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DISSERTATION

**Gender Inequalities in Time Use in Peru: the
determination of market oriented work supply
and nonmarket work supply**

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1. Introduction

Time is a scarce resource. For this reason, researching how it can be allocated and distributed among men and women is highly relevant socially and economically. Preliminary studies about time allocation focused on the relative lower female participation in labour markets, a crucial issue, as it may lead to the underutilization of productive resources. Subsequently, the focus has shifted towards recent research on domestic work activities, where the importance of domestic activities based on time and labour intensity has been presented. Traditionally, domestic work activities, such as housework, were perceived as a non-productive activity as it does not generate income. However, since the seventies the meaning of domestic activities in developing countries as a sort of substitute to market services has been recognized as being essential for improving household wellbeing.

Recent studies presents evidence that women around the world are more engaged in domestic work than men. The larger participation of women in nonpaid work (lower labour force participation) leads to both their reduced ability to generate income and to their higher dependency on men. The implication of which is that women are more vulnerable and more likely to be exposed to poverty.

The unequal distribution of time has meant that women are confronted with a “double burden”, whereby they face trade-offs between domestic work and market work. This circumstance places a restriction on women’s freedom to not only participate more intensively in the labour market - achieving better carries generating higher income - but also in other activities such as leisure and rest time, education and politics. As a result, women may suffer from “time poverty”.

The importance of time allocation in gender issues is clear as an unequal allocation of time makes women vulnerable in an economic sense and it also places restrictions on their freedom. The aim of this study is to analyze the allocation of time estimating the determinants of the different types of works and measuring the unpaid contribution of women and men to society. The underlying hypothesis is the existence of gender inequalities in time use patterns in Peru based not exclusively on economic factors but also on social and cultural norms.

The focus on Peru is of interest for two reasons. First, there are very few studies about time allocation in Peru and thus the investigation proposed in this document will contribute to fill the gap in knowledge about this topic. Second, the study is based on data from the first Time Use Survey carried out in December 2010 in Peru. This type of survey is not frequent in developing countries, where the study of time use issues had been based commonly on Labour Force or Living Standard Measurement Surveys. Therefore the results of this analysis using Time Use Survey will be accurate and will bring new evidence about time use patterns in Peru.

2. Theoretical Framework

2.1 Literature Review

For a more in depth understanding of the underlying concepts and as the relevance of the topic, it is worth to look briefly on the origins of academic research on work time allocation. This includes the coming up of the concept of time poverty and theoretical approaches, which intend to explain empirically proven gender based differences in time allocation.¹

The pioneer study of Becker (1965) and later Gronau (1977) opened the path for the development of “New Household Economics”. Incorporating for the first time, time allocation in home activities to estimate the labour supply based on an unitary household model. The model’s main assumption is the existence of a “benevolent dictator”, who determines the allocation of resources for the whole household under the principle of shared benefits (Ilahi, 2000, p. 10). According to this assumption, the cross effect of a balanced change in a woman’s salary on her husband’s total working time is identical to the adjustment process in the woman’s labour supply when facing variations in the identical husband’s wage (Herrera & Torelli, 2010, p. 3). Given a situation where household members have different comparative advantages, the one with lowest opportunity cost will specialize in domestic work (Fernandez & Sevilla-Sanz, 2006, p. 4). Alternatively, as Ilahi (2001, p.3) explains, overdraws given unequal levels of human capital could lead to the conclusion, that “men are better at market work and women at housework.”

The hypothesis of shared or common preferences of the unitary model has fallen under scrutiny. The main criticism levied against it is that it does not allow for the possibility that there are inequalities in the allocation and distribution of resources within the household. In order to study intra-households inequality issues, later studies have used the collective household model and have included a bargaining element in the decision making process concerning distribution of resources within the household. However, research on intra-household in time allocation is still very new (Ilahi 2000).

The majority of the time allocation research has been focused on labour market developments in industrial nations – consequently where time use surveys were mostly carried out. The main topics of study were to define the determinants of labour supply by married women, to draw attention to the “transformation toward a society and an economy of leisure”² and to describe the modification of gender-patterns concerning domestic activities, especially domestic care³.

¹ Representing major findings of different authors, Ilahi (2000) allows a deeper insight in the development of time allocation analysis and give a broad range of cited empirical investigations.

² Mentioned in Ilahi (2000, p. 3); Herrera & Torelli (2010, p. 3) and Blackden & Wodon (2006, p. 39).

³ Some examples of studies covering industrialized nations: using national representative time diary data from 1965, 1975 and 1998 the author finds that women in the USA still do more household work than men. Nevertheless, men have drastically increased their time spend in domestic working activities. Fernandez & Sevilla-Sanz (2006) study the evolution of time use by gender in Spain. They surprisingly state that even in households where wives income is above their spouses, they still undertake more than half of homework and that women still

Given the lack of convenient data, time allocation in developing countries represents a much more recent field of academic studies. While there exists extensive literature on the intra-household allocation of resources *per se*, these analyses usually focus on the differences in consumption shares and pay little attention to the allocation of time resources. The study of time use in developing countries is also intended to make “visible” the effects of non-market work on living standards estimates in developing regions. As Ilahi (2010) explains, welfare levels tend to be underestimated if non-market production is not taken into account.

Therefore learning about those production activities within households which are not fully considered within the Systems of National Accounts is of increasing interest. As Herrera & Torelli (2010) show for 11 cities within the Economic Community of West African States, this usually “invisible” labour represents almost one third of hours worked. Furthermore, the authors prove that women not only work more hours in total than men, but also that they dedicate a higher share of their working time to domestic work. These two findings, also reported for Peru in Ilahi (2001), show highly gender-sensible characteristics of time use and the explicit underestimation of women’s contribution in labour by looking at their engagement within labour markets and self-employment.

Despite the dominance of literature treating developments in industrial nations, over the last years the interest in developing countries has grown for a more profound understanding of gender-driven differences in the time allocation. This has resulted in studies that have tried to expand on the existing differences in time allocation between different genders. Usually, the main issues of focus are on a more appropriate estimation of total work by women – taking into account their large share of domestic work –, the level of gender inequality in the allocation of time use and understanding the predominant reasons for the differences in time allocation between men and women. Most of publications so far have covered countries in Africa and Asia, whereas Latin America seems to have been of minor interest for academic research (Ilahi, 2000).

Edited by Blackden & Wodon (2006) and published by the World Bank “Gender, Time Use and Poverty in Sub-Saharan Africa” compiles various articles dealing with different aspects of gender inequalities in work time allocations and focused specifically on the issue of time poverty. The book offers detailed insight in regional research concerning time allocations, highlighting some stylized facts and focusing on different aspects of gender inequality in time use.

