{TwoRms} + \beta_{24} \text{ThreeRms} + \beta_{25} \text{FourRms} + \beta_{26} \text{FiveRms} + \beta_{27} \text{AnnA} + \\
 & \quad (-) \quad (-) \quad (-) \quad (-) \quad (-) \quad (-) \\
 & \beta_{28} \text{AnnB} + \beta_{29} \text{AnnC} + \beta_{30} \text{AnnD} + \beta_{31} \text{AnnE} + \beta_{32} \text{AnnF} + \beta_{33} \text{AnnG} + \beta_{34} \text{AnnH} + \\
 & \quad (-) \quad (-) \quad (-) \quad (-) \quad (-) \quad (-) \\
 & \beta_{35} \text{AnnI} + \beta_{36} \text{AnnJ} + \beta_{37} \text{AnnK} + \beta_{38} \text{HicA} + \beta_{39} \text{HicB} + \beta_{40} \text{HicC} + \beta_{41} \text{HicD} + \beta_{42} \text{HicE} \\
 & \quad (-) \quad (-) \quad (-) \quad (?) \quad (?) \quad (?) \quad (?) \\
 & + \beta_{43} \text{HicF} + \beta_{44} \text{HicG} + \beta_{45} \text{HicH} + \beta_{46} \text{HicI} + \beta_{47} \text{HicJ} + \beta_{48} \text{HicK} + \mu_i \\
 & \quad (?) \quad (?) \quad (?) \quad (?) \quad (?) \quad (?)
 \end{aligned}$$

where

β_i = Coefficient of X_i 's, and

μ_i = Population error terms.

To estimate population regression equation is near impossibility since it is very difficult to get information from everyone. Only the sample population can be estimated since this is the information we have for this thesis. The sample regression model for the six models can be written as:

$$\hat{Y}_i = \hat{\beta} X_i + \varepsilon_i$$

where

\hat{Y}_i = the estimated dependent variables (The probability of participation in Cookdoms, Hskpdoms, Maindoms, Othrdoms, Shopdoms and Chlddoms),

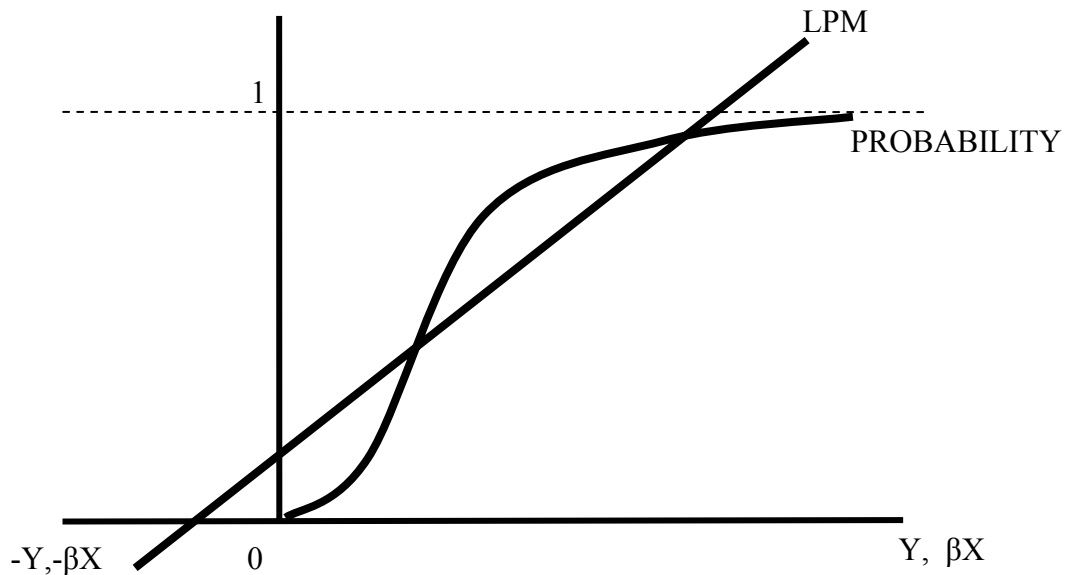
X_i = the independent variables as defined in HUW model above,

$\hat{\beta}$ = Coefficients of the independent variables, and

ε = sample error term.

Note that the value of the dependent variable in the sample is either 1 (participant) or 0 (non participant). Estimating binary dependent variable(s) using Ordinary Least Squares method give rise to certain problems such as: (1) the error term (μ_i) is heteroscedastic in such a way that depends on the $\beta(s)$. (2) there is possibility of the dependent variable (\hat{Y}_i =probability of participation) not to lie within the interval 0-1. (3) non-normality of μ_i and (4) the general idea that R^2 have a low value (see Gujarati 1995, 542-545). This is shown by the LPM regression line in Figure 5.1 below;

Figure 5.1: Relationship between Linear Probability Model and Probit Model



The use of Probit model is justified based on its traits which include: (1) as X_i changes, $P_i = E(Y = 1 | X)$ also changes in the same direction but never go beyond the range of 0-1 interval and (2) the relationship between P_i and X_i is nonlinear. In binary dependent variable case, probit model is the most widely used method utilized by empirical labor economists. Though some of the variables might be correlated, according to Green (2003), using probit method of estimation, multicollinearity is not a big problem.

The probit model is computed from the standardized normal cumulative distribution function CDF (Greene 2003). For a given independent vector, it is expected that;

$$\lim_{X'\beta \rightarrow +\infty} \text{Prob}(Y=1 | X) = 1 \text{ (as } X'\beta \text{ approach plus infinity, the probability of y given x will equal 1)}$$

$$\lim_{X'\beta \rightarrow -\infty} \text{Prob}(Y=1 | X) = 0 \text{ (as } X'\beta \text{ approach minus infinity, the probability of y given x will equal 0)}$$

Figure 5.1 above shows this relationship. The probability model is a regression:

$$E[y | X] = 0[1-F(X'\beta)] + 1[F(X'\beta)] = F(X'\beta)$$

The parameters (b) of the probability model shows the movement along the horizontal axis in Figure 5.1, which is not necessarily the marginal effects on the probability of participation measured along the vertical axis. Below shows how to calculate the marginal effect of an explanatory variable X, assuming X is a continuous variable, in a probit model.

$$\frac{\partial E[Y|X]}{\partial X} = \left\{ \frac{dF(\beta x')}{d(\beta x')} \right\} \beta = f(X'\beta) \beta$$

Where $f(\cdot)$ is the density function that corresponds to cumulative distribution, $F(\cdot)$. This is the product of the effect of X on Y multiplied by the effect of Y on the probability of participation.