Kes & Swaminathan (2006), examine the links between gender, time use and persistent poverty in Sub-Saharan Africa and characterize household economies to be “largely invisible and uncaptured in economic data and in the system of national accounts”. The authors state that labour market employment statistics covers less than 54 percent of all work performed, reaching 75 percent of men’s work but just one third of women’s work. Furthermore, they quote findings from earlier works as existing restrictions on women’s activities, which have to be compatible with domestic obligations (Blackden and Morris-Hughes 1993), and that lower paid labour market activities tend to be more compatible

tend to do more unpaid work and less remunerated labour than men. However, they confirm major symmetry in inter-gender time use and explain this development by changes within men’s and women’s time use patterns.

with the domestic duty of childcare. In consequence, “woman are unable to take full advantage of economic opportunities and participate in income-generating activities” (Kes & Swaminathan (2006), pag. 17). Other topics addressed within the publication include the seasonal dimension of time poverty during the peak of the Malawian cropping season (Wodon & Beegle, 2006) and the effects of the HIV-AIDS epidemic on time use (Kes & Swaminathan, 2005).

Additionally, Herrera & Torelli (2010) focus their research on sub Saharan Africa. For a total of 10 countries, they estimate the effects of cultural standards and socio-economic factors on household inequalities in time use, paying additional attention to informal labour markets. Consequently, analysis provides significant insights in male-female inequalities, as well as findings on the influence of several individuals and cultural factors on the time allocation within the households. They conclude that women work more in total hours than men throughout their life. The authors conclude that there is no increase in the “specialization” of domestic activities between men and women, as women do assume more than 80 percent of domestic work and still take around 43 percent of market-based work, resulting in a “double day” (Herrera & Torelli (2011), pag. 15). In addition, they find that the division of domestic work becomes more equal with higher female education. Surprisingly, access to basic services, such as water and electricity, does not seem to relieve women of their disproportionately large burden of domestic work and has no effect on the division of homework by gender. Herrera & Torelli underline the relevant, in some cases decisive, role of social aspects and household characteristics for the allocation of household time resources.⁴

Medeiros, Guerrero & Costa (2007) conclude using data from a 2011 household survey for the case of Bolivia, that gender-based inequality in terms of work is less a matter of type – domestic vs. market labor - but of the total amount done. Although their analysis reveals that incidence of paid work is higher for men, more than two thirds of the urban female population have an income generating job and even a higher share of men participate in doing domestic work. Nevertheless, the study reveals that many Bolivian women who enter the labor market tend to end up in a double shift as they only partially substitute domestic work and therefore they work more than 10 hours per week more than men in general. The cumulative workload for women is always higher in all quintiles of working time. One of the authors’ main findings implies the existence of inequalities beyond gender frontiers. Women and men do not seem to form homogenous groups: almost 40 percent of urban adult women do not carry out any paid work at all, whereas 20 percent of females contribute half of the total working hours paid for to women. At the same time, about 20 percent of men declare not to participate in domestic labour at all, whereas one seventh of men account for half of all male unpaid work time. Given the high level of inequality within gender groups, only a small part of total inequality can be explained by the disparity between men and women.⁵

In research conducted by Inter-institutional Technical Commission for Accounting Womens’ Work (CTICTF, 2008) they found that the main restriction for Costa Rican

⁴ To be mentioned: position in the family hierarchy, age bracket, religion etc.

⁵ Ilahi somehow agrees on this assumption that subgroup differences may be even stronger than gender-based heterogeneity, stating that “single mothers behave more like male heads than do wives” (Ilahi (2000), p. 42).

woman to carry out different activities is domestic work, which absorbs a large share of woman's time resources. In Costa Rica 88 percent of women declared to be engaged in non-paid household work, reaching an average of more than five hours per day on these activities. Meanwhile, only 25 percent participate in market working activities which results in an average of less than 2 hours daily. Costa Rican men, of whom 63 percent declared to have a remunerated job, invest almost six hours in this labour activity. Although half of men affirmed to participate in domestic work, their average contribution is less than 1.5 hours a day. The authors link the increase in the heterogeneity of time allocation to gender-based inequalities in educational opportunities and severe disadvantages of women within the labour market. For example, lower payments and major challenges for job promotion. Besides gender inequalities, the authors also state the strong influence of socio demographic factors – among others age, legal status and regional aspects – on time use patterns.

Regarding the cyclical effects on time allocation, Hicks (2010) noted the changes in time use in Mexican household after the 1995 Mexican Peso Crisis. His study finds a disproportioned increase in domestic work due to the unemployment status of the household head given his gender. For a male household head the increase was 4.3 hours weekly and for the spouse 5 hours weekly. While in case of female household head, the increase for woman is 13.7 hrs and only 3 hrs for the spouse. These results indicate that the involvement in the labour market has greater implications for women than for men. Hicks draw attention on the possible relationship between the increased size of time reallocation on domestic work for women and their weak bargaining power or “exit option” within the household.

In their study Dagsvik & Aaberge (1990) show that although there is a minimal impact on schooling and increase in wages of wage work participation in Peru, when disaggregated between men and women, the effect is magnified for females. This indicates that women are more sensitive to these factors than males. Ilahi (2001) analysed LSMS data collected in 1994 and 1997 a decade later mainly to address the impact of sickness or unexpected changes within the household – as sudden unemployment - on time use of its members and if women *per se* undertake a disproportionate share of total work. Furthermore, he observes the impact that the supply of basic services as well as ethnicity and demographic variables has on women's and men's time allocation. The first surprising results is that the Peruvian population does not seem to suffer from severe cases of time poverty as in none of weekly work burden exceeds 60 hours. Nevertheless, women spend from 15% to 20% more time than men in the total work activities. These gender disparities are present in urban and rural areas, but in the latter men and women work more hours. Moreover, there is a specialization of female participation in housework; women devote 70% of their time to the domestic work, whereas men devote only 28 percent. The share of women's time use to be accounted for domestic work is considerably higher in rural areas where women seem to “hardly spend any time on wage work compared to urban women and rural and urban men” (Ilahi, 2001, p. 15). One very important finding is that women in the two deciles of lowest consumption work most, while there is no similar pattern of work burden in the case of men. As the author points out, this is a strong sign of the “burden of poverty may be falling on the women in the form of high work needs” (Ilahi, 2001, p. 14). Cases of sickness do not seem to affect work burdens in total, but do modify the composition of time use with men dedicating a higher number of hours to income

generating activities while in case of women the “care” effect seems to over-compensate substitution effects. Of special relevance for policymakers are findings concerning the access to basic services: While better provision of water and energy fosters both -men and woman - to turn to income generating work, “men [will be] benefiting from water related investments and women from energy related ones” (Ilahi, 2001, p. 23). The author also finds demographic and life-cycle variables just as household composition to be crucially important factors for time allocation issues.

2.2 Concepts and Definitions

The international statistical framework is compiled in the System of National Accounts (SNA), which classifies productive activities in two groups corresponding to the destination of the goods and services produced. These are: market oriented (whether for sale or barter) production and own consumption production. However, the SNA establishes a Production Boundary that determines which productive activities are considered in the national accounts. Under the Production Boundary, all market oriented production is included but only own use production within the following criteria is included:

“... all production of goods for own use [...], as the decision whether goods are to be sold or retained for own use can be made even after they have been produced, but it excludes all production of services for own final consumption within the household (except for the services produced by employing paid domestic staff and the own-account production of housing services by owner-occupiers). The services are excluded because the decision to consume them within the household is made even before the service is provided.” (SNA, 2009, § 1.42)

In this context, international statistics consider economically active persons as those who are involved in the activities outlined by the SNA production boundary. Since non-market production activities are not included in national accounts, there are no records of the economic significance of this type of activities.

In this study it is considered that individuals can allocate their time among two types of productive activities (market oriented work and non-market work) and non productive activities as following:

- a) Time devoted to activities related to market oriented work (SNA productive activities):
 - For employees: all activities related to paid work such as time spent in the principal and secondary job, the transportation to the work place, travelling on work assignments and related training;
- b) Time devoted to non-market work (non SNA productive activities)
 - Domestic or reproductive activities: such as domestic services (cleaning, cooking, etc.)and care work (infants, children and elderly; sick and totally dependent family members);

- Non-domestic activities: such as voluntary activities and home farming and agricultural production for own consumption (for subsistence);
- c) Time devoted to tertiary activities:
 - Education (not work-specific);
 - Leisure and social activities;
 - Time searching for a job;
 - Personal care.

3. Peruvian Time Use Survey 2010

The micro-data to be used in this study comes from the National Time Use Survey - TUS (*Encuesta Nacional de Uso del Tiempo*) conducted in Peru by the National Institute for Statistics and Informatics (INEI) in November and December 2010. This is the first Time Use Survey conducted in Peru. The NTUS was carried out on a sample of 4459 households among urban and rural areas within the national territory. The time use module was filled for all members of the household aged 12 years or over⁶.

There are various methodologies used in conducting time use surveys. In the case of the ENUT the methodology used is “Stylized Activity List”, which consists of asking the interviewed about the time spent in a set of daily activities carried through the week previous to the interview and recording the information in hours and minutes. The main advantage of this methodology is the reliability in recording frequency of participation, while the main disadvantages is that the list may not include all possible daily activities. It also assumes that the interviewed is able to calculate precisely in hours and minutes the time dedicated to the different activities⁷.

The survey has two questionnaires: the first one focused on the households and dwelling characteristics and information about help received by domestic paid workers or others; and the second one, focused on domestic and market oriented activities. The module of particular interest for this study is the one about non-market activities which is organized in seventeen groups: (a) personal care; (b) studies; (c) cooking; (d) cleaning; (e) laundry and garment care; (f) repair, construction and maintenance of the dwelling; (g) childcare; (h) care of household members showed any symptoms, illness or disease; (i) shopping for the household; (j) household management; (k) family social life; (l) leisure; (m) home farming (non-market production); (n) help to other household; (o) volunteer work; (p) care of household members with physical, mental or permanent illness or totally dependent elderly; and (q) other activities.

4. Descriptive Statistics

⁶ It excludes individuals living in collective households such as hospital, hotels, jails, etc.

⁷ Kes & Swaminathan (2005) offer a critical review of the different methodologies commonly used in Time Use Surveys.

The sample covers 4459 households in which 17237 individuals live. The module concerning to the non-market activities were applied only for those households' members over 12 years old. The sample analyzed in this study is composed by those who answer completely both the non-market as well as the market activities questionnaires: which male 12424 individuals.

In empirical time use studies, it is common to have the problem of overestimation of time due to a double counting of time spent in simultaneously activities. This results in an overestimation of total time available. Since the TUS recalls weekly periods, in order to correct this overestimation a maximum time of 168 (24*7) hours is set. For those individuals who's total weekly time exceeds 168 hours, a correction factor (total time/168) to all activities is apply. In this way, the adjustment will be equally proportional for each activity.

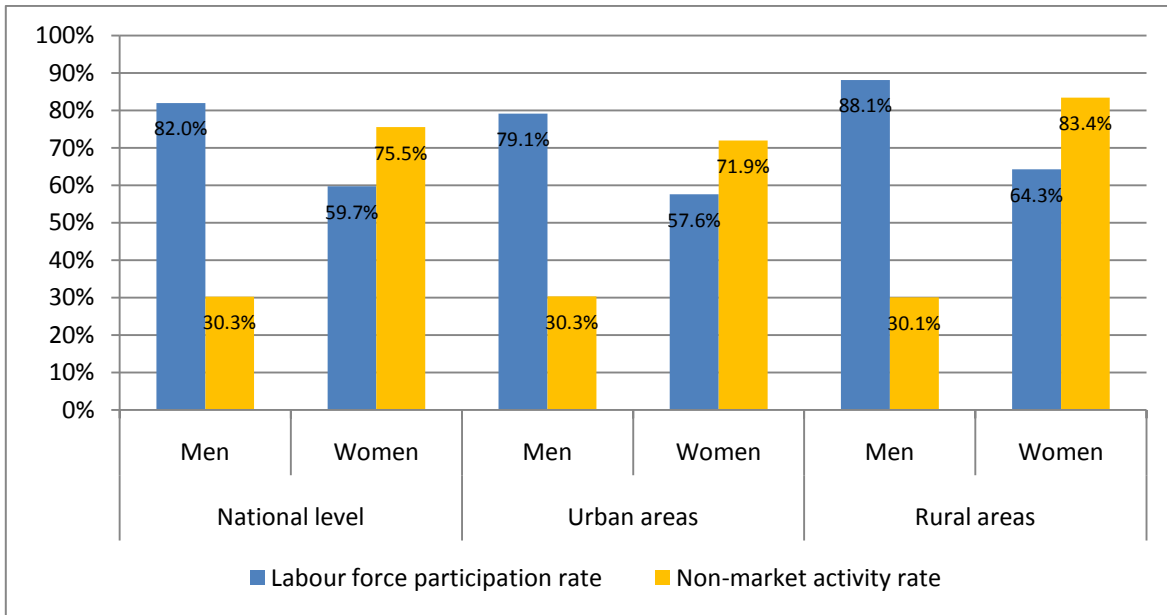
Detail statistics about the characteristics of the sample are provided in Annex 1 and the distribution of average weekly hours per activity is given in Annex 2. In the following section, we explain the main stylised facts on time use by gender. As we use the sampling weight, these statistics are representative for the whole population.