The appropriate marginal effect for a binary independent variable say d would be:

$$\text{Marginal Effects} = \text{Prob}[Y = 1 | \bar{X}_{(d)}, d=1] - \text{Prob}[Y=1 | \bar{X}_{(d)}, d=0]$$

Where $\bar{X}_{(d)}$ symbolizes the means of all the other variables in the model. As shown in Green (2003), this formula and the general formula for continuous case give approximately the same effect and as such for convenience, I would use the general continuous method of estimating the marginal effect.

The various z-statistics presented by the probit model are the z-statistics for the coefficients and in computing the z-statistic for the marginal effect, it is imperative to state the formula for calculating its' variance below as:

$$\text{Asy. Var}(\hat{F}) = \left(\frac{\partial \hat{F}}{\partial \hat{\beta}} \right)' V \left(\frac{\partial \hat{F}}{\partial \hat{\beta}} \right)$$

or

$$\text{Asy. Var}(\hat{\gamma}) = \phi^2 [I - (\hat{\beta}' \bar{X}) (\hat{\beta} \bar{X}')] V [I - (\hat{\beta}' \bar{X}) (\hat{\beta} \bar{X}')]$$

where

I = Identity matrix,

$\hat{\beta}'$ = the transpose of estimated parameters,

\bar{X}' = the mean of the variables transposed,

$\hat{\beta}$ = the estimated parameters of the models,

\bar{X} = the mean of the variables in the models,

V = the variance-covariance matrix (obtained from E-views), and

$$\phi = \frac{1}{\sqrt{2\pi}} e^{-\frac{(\hat{y}^*)^2}{2}}$$

It is these calculated marginal effects that are reported in the Table below with their corresponding standard error. The Z-values are shown in appendix Table A.15.

5.3 Regression Results

The results of household unpaid work (six models) are as presented in Table 5.1. The marginal effect of the probit model is as discussed in section 5.2 above.

Table 5.1 Regression result using the probit model (dependent variable: participant = 1, Non-participant = 0)

Explanatory variables	Cookdoms Slope(M.E) (Std. error)	Hskpdoms Slope(M.E) (Std. error)	Maindoms Slope(M.E) (Std. error)	Othrdoms Slope(M.E) (Std. error)	Shopdoms Slope(M.E) (Std. error)	Chlddoms Slope(M.E) (Std. error)
Sample size	5316	5316	5316	5316	5316	5316
Age	0.0080 (0.0114)	0.0027 (0.0030)	-0.0003 (0.0038)	0.0041 (0.0024)	0.000001 (0.0001)	-0.0012 (0.175)
Canfemale	0.1507* (0.0105)	0.3267* (0.0101)	-0.0530* (0.0070)	0.0490* (0.0151)	0.0015* (0.0003)	0.0127* (0.0024)
Immifemale	0.1489* (0.0245)	0.3222* (0.0257)	-0.0801* (0.0145)	0.0577** (0.0255)	0.0009*** (0.0005)	0.0120** (0.0054)
Immimale	-0.0293 (0.0224)	0.0117 (0.0305)	0.0056 (0.0105)	-0.0134 (0.0279)	-0.0004 (0.0005)	0.0041 (0.0073)
Chdlr	0.0982* (0.0224)	0.1054* (0.0281)	-0.0041 (0.0140)	0.0204 (0.0295)	0.0010*** (0.0005)	0.0301 (0.0283)
Nchld4	0.0718* (0.0200)	0.0901* (0.0241)	0.0046 (0.0100)	-0.0229 (0.0235)	0.0001 (0.0004)	0.0342* (0.0029)
Nchld5	0.0475** (0.0200)	0.0826* (0.0217)	0.0034 (0.0093)	0.0222 (0.0210)	0.00002 (0.0004)	0.0259* (0.0043)
Nchld13	0.0140 (0.0245)	-0.0038 (0.0286)	0.0229** (0.0108)	0.0319 (0.0257)	0.0004 (0.0005)	0.0073*** (0.0042)
LMrr	-0.0211 (0.0245)	0.0751* (0.0230)	0.0316** (0.0127)	0.0429*** (0.0229)	-0.0010** (0.0004)	-0.0015 (0.0116)
WDS	0.0195 (0.0224)	0.0861* (0.0252)	0.0161 (0.0124)	0.0410*** (0.0240)	-0.0002 (0.0004)	-0.0006 (0.0099)
TwoM	-0.0642** (0.0265)	-0.0716** (0.0302)	0.0054 (0.0125)	-0.0279 (0.0267)	-0.0008*** (0.0005)	0.1122 (97495)
ThreeM	-0.1636* (0.0412)	-0.1631* (0.0488)	-0.0036 (0.0189)	-0.0951** (0.0424)	-0.0016** (0.0007)	0.1164 (56182)
FourM	-0.1891* (0.0480)	-0.1896* (0.0555)	-0.0145 (0.0205)	-0.1328* (0.0488)	-0.0014*** (0.0008)	0.1165 (63836)
FiveM	-0.2219* (0.0490)	-0.2060* (0.0584)	-0.0291 (0.0232)	-0.1304** (0.0522)	-0.0010 (0.0009)	0.1134 (13841)
SixM	-0.2309* (0.0632)	-0.2209* (0.0756)	-0.0317 (0.0295)	-0.1862* (0.0688)	-0.0016 (0.0012)	0.1082 (4941)
SevenM	-0.1539 (0.1212)	-0.0867 (0.1304)	-0.0505 (0.0576)	-0.1809 (0.1193)	-0.0046** (0.0022)	0.1017 (11984)
Eightmore	-0.2729** (0.1371)	-0.3159*** (0.1649)	0.0079 (0.0536)	-0.0660 (0.1433)	-0.0003 (0.0026)	0.0992 (11984)

Table 5.1 Regression result using the probit model (dependent variable: participant = 1, Non-participant = 0) {Cont'd}