4.1 Non market activity rate and labour force participation

The non-market activity rate is the proportion of people whose main activity is non-market oriented. The Time Use Survey does not directly ask whether someone is mainly engaged in non-market or market activities. Therefore, it was decided to classify those people, who dedicate more than 50% of their total working time to non-market activities, as mainly engaged in non-market activities. Chart 1 shows that the male labour force participation is more than one third higher than the one for females. However, the female non-market activity rate is than double the male one. Although there is a visible difference in participation rates between urban and rural areas, labour force participation rates remain almost constant for women while non-market activity rate remain constant for males.

Although both genders participate in market and non-market activities, Charts 2 and 3 suggest the existence of a **sexual division of work**: women are responsible for almost 70% of non-market working hours, while men are responsible for 66.6% of market working hours. Looking at the total working hours in the economy, female work is concentrated in non-market work (37.1% of total working hours) and male work is concentrated in market oriented work (31.2% of total working hours).

Chart 1: Non market activity rate and labour force participation



Source: Peruvian Time Use Survey 2009-2010; author's calculations.

This work specialization has a 1:2 relationship. Men are responsible for twice the time dedicated by women for market activities and women are engaged twice the time of men in domestic activities. A female work specialization in non-market work means that their main productive contribution is not remunerated and not even recognized in the economy. Since women are not being remunerated for the production they dedicate most of their time, women are likely to find themselves in a vulnerable and dependent economic situation.

Chart 2: Division of work by sex

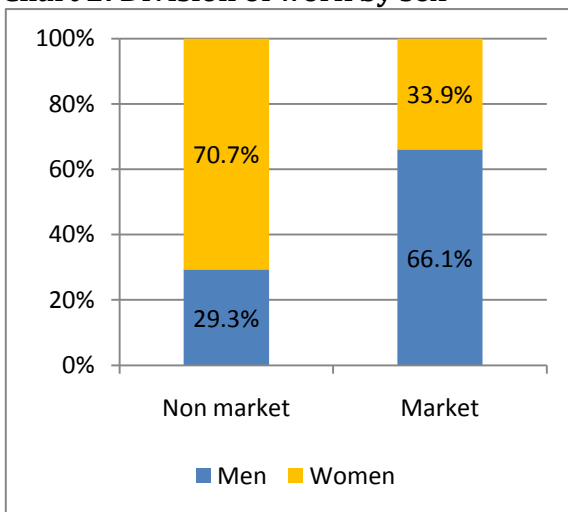
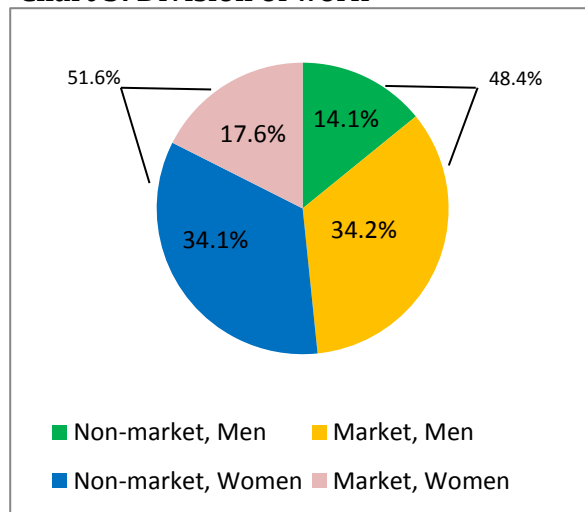


Chart 3: Division of work

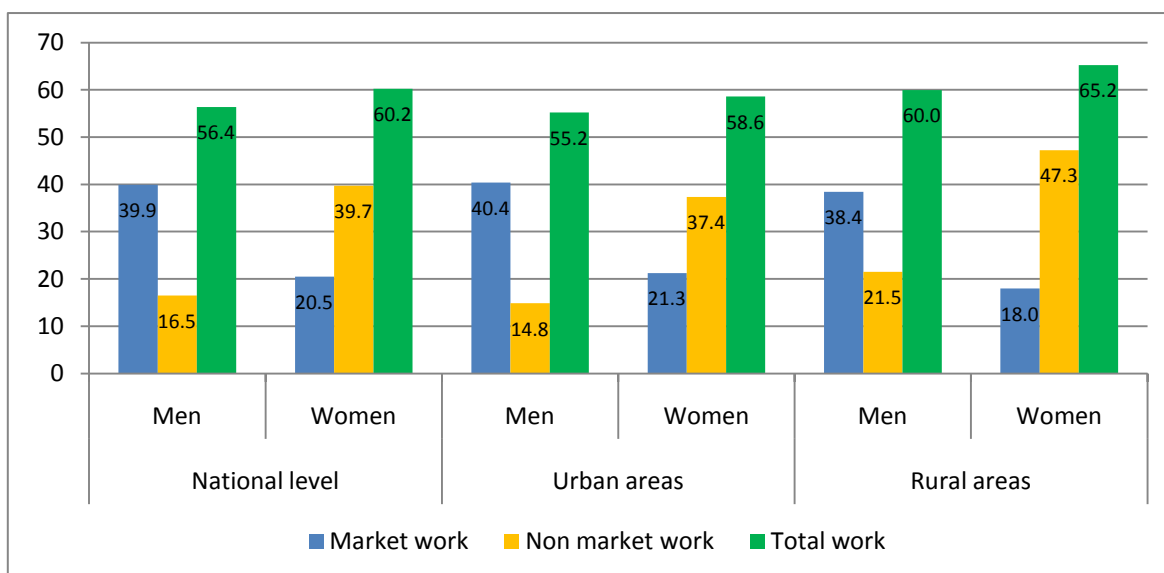


Source: Peruvian Time Use Survey 2009-2010; author's calculations.

4.2 Total working time – tertiary activities

As defined before, total working time involves both types of productive activities: the market and non-market oriented. Chart 3 shows in the total working time, 51.6% of the hours are contributed by women and only 48.4% by men. This indicates that women dedicate more of their time to productive activities than men. Chart 4 shows that both women and men are involved in non-market as well as market activities, but the time spent for each type of productive work differs across gender.