Singled	0.0110 (0.0173)	0.0040 (0.0201)	0.0323* (0.0093)	0.0535* (0.0169)	-0.0010* (0.0003)	-
Lowr	-0.0106 (0.0224)	0.0116 (0.0257)	-0.0026 (0.0126)	-0.0346 (0.0247)	0.0006 (0.0004)	-
Highr	0.0314 (0.0316)	0.0008 (0.0377)	-0.0574** (0.0261)	-0.0350 (0.0359)	0.0021* (0.0006)	-
OneRMS	-0.0082 (0.0632)	-0.1396*** (0.0801)	-0.6516 (2098)	-0.0420 (0.0742)	-0.0020 (0.0013)	-
TwoRMS	-0.0150 (0.0500)	-0.0631** (0.0608)	-0.0447 (0.0364)	-0.0063 (0.0567)	-0.0001 (0.0010)	-
ThreeRMS	-0.0125 (0.0300)	-0.0472 (0.0377)	-0.0226 (0.0500)	-0.0371 (0.0344)	-0.0006 (0.0006)	-
FourRMS	-0.0053 (0.0224)	-0.0591 (0.0265)	-0.0168 (0.0112)	-0.0397 (0.0242)	-0.0007*** (0.0004)	-
FiveRMS	-0.0291*** (0.0173)	0.0239 (0.0202)	-0.0044 (0.0080)	-0.0456** (0.0193)	-0.0005 (0.0003)	-
AnnA	-0.0591 (0.0548)	-0.0619 (0.0527)	-0.0020 (0.0194)	0.0468 (0.0467)	-0.0005 (0.0008)	-0.0023 (0.0134)
AnnB	0.0177 (0.0529)	-0.0264 (0.0480)	-0.0342*** (0.0194)	0.0467 (0.0421)	-0.0010 (0.0008)	0.0013 (0.0118)
AnnC	-0.0996** (0.0458)	-0.0632 (0.0447)	-0.0232 (0.0175)	-0.0007 (0.0394)	0.0004 (0.0007)	-0.0022 (0.0110)
AnnD	-0.1202* (0.0447)	-0.0735*** (0.0424)	-0.0457* (0.0176)	-0.0110 (0.0377)	-0.0006 (0.0007)	0.0019 (0.0099)
AnnE	-0.1678* (0.0436)	-0.1407* (0.0387)	-0.0270** (0.0137)	-0.0589*** (0.0329)	-0.0010*** (0.0006)	-0.0035 (0.0100)
AnnF	-0.2270* (0.0469)	-0.1842* (0.0412)	-0.0215 (0.0142)	-0.0560 (0.0342)	-0.0015** (0.0006)	-0.0025 (0.0101)
AnnG	-0.2451* (0.0480)	-0.1848* (0.0436)	-0.0475* (0.0159)	-0.0850** (0.0374)	-0.0011*** (0.0007)	0.0002 (0.0100)
AnnH	-0.2981* (0.0510)	-0.2228* (0.0473)	-0.0187 (0.0169)	-0.1296* (0.0414)	-0.0020* (0.0007)	-0.0036 (0.0118)
AnnI	-0.3102* (0.0529)	-0.2350* (0.0503)	-0.0116 (0.0181)	-0.1148* (0.0435)	-0.0015** (0.0008)	-0.0008 (0.0120)
AnnJ	-0.3584* (0.0616)	-0.2600* (0.0671)	-0.0530*** (0.0282)	-0.1168** (0.0594)	-0.0023** (0.0011)	-0.0011 (0.0170)
AnnK	-0.3791* (0.0616)	-0.3381* (0.0686)	-0.0301 (0.0259)	-0.1401** (0.0581)	-0.0036* (0.0010)	0.0015 (0.0155)
HicA	0.1052 (0.1308)	0.0553 (0.1490)	-0.7118 (7611)	-0.0175 (0.1404)	-0.0039 (0.0025)	-0.0099 (0.0608)
HicB	-0.0146 (0.1095)	0.0291 (0.1200)	-0.0259 (0.0442)	-0.0174 (0.1131)	-0.0017 (0.0020)	-0.0193 (0.0529)
HicC	0.1064 (0.1000)	0.0520 (0.1145)	-0.0348 (0.0411)	0.0550 (0.1079)	-0.0018 (0.0019)	-0.0137 (0.0520)
HicD	0.0716 (0.0995)	0.0145 (0.1140)	-0.0417 (0.0410)	0.0680 (0.1065)	-0.0021 (0.0019)	-0.0144 (0.0520)

Table 5.1 Regression result using the probit model (dependent variable: participant = 1, Non-participant = 0) {Cont'd}

HicE	0.1431 (0.0911)	0.0793 (0.1077)	-0.0274 (0.0383)	0.0865 (0.1015)	-0.0009 (0.0018)	-0.0156 (0.0624)
HicF	0.1932* (0.0860)	0.1433 (0.1044)	-0.0363 (0.0381)	0.0778 (0.1012)	-0.0004 (0.0018)	-0.0144 (0.0656)
HicG	0.2375* (0.0837)	0.1478 (0.1044)	-0.0476 (0.0382)	0.1509 (0.0985)	-0.0003 (0.0018)	-0.0153 (0.0671)
HicH	0.2523* (0.0843)	0.1449 (0.1058)	-0.0312 (0.0386)	0.1504 (0.0995)	0.0001 (0.0018)	-0.0134 (0.0624)
HicI	0.3013* (0.0794)	0.1642 (0.1044)	-0.0453 (0.0387)	0.1808*** (0.0980)	0.0016 (0.0018)	-0.0158 (0.0700)
HicJ	0.3352* (0.0900)	0.1830*** (0.1105)	-0.0503 (0.0401)	0.1578 (0.1044)	0.0017 (0.0019)	-0.0131 (0.0551)
HicK	0.3138* (0.0883)	0.1509 (0.1108)	-0.0721*** (0.0404)	0.2131** (0.1025)	0.0018 (0.0019)	-0.0129 (0.0583)
S.E of Regression	0.4026	0.4554	0.2643	0.4679	0.4921	0.2639
Log likelihood	-2612.388	-3187.873	-1349.734	-3315.96	-3575.972	-1178.33
Mc Fadden R-squared	0.0787	0.1268	0.0766	0.0289	0.0237	0.6306

Note:

*** SIGNIFICANT AT $\leq 10\%$ LEVEL

**SIGNIFICANT AT $\leq 5\%$ LEVEL

* SIGNIFICANT AT $\leq 1\%$ LEVEL

—: Not applicable

As mentioned in section 5.2 above, the marginal effect shows the effect of a change in an explanatory variable on the probability of participation in household production. The value in the brackets under marginal effects shows the standard error of the marginal effect. In interpretation of the results, a positive marginal/slope effect implies that the probability of participation increases with an increase in the explanatory (the reverse is the case for negative signs). A statistically insignificant effects means that the explanatory variable is not important in determining the participation decision in household work. These results shown in Table 5.1 above are discussed below:

Immigration status by gender (Base group: Canadian men)

All the slope coefficients for immigrant men are statistically insignificant, which implies that statistically immigrant men and Canadian men (the base group) are equally likely to participate in all six categories of household work. However, compared to Canadian men, women (both Canadians and immigrants) are more likely to participate in five of the six categories of household work and the effect is statistically significant. The exception is household maintenance, where immigrant (Canadian) women are 8% (5%) less likely to participate. The predicted participation rate for Canadian women in housekeeping is 32% higher than men while the rate is 15% higher for cooking.

These results are consistent with the results reported in chapter 3 where no significant difference for men by immigration status was observed in the participation rate for cooking, housekeeping, other household work, shopping, and childcare. However, while the raw difference for maintenance work was statistically significant, the regression results reported here shows no statistically significant difference. This implies that the additional explanatory variables included in the regression explain this difference shown in Table 3.5.