Chart 4: Average weekly total working hours



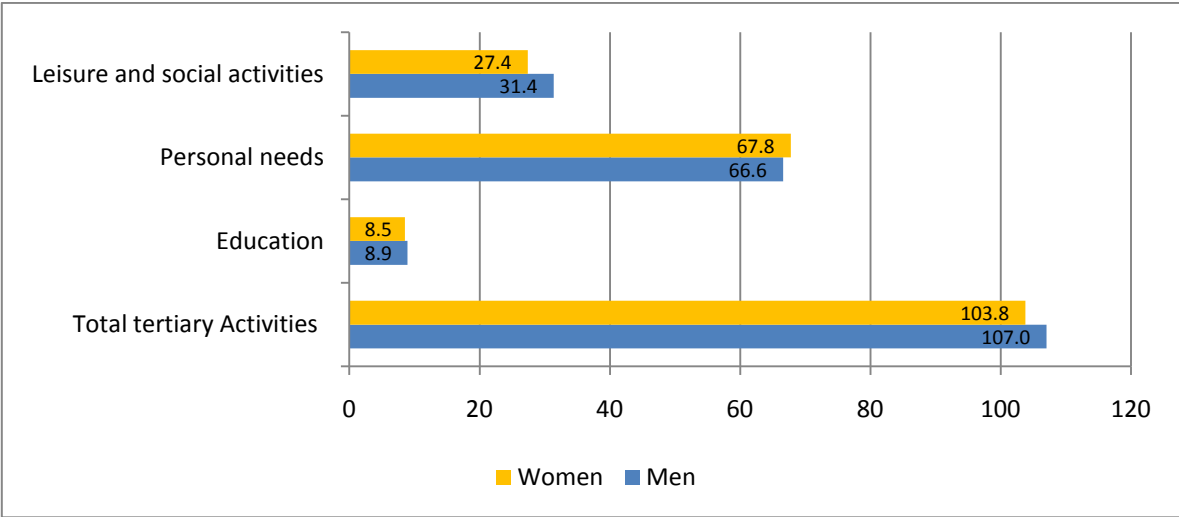
Source: Peruvian Time Use Survey 2009-2010; author's calculations.

On the one hand, men dedicate around 40 hours weekly to market activities, while women only spend around 16.5 hours on remunerated work. On the other hand, women dedicate around 40 hours weekly to non-market activities, while men's participation averages only around 20.5 hours. Therefore, the average total weekly working time is higher for females than males: 60 vs. 56 hours weekly at the national level. The difference with regards to total working time between genders is around 5 hours in urban as well as in rural areas. The difference is based on larger female engagement in non-market activities: Although women do not achieve male working hours in market activities, this gap is overcompensated by far by higher engagement in non-market activities. This difference is even more accentuated in rural areas and in both locations gives evidence of a **“double burden”** of work for women: While they spend more hours on non-remunerated activities, they still account for a very considerable share of market-activities, leaving them with a “double shift”: one (minor) in the market and one (major) in the household.

Chart 5 shows that men have larger amounts of time to dedicate to tertiary activities than women: 107 vs. 103.8 hours weekly. Since both genders dedicate the same average time

to personal needs (sleeping, eating, etc.), the difference in time spent on tertiary activities is mainly due to a higher male participation in education (0.4 hour difference) and clearly more time spent on leisure and social activities (4 hours difference). The female higher working time and lower leisure and education time, clearly suggest that Peruvian women face “**time poverty**”. This means the higher work burden leads to a severe lack of leisure time and educational engagement.

Chart 5: Average weekly hours dedicated to tertiary activities



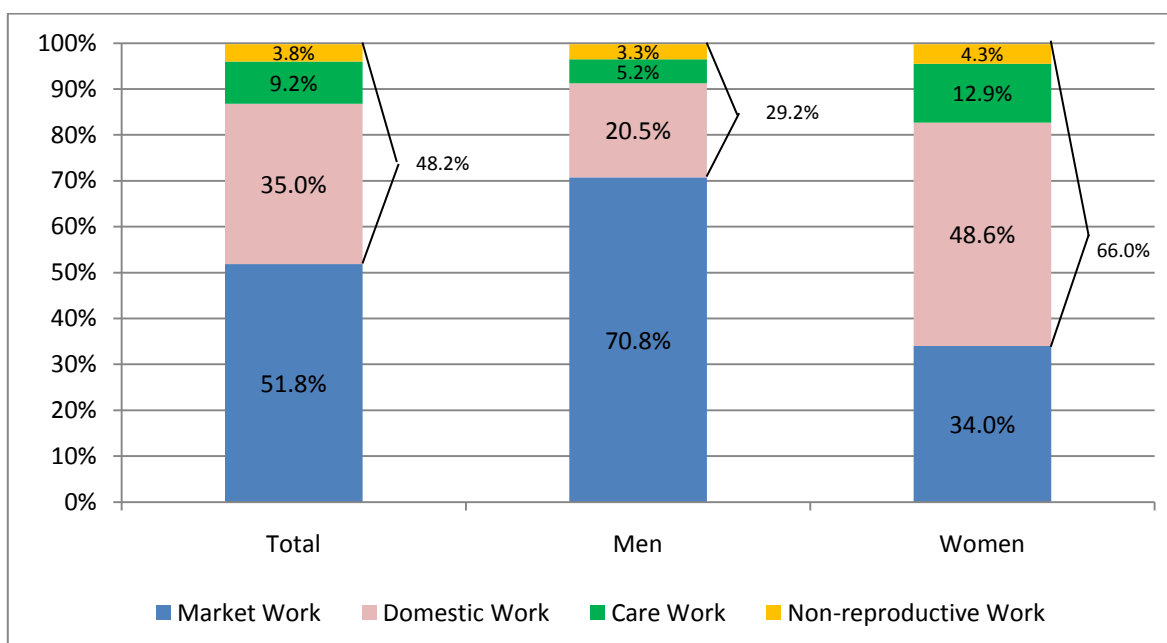
Source: Peruvian Time Use Survey 2009-2010; author’s calculations.

4.3 Share of non-market work in total working hours

Chart 6 shows in more detail the share of different non-market activities in total working time. It shows that on average around 48.2% of the working time is dedicated to non-market activities. However, men only dedicate 29.2% of their working time on these activities, while women dedicate 66% of them. As non-market production also enhances welfare, by not registering this production in national accounts GDP underestimates the household’s level of well-being.

Within non-market activities, domestic work activities (defined as cooking, cleaning, repairing, managing the household, etc) are the most important activities, followed by care activities. A third type of non-market activity, referred to as “non-domestic” tasks (farming and voluntary work), represents only a small proportion of working time and is equally done by men and women.

Chart 6: Breakdown of total working time by sex



Source: Peruvian Time Use Survey 2009-2010; author's calculations.

4.4 Household position

Table 6 shows that the average observed sexual division of work is present regardless of the individual position of women within the household (household head, spouse, son/daughter and other type of family member). However, it also shows higher gender inequalities in time use for spouses. Female spouses work 37.2 hours more in non-market activities and 29.2 hours less in market activities per week than male spouses.

Table 1: Average working hours by position within the household

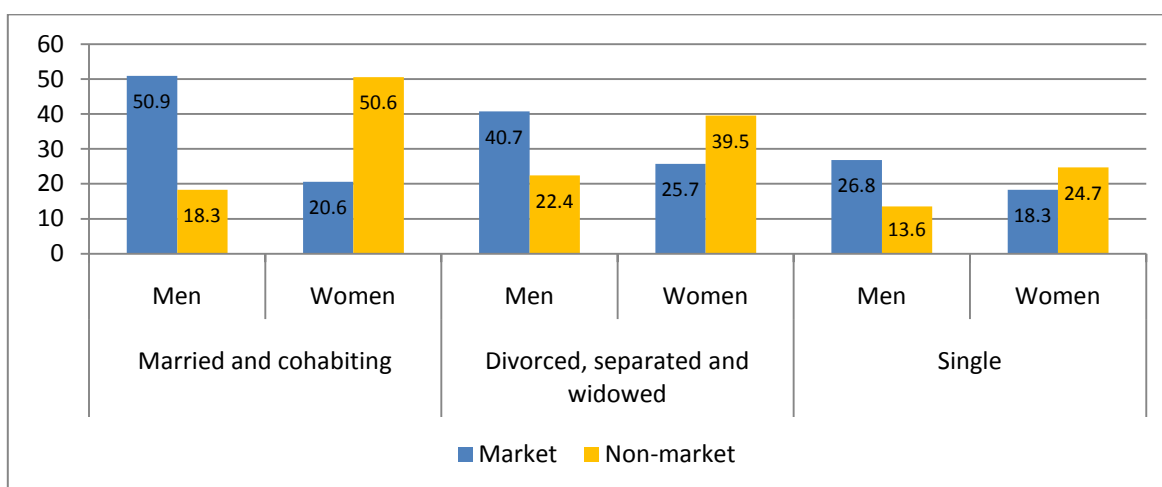
Position in the Household	Type of work	Men	Women	Difference (Men-Women)
Household head	Market	49.7	29.4	20.3
	Non-market	19.3	40.6	-21.3
Spouse	Market	49.8	20.6	29.2
	Non-market	14.2	51.4	-37.2
Son/Daughter	Market	27.4	17.7	9.7
	Non-market	13.5	27.2	-13.7
Other family member	Market	34.8	14.8	20.0
	Non-market	13.7	32.5	-18.8

Source: Peruvian Time Use Survey 2009-2010; author's calculations.

4.5 Marital Status

Chart 7 shows that women are specialised in non-market work regardless of their marital status. However, the intensity of specialization is related to marital status: married and cohabitating women are dedicating the largest average hours to non-market work compared to the others. This indicates that within the couple, the female partner is the one responsible for domestic and care work; while men are the “bread winners”. Divorced, separated and widowed men have the highest engagement in non-market work while their female counterparts have the highest market working hours. Most likely because they face the lack of a partner, they have to do some of the work the partner was mainly specialized in. Single men and women dedicate on average less time to work activities than the other groups, probably because they are engaged in education or because they have no dependants.

Chart 7: Average working hours by marital status

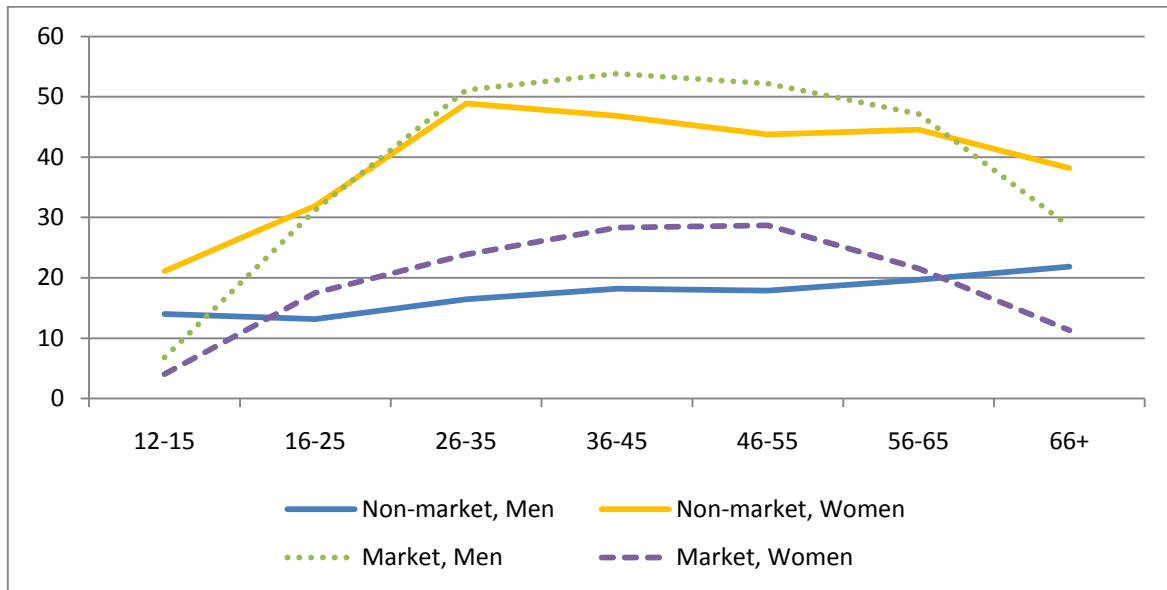


Source: Peruvian Time Use Survey 2009-2010; author’s calculations.

4.6 Age

Chart 8 shows the average working hours for market and non-market activities along the life cycle. First of all, we can see that the labour division by sex is constant throughout all age groups, since curves for each activity by sex do not cross. Regarding non-market work, the gender difference starts already in the first age group and reaches its highest level for the 26-35 years old women, who dedicate approximately 49 hours per week to non-market work. Regarding market work, gender differences are increasing with age, probably because in first age group both genders are still engaged in schooling. The male group between 36 and 54 years of age has the highest market working hours. The gap between curves by sex is larger for non-market work than for market-work. Particularly for males, the shape of the non-market curve is flatter than the one for market work, suggesting that while hours dedicated to market work change, hours for non-market work maintain similar levels across the life cycle.

Chart 8: Average working hours for types of work by gender and age



Source: Peruvian Time Use Survey 2009-2010; author’s calculations.