Age: From the results in Table 5.1 above, Age variable have expected signs in cooking/washing up, housekeeping, other household work and shopping for goods and services but are statistically insignificant in five of the six models. Only in the case of housekeeping is the participation rate expected to increase with age. Interpreting this result, one could conclude that, in general, age has no effect in household activities, which is against what was expected.

Marital Status (Base group: Single)

Married or living common law partner: For housekeeping, maintenance, and other household work the slope coefficients have the expected positive sign and the effects are statistically significant. This means that married or common law partners participate more in household work than a single person (the base group) which is in line with our expectations. It is also statistically significant in shopping for goods and services model though with unexpected signs meaning that married or common law partners are less likely to participate than a single person. Also this variable has negative signs in cooking/washing up, and child care activities though they are statistically insignificant.

Widowed, Divorced or Separated: Compared to single individuals, widowed/divorced/separated individuals are statistically more likely to participate in housekeeping, and other household work. No significant differences were observed for the other four cases.

Presence of Children in the respondent Household (Chldr)

Though it does not have the expected sign in maintenance activities it is also insignificant. As expected, individuals in families with more children are more likely to participate in cooking, housekeeping, and shopping. In other three cases, presence of children does not have any statistically significant effect on the probability of participation.

Number of Children present in respondent household from age 0 to 13 years

From 0 to 4 years: As expected this variable has a positive effect on participation in different categories of household work, although the effects are not statistically significant for some of the cases. Only exception is for effect of children in the age group 13 -14 on the

likelihood of participation in other household activities, but the effect is statistically insignificant.

Some of the results for presence/number of children in the household are in line with findings of previous studies (see Gronau, 1977) which show that the presence of children have a positive relationship on household work especially when they are very young. He however said that the older the child becomes the possibility of participating in the market activities increases.

Household size of the respondent (Base group: single)

As expected, in most cases individuals in families with more members are less likely to participate in household work, except for childcare model where the signs are positive but statistically insignificant. Statistically insignificant implies that the explanatory variable is not important in determining the probability of participation in household work.

Dwelling type of the respondent

Individuals who live in single house are more likely to participate in other household work and shopping than those who live in other kind of dwellings. However they are less likely to participate in childcare, but the effect is economically insignificant (one-tenth of one percent). As expected, high-rise apartment (usually rented) dwellers are less likely to participate in home maintenance work.

Number of rooms in the respondent dwelling (Base group: six or more rooms)

The signs of all the statistically significant marginal effects are consistent with our expectations; individuals living in houses with fewer rooms are less likely to participate in household works.

Annual Personal Income of the respondent (Base group: No employment income)

It is expected that higher employment income implies higher wage rate and more time allocated to market work, which implies lower probability of participation in household work. The results in Table 5.1 are consistent with our expectations, all the statistically significant marginal effects have the correct signs. However, employment income below \$15,000 per year in most cases does not have significant effects on the participation decision. Employment income does not have any significant effect (both statistical and economic effects) on the probability of participation in childcare and related activities.

Household Annual Income of the respondent (Base group: Zero income)

It was expected that household annual income should have no effect on the household work of the employed individuals but decrease household work for non participants. Our empirical results shows that participation in shopping and other household work is not affected by household income and only the highest income level have significant negative effect on participation in maintenance work. For cooking, housekeeping, and other household work very high level of household income appears to have a statistically significant positive effect on participation probability. This later finding is inconsistent with our prior expectation which can be explored further in future studies.

In general the results reported here are consistent with those reported in chapter 3. No statistical difference was found in the participation decision by immigration status. Women are observed to participate more in each of the six types of household work studied except for maintenance and repairs. In conclusion, there may be other factors, such as educational level, family type, and so on that affect the decision to participate in household work or market work which should be introduced into the model in future study.

CHAPTER 6

Summary and Conclusion

Past studies show that people spend as much time in unpaid work as they do in paid work, and social scientists are increasingly emphasizing on the need to account for non-monetary activities such as household unpaid work. From the representative literature review, it was observed that females generally do more household work than males and have a higher value of non-market production. However, to the best of my knowledge no previous study has examined the differences in time allocation by immigration status. This thesis examines that issue. Specifically the thesis looks at the ‘immigration status differentials’ in time allocation, value of household work, and determinants of participation rate in household work. The data for this study comes from the General Social Survey, 1998 (GSS 1998 cycle 12: Time Use.), comprised of 6,944 observations in the age group 25 to 65 years (5779 Canadian born and 1165 immigrants).

In time allocation, Canadians’ participation rate in maintenance and repair activities was higher than the rate for their immigrant counterparts, while Canadian females’ participation rate in housekeeping was higher than that for female immigrants. No statistically significant difference by immigration status was observed in the participation rates in cooking/cleaning, other household work, shopping, and childcare.

In terms of hours of unpaid work, an average immigrant participant allocated more time to cooking/ washing up, shopping and childcare activities and the difference is statistically significant at 10 percent level of significance. An average immigrant allocates more time to household unpaid work because they have lower wages compared to an average Canadian. The result is in line with a priori expectations.

One of the reasons why the average Canadian participation rate was higher than that of an average immigrant for maintenance and repairs may be due to the fact that immigrants mainly live in rented apartments/ houses than Canadians. The average house ownership of Canadians is expected to be higher than that of immigrants and since maintenance activities are associated with house ownership, it was not surprising to see that an average Canadian's participation rate in maintenance and repairs is higher than that of an average immigrant.

The results of this thesis show significant gender differentials in unpaid work. Men spent about 1,028 hours per year on household unpaid work while women spent about 1,745 hours per year for the same activities in 1998. A previous Statistics Canada study (1995) reports that in 1992, time spent by males and females were 831 and 1,482 hours respectively. This thesis studied people within ages group 25 to 64 years while Statistics Canada study was based on people aged 15 years and older. This may account for the observed difference between our findings and those of Statistics Canada.

No statistically significant difference in the replacement cost valuation of unpaid work was found by immigration status in Canada, but the value was significantly higher for women compared to men. Also the value was significantly higher for individuals with children. For respondents without children, the value of household work was around \$8,533 for men and \$13,417 for women. The corresponding values for respondents with children were around \$13,185 for men and \$23,394 for women. Since there were differences in time allocation on household work between Canadians and immigrants in this study and since the same hourly wage rates applies to both Canadians and immigrants, it is not surprising to observe that statistically, there was no significant difference between the values Canadians and immigrants attach to household work. On the other hand, the value of household work by females is higher

than that of the males and the difference is statistically significant. This is due to the fact that women allocate more time to household unpaid work as reported in chapter three.