4.7 Education

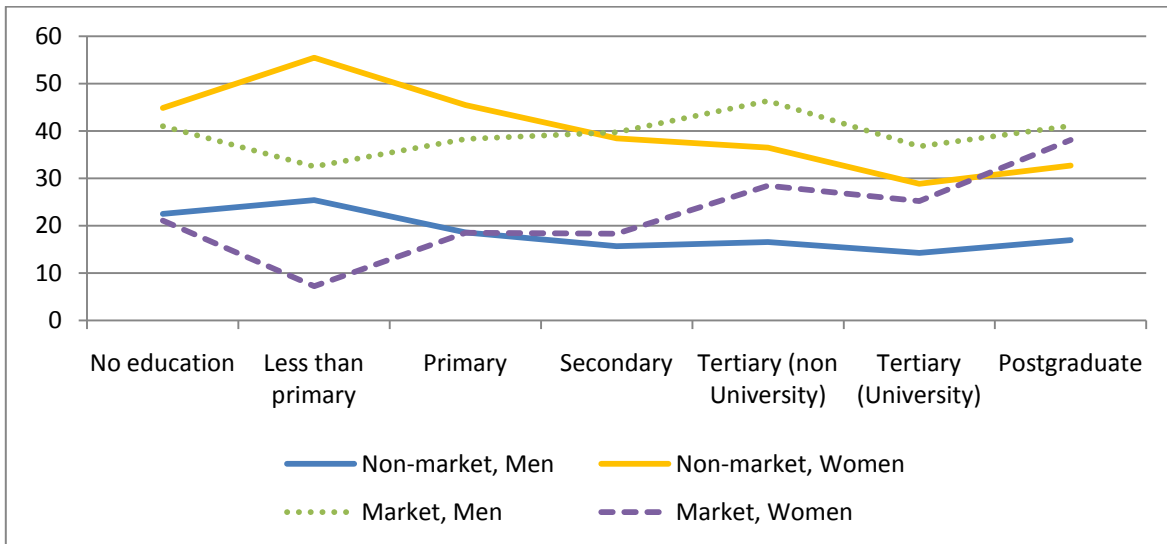
Chart 9 shows that the level of education impacts in different ways on market and non-market labour participation for men and women. While average working hours for males fluctuate between specific ranges and no clear relation with education can be seen, market work participation for females clearly increases and non-market participation decreases with a higher education level attained. It can be said that the higher the education levels, the smaller the gender-based differences in participation in the labor market. However, education seems to have just a slight effect on the reduction of the gap of work intensity in non-market activities between genders. This is mostly due to the fact that no clear correlation can be drawn between men’s educational level and their participation in non-market activities. For women nevertheless there seems to be a link between higher education and less time spent on non-market activities.

4.8 Ethnicity

Chart 10 shows the relation between work intensity in both types of activity and ethnicity. The identification of the individuals’ ethnicity in the survey is done through the question about the mother language. It identifies three types of native Peruvian ethnicities (Quechua, Aymara and Ashaninka), the creole corresponding to Spanish speakers and the

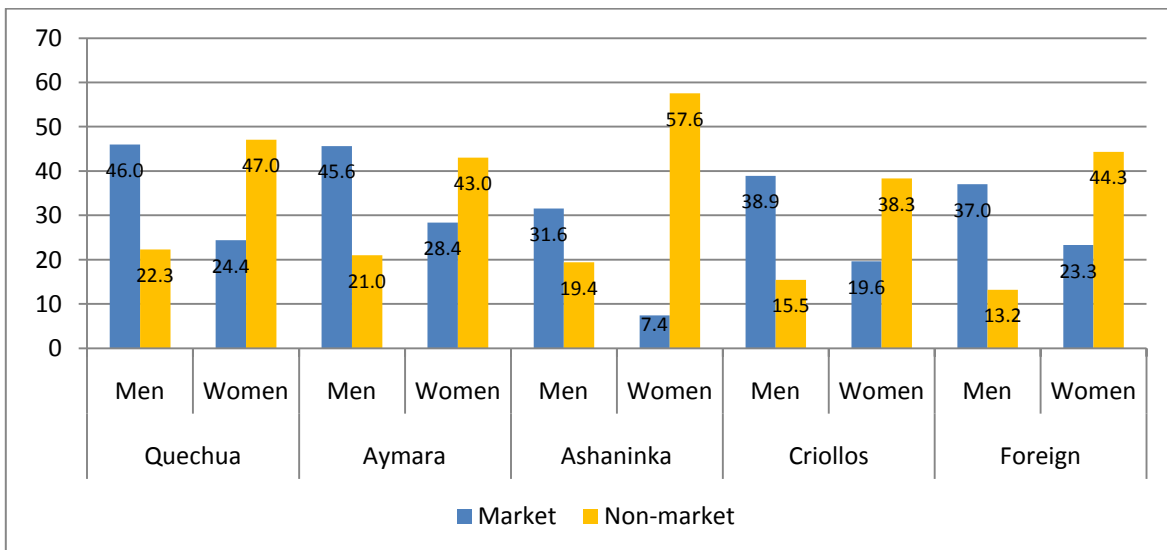
descendants from foreigners. We can see that regardless of ethnicity there is labour division by sex. In the case of the Ashaninkas, there is only a very small engagement of women in market work. This may be explained because the Ashaninkas belong to the Amazonian area, which is the least urbanized area in the country. Therefore, there may be a lack of public services that are being substituted by non-market production.

Chart 9: Average working hours for types of work by gender and age



Source: Peruvian Time Use Survey 2009-2010; author's calculations.

Chart 10: Average working hours by ethnicity



Source: Peruvian Time Use Survey 2009-2010; author's calculations.

5. Methodology

5.1 Econometric model

In order to study the allocation of time between market and non-market activities with particular attention to gender based differences, we estimate the determination of hours worked in each type of work, separately for men and women. Since not all population is engaged in both types of work for the week of reference, the dependent variable takes the value zero for some observation. At this point in many studies where hours worked are analyzed it is said that the dependent variable is left-censored at value zero. In this case, OLS model will yield to inconsistent estimates. The more accurately approach to use in case of censored dependent variable is the Tobit model. According to the Tobit model (Tobin 1958) the dependent variable is defined as follows:

$$Y_i^* = X_i\beta + \varepsilon_i \quad (1)$$

where the error term is normally distributed with mean 0 and a constant variance:

$$\varepsilon \sim N[0, \sigma^2] \quad (2)$$

and the observed y is defined as:

$$Y_i = \begin{cases} Y_i^* & \text{if } Y_i^* > 0 \\ 0 & \text{if } Y_i^* \leq 0 \end{cases} \quad (3)$$

However, it is important to look at the limitations of the Tobit model. As Maddala (2001, p. 335) explains, this model (equation (3)) is actually designed for the situations where Y_i^* can take negative values but these values are not observable which is the reason why Y_i is called a censored variable. In the case of hours worked, Y_i takes values zero not because of censoring but because of decision of individuals of participate in the labour market or in the non-market activities. Using the standard Tobit model for hours worked can yield to inconsistent estimated parameters. Therefore Maddala recommends to use models where the decision making process of individuals is considered⁸. Following this idea the appropriate model that should be used is the Heckman's Two-Step model - also called Heckit estimator - (Heckman, 1978). It consists of two steps, as the name suggest. The first one is a Probit regression of selectivity by MLE using all observations and the second

⁸ Moreover, as Herrera & Torelli (2010, p. 22) explain "The Tobit model assumes that the same variables determine both the probability of an observation being censored and the values of the non-censored observations. Moreover, the marginal effect of a variable is constrained to the same sign for both these types of observations. Given that individuals with zero values present particular characteristics (their non-participation is not random), the estimated coefficient present biases, even when talking account of censored values".

step consists of an OLS regression using only the positive values of the dependent variable. The estimators from this two-step procedure are consistent and asymptotically normal⁹.