The opportunity cost method (both before tax and after tax estimates), show significantly higher value for Canadians compared to their immigrant counterparts. The average aggregate value of unpaid work using opportunity cost before tax for male Canadians with children is \$23,939 and for immigrants with children is \$17,724. The measures for without children sample are \$15,944 for Canadian men and \$12,092 for immigrant men. Similarly the value of household work by an average Canadian woman was 25% higher than her immigrant counterpart. Using opportunity cost after tax, an average Canadian's (with or without children) value of household work is higher than an average immigrant's value of household work with about 19 percentage difference. The difference is statistically significant.

Past studies show that an average Canadian has higher opportunity cost (wage rate) of working at home than an average immigrant and that an average male has higher opportunity of working at home than an average female. This explains the immigration-status and gender differences in the opportunity cost valuation of unpaid work. Even if an average Canadian and an average immigrant male and female allocate the same number of hours to household work, the value of household work for an average Canadian male would be higher than that of an immigrant male and female.

From the two methods introduced in this study for measuring household unpaid work, I will suggest that measuring household unpaid work be done by using replacement cost method, because it reflects the value of output produced. Since GNP is a measure of output, i.e. it is concerned with counting of output and not utility or disutility associated with market

production (Murphy, 1978), measuring household work is only fair if replacement method is used.

Using the probit model, the probability of participating in household unpaid work was regressed on conceptually determined independent variables. In household unpaid work, we had six equations with the following dependent variables: cooking/washing up, housekeeping, maintenance and repairs, other household work, shopping for goods and services and lastly child care activities. The coefficients obtained from the probit model are not the slopes. It is the marginal effects that are reported in Table 5.1 which are also the slopes and are calculated as specified in section 5.2.

Age as an independent variable has no effect on the participation rate for each of the six categories of unpaid work, meaning that age does not affect whether an individual should participate in household work or not. This result contradicts what was expected prior to the study. The reason for this outcome may be that people between the age of 25 and 64 years equally participate in household work. Also, from the regression results in all the models with the exception of activities under maintenance and repairs, the results show that females participate more in household work than the males and that immigrant and Canadian males are equally likely to participate in all household work. This is in line with results obtained in chapter three where it was observed that there were no statistically significant differences in participation rates by Canadian and immigrant males except for maintenance and repairs. But when other variables were considered using probit model, it was discovered that both Canadian and immigrant male participation rates in household work are the same statistically. Both from econometric and time use approach, it was discovered as expected, that respondents without

children do less of household work than those with children. This difference is statistically significant.

It was expected that household annual income would have no effect on household work of the employed individuals but decrease household work for non participants. Empirical results from this study showed that participation in shopping for goods and services, childcare activities, housekeeping, maintenance and repairs and other household work is not affected by household income, and only the highest income level has a significant negative effect on participation in maintenance work and a positive effect on cooking/ washing up and other household work. Not all the results had the expected signs. This issue can be pursued further in future studies.

Though no statistically significant difference in time allocation of household work between Canadians and immigrant were found, it should however be noted that a large number of socioeconomic factors may determine whether time be allocated to household work or not, and we do not have observations of all the relevant explanatory variables. The reason why I did not get significant difference in time allocation to household work between Canadians and immigrant might be associated to lack of information in differentiating between old and recent immigrants. I think that old immigrants are likely to have the same opportunity cost as Canadians since they would have lived in Canada longer than some Canadians if they are older than the Canadians. But since there was inadequate information to differentiate between the two groups (old and recent immigrants), taking them as immigrants was the only option available.

In future research, determinants of hours of unpaid work rather than participation rate can also be studied. I suggest that in their next survey, Statistics Canada should ask the

respondents to state how long they have lived in Canada if they indicated that they were born outside Canada. That way, any future research that will be carried out on household unpaid work by immigration status will have enough information to differentiate between old and recent immigrants.

Another shortcoming observed is that participation in household work or not is a joint decision, in other words it is a family decision. This means that using a family data file instead of individual data file may be more appropriate. Also, another problem that could be addressed in future research is the problem of general agreement as to what constitutes household work. In some of the literature, leisure and helping out relatives were considered as part of household work. These were not considered as part of household work in this study. If there is general agreement to this problem of definition, then valuing household work will be properly done.

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APPENDIX

Table A.1: Average Hours per Day Spent on Paid Work and Related Activities by Immigrants and Canadians.

	Immigrants			Canadians		
	Total	Male	Female	Total	Male	Female
Paid Work						
Work for pay at main job	7.67	8.06	7.15	7.54	7.96	7.06
Work for pay at other job(s)	2.43	2.18	2.81	3.49	3.96	2.87
Overtime Work	2.14	1.86	2.9	1.91	1.91	1.9
Unpaid Work in a Family Business or Farm	2.14	2.6	1.85	3.22	3.18	3.27
Travel During Work	0.83	0.99	0.49	1.36	1.71	0.78
Waiting/Delays at Work	0.54	0.57	0.51	0.45	0.51	0.39
Coffee, other breaks	0.41	0.41	0.4	0.44	0.45	0.42
Hobbies Done For Sale or Exchange	0	0	0	2.87	2.74	2.98
Domestic Home Crafts Done For Sale or Exchange	4.92	4.92	0	3.62	0.33	3.98
Other Work Activities	1.7	0.84	2.92	0.8	0.92	0.71
Activities Related To Paid Work						
Looking for work	3.51	5.33	0.77	1.82	1.91	1.67
Idle time before/after work	0.43	0.47	0.35	0.4	0.42	0.38
Travel: Hobbies and crafts for sale	0	0	0	0.69	1.12	0.44
Commuting						
Travel: to/from work	0.96	0.96	0.94	0.78	0.84	0.71

Table A.2: Average hours per day Spent on Activities Cooking/washing up, Housekeeping and Maintenance and Repairs by Immigrants and Canadians

	Immigrants			Canadians		
	Total	Male	Female	Total	Male	Female
Cooking/washing up						
Meal preparation	0.95	0.68	1.15	0.79	0.61	0.9
Baking, preserving food etc.	1.11	1.43	0.92	1.59	1.98	1.54
Food (or meal) clean up	0.5	0.4	0.54	0.48	0.42	0.51
Housekeeping						
Indoor Cleaning	1.37	1.16	1.46	0.53	1.25	1.16
Outdoor Cleaning	1.47	1.81	0.82	1.5	1.66	1.17
Laundry, Ironing, Folding	1.07	0.87	1.11	0.95	0.8	0.97
Mending/Shoe Care	1.14	0	1.14	0.91	0.6	0.98
Dressmaking and Sewing	1.89	0	1.89	1.51	0	0.51
Maintenance and repairs						
Interior Maintenance and Repairs	3.8	4.2	2.88	2.8	2.99	2.49
Exterior Maintenance and Repairs	1.99	1.9	2.1	2.6	2.94	1.2
Vehicle Maintenance	1.72	1.87	0.83	1.56	1.81	0.88
Other Home Improvements	3.14	3.6	2.21	3.82	3.65	4.29

Table A.3: Average Hours per day Spent on Other Household work/Activities by Immigrants and Canadian

	Immigrants			Canadians		
	Total	Male	Female	Total	Male	Female
Other household work						
Gardening/Grounds Maintenance	2	2.09	1.92	1.9	2.2	1.64
Pet Care	0.78	0.78	0.78	0.65	0.71	0.61
Care of House Plants	0.5	0.53	0.48	0.52	0.67	0.46
Household Management	1.1	0.8	1.4	1.01	1.19	0.85
Stacking and Cutting Firewood	1.3	1.3	0	1.86	2.13	1.15
Other Domestic/Household Work, n.e.s.	0.71	1.08	0.55	0.93	0.9	0.95
Unpacking Groceries	0.29	0.29	0.29	0.29	0.26	0.3
Packing and Unpacking Luggage and/or Car	1.53	2.52	0.9	0.92	0.95	0.9
Packing and Unpacking for a move of the Household	4.71	3	5.28	5.1	5.82	4.87
Travel: Domestic Work	0.85	1.14	0.26	0.56	0.61	0.52

Table A.4: Average hours per Day Spent on Shopping for Goods and Services by Immigrants and Canadians.

	Immigrants			Canadians		
	Total	Male	Female	Total	Male	Female
Shopping for goods and services						
Groceries	0.84	0.74	0.92	0.68	0.62	0.71
Everyday Goods and products (Clothing, Gas, etc.)	1.55	1.29	1.74	1.21	1.1	1.29
Take-out Food	0.2	0.19	0.22	0.24	0.27	0.22
Rental of Videos	0.31	0.27	0.33	0.26	0.27	0.25
Shopping for Durable Goods	1.35	0.98	1.86	1.07	1.03	1.12
Personal Care Services	1.08	0.85	1.18	0.96	0.8	1.03
Financial Services	0.42	0.58	0.26	0.35	0.35	0.34
Government Services	0.8	1.02	0.57	0.38	0.4	0.37
Adult Medical and Dental Care (Outside Home)	1.1	1.28	0.93	1.13	1.27	1.08
Other Professional Services (Lawyer, Veterinarian)	1.55	2.05	0.92	0.98	1.13	0.87
Automobile Maintenance and Repairs Services	1.12	1.14	1.08	0.73	0.93	0.48
Other Repairs and Cleaning Services	0.55	0.33	0.63	0.39	0.47	0.32
Other Shopping and Services	0.95	1	0.94	1.13	1.03	1.19
Travel: Shopping for Goods and Services	0.68	0.64	0.72	0.62	0.62	0.61

Table A.5: Average Hours per Day Spent on Childcare Activities by Immigrants And Canadians

	Immigrants			Canadians		
	Total	Male	Female	Total	Male	Female
Child care activities						
Child Care (Infant to 4 Years Old)	1.92	1.11	2.3	1.54	1.22	1.68
Putting Children to Bed	0.53	0.53	0.52	0.53	0.56	0.51
Getting Children Ready for School	0.58	0.59	0.57	0.52	0.53	0.52
Personal Care of Children in the Household	0.54	0.48	0.57	0.47	0.49	0.47
Helping/Teaching/Reprimanding	1.14	1.34	1.07	0.87	0.72	0.92
Reading/Talking/Conversation with Child	0.69	0.69	0.68	0.64	0.67	0.63
Play with Children	1.45	1.45	1.44	1.4	1.39	1.42
Medical Care- Household Child	0.53	0.75	0.4	1.47	1.14	1.52
Unpaid Babysitting	1.38	1.75	1	1.32	1.58	0.92
Help and Other Care-Household Children	1.25	1.59	1.02	0.62	0.66	0.61
Travel: Household Child	0.79	0.8	0.79	0.61	0.64	0.6

Table A.6: Participation Rates and Average Time Spent on Paid Work and Related Activities

	Canadians			Immigrants		
	Participation rate (Percentage)	Participants (Hours/day)	Population (Hours/day)	Participation rate (Percentage)	Participants (Hours/day)	Population (Hours/day)
Male	60.9	8.9	5.4	63.6	9.2	5.9
Female	45.2	7.8	3.5	48.1	8.1	3.9
Z-values	12.32	9.69	15.09	5.55	4.69	7.09
P-value	0.00	0.00	0.00	0.00	0.00	0.00

Table A.7: Participation Rates and Average Time Spent on Unpaid Work and Related Activities

	Canadians			Immigrants		
	Participation rate (Percentage)	Participants (Hours/day)	Population (Hours/day)	Participation rate (Percentage)	Participants (Hours/day)	Population (Hours/day)
Male	87.0	3.0	2.6	88.6	3.0	2.6
Female	97.3	4.6	4.4	95.6	4.8	4.6
Z-values	-13.95	-19.77	-22.76	-5.62	-9.69	-10.94
P-value	0.00	0.00	0.00	0.00	0.00	0.00

Table A.8: Participation Rates and Average Time Spent on Cooking/washing up

	Canadians			Immigrants		
	Participation rate (Percentage)	Participants (Hours/day)	Population (Hours/day)	Participation rate (Percentage)	Participants (Hours/day)	Population (Hours/day)
Male	65.4	0.7	0.5	66.7	0.8	0.5
Female	87.0	1.2	1.1	87.6	1.4	1.3
Z-values	-19.97	-19.47	-26.63	-8.63	-9.26	-13.76
P-value	0.00	0.00	0.00	0.00	0.00	0.00

Table A.9: Participation Rates and Average Time Spent on Housekeeping

	Canadians			Immigrants		
	Participation rate (Percentage)	Participants (Hours/day)	Population (Hours/day)	Participation rate (Percentage)	Participants (Hours/day)	Population (Hours/day)
Male	24.9	1.5	0.4	25.1	1.4	0.4
Female	63.4	1.9	1.2	54.1	1.8	1.0
Z-values	-31.56	-6.05	-23.49	-10.60	-2.85	-8.70
P-value	0.00	0.00	0.00	0.00	0.00	0.00

Table A.10: Participation Rates and Average Time Spent on Maintenance and Repairs

	Canadians			Immigrants		
	Participation rate (Percentage)	Participants (Hours/day)	Population (Hours/day)	Participation rate (Percentage)	Participants (Hours/day)	Population (Hours/day)
Male	11.8	2.8	0.3	6.8	2.9	0.2
Female	4.7	2.1	0.1	2.6	2.2	0.1
Z-values	9.42	3.08	7.28	3.16	1.1	2.26
P-value	0.00	0.00	0.00	0.00	0.27	0.02

Table A.11: Participation Rates and Average Time Spent on Other Household Work

	Canadians			Immigrants		
	Participation rate (Percentage)	Participants (Hours/day)	Population (Hours/day)	Participation rate (Percentage)	Participants (Hours/day)	Population (Hours/day)
Male	30.3	1.5	0.5	26.5	1.4	0.4
Female	37.9	1.1	0.4	33.8	1.3	0.4
Z-values	-6.43	5.08	3.25	-2.60	0.57	0
P-value	0.00	0.00	0.00	0.00	0.57	1.0

Table A.12: Participation Rates and Average Time Spent on Shopping for Goods & Services

	Canadians			Immigrants		
	Participation rate (Percentage)	Participants (Hours/day)	Population (Hours/day)	Participation rate (Percentage)	Participants (Hours/day)	Population (Hours/day)
Male	39.2	1.6	0.6	41.0	1.9	0.8
Female	49.2	1.8	0.9	48.1	2.2	1.1
Z-values	-7.68	-3.38	-8.78	-2.41	-2.21	-3.54
P-value	0.00	0.00	0.00	0.02	0.03	0.00

Table A.13: Participation Rates and Average Time Spent on Childcare and Related Activities

	Canadians			Immigrants		
	Participation rate (Percentage)	Participants (Hours/day)	Population (Hours/day)	Participation rate (Percentage)	Participants (Hours/day)	Population (Hours/day)
Male	20.4	1.7	0.4	21.5	2	0.4
Female	33	2.3	0.8	31.7	2.6	0.8
Z-values	-11.35	-6.96	-12.08	-3.88	-2.75	-4.69
P-value	0.00	0.00	0.00	0.00	0.00	0.00

Table A.14: Number of Participants in Various Activities and Total Population

	Canadians		Immigrants	
	Male	Female	Male	Female
Population	2669	3110	585	580
1.0 Paid work and related activities	1625	1405	372	279
2.0 Unpaid work and related activities	2322	3026	518	555
2.1 Cooking/washing up activities	1746	2706	390	508
2.2 Housekeeping	665	1973	147	314
2.3 Maintenance and repairs	316	145	40	15
2.4 Other household work	808	1180	155	196
2.5 Shopping for goods and services	1047	1537	240	279
2.6 Child care and related activities	543	1025	126	184

Table A.15: Regression result using the probit model (dependent variable: Participant= 1, Non-participant = 0)

Explanatory variables	Cookdoms Slope(M.E) (z-statistic)	Hskpdoms Slope(M.E) (z-statistic)	Maindoms Slope(M.E) (z-statistic)	Othrdoms Slope(M.E) (z-statistic)	Shopdoms Slope(M.E) (z-statistic)	Chlddoms Slope(M.E) (z-statistic)
Age	0.0008 (0.30)	0.0027 (0.74)	-0.0003 (-0.07)	0.0041 (1.26)	0.000001 (0.21)	-0.0012 (-0.04)
Canfemale	0.1507 (14.37)*	0.3267 (32.35)*	-0.0530 (-7.55)*	0.0490 (3.24)*	0.0015 (5.12)*	0.0127 (5.26)*
Immifemale	0.1489 (6.08)*	0.3222 (12.54)*	-0.0801 (-5.53)*	0.0577 (2.26)**	0.0009 (1.94)**	0.0120 (2.20)**
Immimale	-0.0293 (-1.31)	0.0117 (0.38)	0.0056 (0.53)	-0.0134 (-0.48)	-0.0004 (-0.82)	0.0041 (0.56)
Chdlr	0.0982 (4.39)*	0.1054 (3.75)*	-0.0041 (-0.29)	0.0204 (0.69)	0.0010 (1.85)***	0.0301 (1.06)
Nchld4	0.0718 (3.59)*	0.0901 (3.74)*	0.0046 (0.46)	-0.0229 (-0.98)	0.0001 (0.24)	0.0342 (11.99)*
Nchld5	0.0475 (2.38)**	0.0826 (3.80)*	0.0034 (0.37)	0.0222 (1.06)	0.00002 (0.05)	0.0259 (5.96)*
Nchld13	0.0140 (0.57)	-0.0038 (-0.13)	0.0229 (2.13)**	0.0319 (1.24)	0.0004 (0.86)	0.0073 (1.75)***
LMrr	-0.0211 (-0.86)	0.0751 (3.26)*	0.0316 (2.49)**	0.0429 (1.88)***	-0.0010 (-2.38)**	-0.0015 (-0.13)
WDS	0.0195 (0.87)	0.0861 (3.42)*	0.0161 (1.30)	0.0410 (1.71)***	-0.0002 (-0.47)	-0.0006 (-0.06)
TwoM	-0.0642 (-2.43)**	-0.0716 (-2.37)**	0.0054 (0.43)	-0.0279 (-1.04)	-0.0008 (-1.76)***	0.1122 (0.000001)
ThreeM	-0.1636 (-3.97)*	-0.1631 (-3.34)*	-0.0036 (-0.19)	-0.0951 (-2.24)**	-0.0016 (-2.28)**	0.1164 (0.000002)
FourM	-0.1891 (-3.94)*	-0.1896 (-3.42)*	-0.0145 (-0.71)	-0.1328 (-2.72)*	-0.0014 (-1.79)***	0.1165 (0.000002)
FiveM	-0.2219 (-4.53)*	-0.2060 (-3.53)*	-0.0291 (-1.26)	-0.1304 (-2.50)*	-0.0010 (-1.13)	0.1134 (0.000008)
SixM	-0.2309 (-3.65)*	-0.2209 (-2.92)*	-0.0317 (-1.07)	-0.1862 (-2.71)*	-0.0016 (-1.35)	0.1082 (0.000022)
SevenM	-0.1539 (-1.27)	-0.0867 (-0.66)	-0.0505 (-0.88)	-0.1809 (-1.52)	-0.0046 (-2.12)**	0.1017 (0.000008)
Eightmore	-0.2729 (-1.99)**	-0.3159 (-1.92)***	0.0079 (0.15)	-0.0660 (-0.46)	-0.0003 (-0.12)	0.0992 (0.000008)

Table A.15: Regression result using the probit model (dependent variable: Participant = 1, Non-participant = 0) {Cont'd}

Singled	0.0110 (0.64)	0.0040 (0.20)	0.0323 (3.46)*	0.0535 (3.16)*	-0.0010 (-3.10)*	-
Lowr	-0.0106 (-0.47)	0.0116 (0.45)	-0.0026 (-0.21)	-0.0346 (-1.40)	0.0006 (1.40)	-
Highr	0.0314 (0.99)	0.0008 (0.02)	-0.0574 (-2.20)**	-0.0350 (-0.97)	0.0021 (3.39)*	-
OneRMS	-0.0082 (-0.13)	-0.1396 (-1.74)***	-0.6516 (-0.0003)	-0.0420 (-0.57)	-0.0020 (-1.57)	-
TwoRMS	-0.0150 (-0.30)	-0.0631 (-1.04)	-0.0447 (-1.23)	-0.0063 (-0.11)	-0.0001 (-0.10)	-
ThreeRMS	-0.0125 (-0.42)	-0.0472 (-1.25)	-0.0226 (-0.45)	-0.0371 (-1.08)	-0.0006 (-1.09)	-
FourRMS	-0.0053 (-0.24)	-0.0591 (-2.23)**	-0.0168 (-1.50)	-0.0397 (-1.64)	-0.0007 (-1.67)***	-
FiveRMS	-0.0291 (-1.68)***	0.0239 (1.18)	-0.0044 (-0.55)	-0.0456 (-2.37)**	-0.0005 (-1.50)	-
AnnA	-0.0591 (-1.08)	-0.0619 (-1.17)	-0.0020 (-0.10)	0.0468 (1.00)	-0.0005 (-0.59)	-0.0023 (-0.17)
AnnB	0.0177 (0.33)	-0.0264 (-0.55)	-0.0342 (-1.76)***	0.0467 (1.11)	-0.0010 (-1.30)	0.0013 (0.11)
AnnC	-0.0996 (-2.17)**	-0.0632 (-1.41)	-0.0232 (-1.33)	-0.0007 (-0.02)	0.0004 (0.57)	-0.0022 (-0.20)
AnnD	-0.1202 (-2.69)*	-0.0735 (-1.73)***	-0.0457 (-2.60)*	-0.0110 (-0.29)	-0.0006 (-0.88)	0.0019 (0.19)
AnnE	-0.1678 (-3.85)*	-0.1407 (-3.63)*	-0.0270 (-1.96)**	-0.0589 (-1.79)***	-0.0010 (-1.75)***	-0.0035 (-0.35)
AnnF	-0.2270 (-4.84)*	-0.1842 (-4.47)*	-0.0215 (-1.51)	-0.0560 (-1.64)	-0.0015 (-2.52)**	-0.0025 (-0.25)
AnnG	-0.2451 (-5.11)*	-0.1848 (-4.24)*	-0.0475 (-2.98)*	-0.0850 (-2.27)**	-0.0011 (-1.69)***	0.0002 (0.02)
AnnH	-0.2981 (-5.85)*	-0.2228 (-4.71)*	-0.0187 (-1.11)	-0.1296 (-3.13)*	-0.0020 (-2.82)*	-0.0036 (-0.3)
AnnI	-0.3102 (-5.86)*	-0.2350 (-4.67)*	-0.0116 (-0.64)	-0.1148 (-2.64)*	-0.0015 (-1.98)**	-0.0008 (-0.07)
AnnJ	-0.3584 (-5.81)*	-0.2600 (-3.88)*	-0.0530 (-1.88)**	-0.1168 (-1.97)**	-0.0023 (-2.18)**	-0.0011 (-0.06)
AnnK	-0.3791 (-6.15)*	-0.3381 (-4.93)*	-0.0301 (-1.16)	-0.1401 (-2.41)**	-0.0036 (-3.48)*	0.0015 (0.10)
HicA	0.1052 (0.80)	0.0553 (0.37)	-0.7118 (-0.0001)	-0.0175 (-0.12)	-0.0039 (-1.59)	-0.0099 (-0.16)
HicB	-0.0146 (-0.13)	0.0291 (0.24)	-0.0259 (-0.59)	-0.0174 (-0.15)	-0.0017 (-0.87)	-0.0193 (-0.36)
HicC	0.1064 (1.06)	0.0520 (0.45)	-0.0348 (-0.85)	0.0550 (0.51)	-0.0018 (-0.96)	-0.0137 (-0.26)
HicD	0.0716 (0.72)	0.0145 (0.13)	-0.0417 (-1.02)	0.0680 (0.64)	-0.0021 (-1.13)	-0.0144 (-0.28)

Table A.15: Regression result using the probit model (dependent variable: Participant = 1, Non-participant = 0) {Cont'd}

HicE	0.1431 (1.57)	0.0793 (0.74)	-0.0274 (-0.71)	0.0865 (0.85)	-0.0009 (-0.50)	-0.0156 (-0.25)
HicF	0.1932 (2.25)**	0.1433 (1.37)	-0.0363 (-0.95)	0.0778 (0.77)	-0.0004 (-0.22)	-0.0144 (0.22)
HicG	0.2375 (2.84)*	0.1478 (1.42)	-0.0476 (-1.25)	0.1509 (1.53)	-0.0003 (-0.17)	-0.0153 (-0.23)
HicH	0.2523 (2.99)**	0.1449 (1.37)	-0.0312 (-0.81)	0.1504 (1.51)	0.0001 (0.05)	-0.0134 (-0.21)
HicI	0.3013 (3.80)*	0.1642 (1.57)	-0.0453 (-1.17)	0.1808 (1.85)***	0.0016 (0.87)	-0.0158 (-0.23)
HicJ	0.3352 (3.72)*	0.1830 (1.66)***	-0.0503 (-1.25)	0.1578 (1.51)	0.0017 (0.90)	-0.0131 (-0.24)
HicK	0.3138 (3.55)*	0.1509 (1.36)	-0.0721 (-1.79)***	0.2131 (2.08)**	0.0018 (0.95)	-0.0129 (-0.22)
Constant ^A	-0.6187 (-1.29)	-0.4008 (-3.15)	-1.4630 (-2.33)	-1.5026 (-3.38)	0.0904 (0.21)	-8.0500 (-4.E-05)
S.E of Regression	0.4026	0.4554	0.2643	0.4679	0.4921	0.2639
Log likelihood	-2612.388	-3187.873	-1349.734	-3315.96	-3575.972	-1178.33
Mc Fadden R-squared	0.0787	0.1268	0.0766	0.0289	0.0237	0.6306

Note:

*** SIGNIFICANT AT $\leq 10\%$ LEVEL

**SIGNIFICANT AT $\leq 5\%$ LEVEL

* SIGNIFICANT AT $\leq 1\%$ LEVEL

—: Not applicable

Constant^A: the slope are the coefficients and not marginal effect

Foot Note: Calculation of Z-values

$$(i) \text{ For participation rate, } Z_c = \frac{\rho_1 - \rho_2}{\sqrt{\left\{ \frac{\rho_1(1-\rho_1)}{n_1} \right\} + \left\{ \frac{\rho_2(1-\rho_2)}{n_2} \right\}}}$$

$$(ii) \text{ For participants and population, } Z_c = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{\sigma_1}{n_1} + \frac{\sigma_2}{n_2}}}$$

where:

ρ = participation rates

\bar{X} = mean of X_1 and X_2
 σ = Sample Standard deviation
 n = number of observation