Selection equation:

$$Z_i^* = W_i\gamma + u_i \quad (4)$$

Where

$$Z_i = \begin{cases} 1 & \text{if } Z_i^* > 0 \\ 0 & \text{if } Z_i^* \leq 0 \end{cases} \quad (5)$$

Structural equation:

$$Y_i^* = X_i\beta + \varepsilon_i \quad (6)$$

Where

$$Y_i = \begin{cases} Y_i^* & \text{if } Z_i^* = 1 \\ 0 & \text{if } Z_i^* = 0 \end{cases} \quad (7)$$

Stochastic specification:

$$\begin{aligned} u_i &\sim N[0,1] \\ \varepsilon_i &\sim N[0, \sigma^2] \\ \text{Corr}(u_i, \varepsilon_i) &= \rho \end{aligned} \quad (8)$$

Likelihood function corresponding to the selection equation:

$$L = \prod_{Z_i=1} P(Z_i^* \leq 0) \cdot \prod_{Z_i=1} [P(Z_i^* > 0) \cdot f(Y_i|Z_i^* > 0)] \quad (9)$$

It can be shown that

$$P(Z_i^* > 0) \cdot f(Y_i|Z_i^* > 0) = P(Z_i^* > 0|Y_i) \cdot f(Y_i) \quad (10)$$

Hence

$$L = \prod_{Z_i=0} (1 - \Phi(W_i\gamma)) \cdot \prod_{Z_i=1} \left[\Phi \left(\frac{W_i\gamma + \frac{\sigma}{\sigma_\varepsilon} (Y_i - X_i\beta)}{\sqrt{1 - \frac{\sigma^2}{\sigma_\varepsilon^2}}} \right) \cdot \frac{1}{\sigma_\varepsilon} \cdot \varphi \left(\frac{Y_i - X_i\beta}{\sigma_\varepsilon} \right) \right] \quad (11)$$

L is maximized on $\beta, \gamma, \sigma, \sigma_\varepsilon$.

⁹ For deeper microeconometrics see Cameron & Trivedi (2005).

Thus, the marginal effect of X on Y in the observed sample is¹⁰:

$$\frac{\partial E(Y_i|Z_i^* > 0)}{\partial X_{ik}} = \beta_k - \gamma_k \left(\frac{\rho \sigma_\varepsilon}{\sigma_u} \right) \delta(\alpha_u) \quad (12)$$

Through using marginal effects in the Heckman model it is possible to identify both the direct effect of the independent variables on the mean of Y_i^* captured by β , and the indirect effect of the independent variables on the probability of the dependent variable being observed. Since we are analyzing the allocation of time between non-market and market activities in this paper, we are focused on the marginal effect on the working hours conditional on being observed.

Finally, the variables assumed to affect time allocation (participation and number of hours) between market and non-market activities are age (age group dummies where the age group corresponding to 26-35 is omitted), quintile distribution of potential hourly wages (lowest quintile is omitted), level of education (illiterate and only pre-primary school are omitted), area of residence (rural is omitted), the relation of the individual to the household head (household head is omitted), the type of household (couples without children is omitted), the number of household members in different age ranges, marital status (single is omitted), ethnicity (major ethnic group is omitted) access to electricity (non access is omitted), direct access to water supply (indirect access is omitted).

5.2 Ex-ante impact of the variables

The underlying hypothesis of this study is that variables other than traditional economic variables may have an impact on time allocation between market and non-market work. We attempt to take into consideration an overlooked group of factors, gathered under the label of sociological and cultural factors, which may affect the allocation of time and be decisive in the sexual division of work. Regarding the traditional variables studied for

¹⁰ As derived by Green in 2003, the conditional mean is:

$$\begin{aligned} E(Y_i|Y_i \text{ is observed}) &= E(Y_i|Z_i^* > 0) \\ &= E(X_i\beta + \varepsilon_i|W_i\gamma + u_i > 0) \\ &= X_i\beta + E(\varepsilon_i|W_i\gamma + u_i > 0) \\ &= X_i\beta + E(\varepsilon_i|u_i > -W_i\gamma) \\ &= X_i\beta + \rho\sigma_\varepsilon\lambda_i(\alpha_u) \\ &= X_i\beta + \beta_\lambda\rho\lambda_i(\alpha_u) \end{aligned}$$

estimating the labour supply, we expect the level of education to have a negative effect on the hours worked in non-market activities. Since higher education level implies higher potential wages, the opportunity cost of not participating in market (remunerated) activities for highly educated individuals is higher than for those with lower levels of education. Since wages are only observable for those individuals participating in market activities, we calculate the potential wages for the whole sample as the predicted hourly wages¹¹. According to economic theory, increases in wages may have two different effects on the labour supply. On the one hand, the income effect of higher wages leads to an increase in leisure supply as the same level of goods consumption can be reached with lower hours of work. On the other hand, there is a substitution between leisure and working hours as the leisure is relatively more expensive¹². Depending on whether the substitution effect or the income effect dominates, the relationship of wages and remunerated working hours can be positive or negative. In the traditional model just described, the only two activities considered are leisure and market activities. Since non-market activities also generate utility for individuals and due to time restrictions, a trade-off between market and non-market activities engagement exists, we can expect the effect of potential wages on non-market time supply to be the opposite than on market time supply.

In this paper we consider individual and household characteristics to be representative of the cultural aspects. As shown in the descriptive statistics analysis, a person's position in the life cycle clearly determines time allocation. We take the age group from 26 to 35 as the reference age bracket as this is the most intensive non-market working period for women as shown by the descriptive statistics. We expect that the first years, have a positive effect on the allocation of both types of work activities, while the last years may have a diminishing impact especially for working time in market activities. Regarding marital status, we expect a status different to "single" to have a positive impact on working time in all activities due to the major family responsibilities. However, the different intensity of their effects on men's and women's time allocation will give us hints about social norms in Peru. The demographic structure of the household has a relevant impact on the allocation of time. The presence of infants and children is expected to have a positive impact on the time oriented to non-market activities since children may raise the demand for services at home. The presence of adolescent may be ambiguous: on the one hand, they may help especially with domestic and care activities and on the other hand, they may still demand domestic work. The presence of other adults, especially adult women, is expected to reduce the individual's non-market working time as they are supposed to collaborate in the home task. In this sense, they sort of generate economies of scale in home-activities production and reduce the cost in terms of time. Regarding its effect on time spent in market activities, we expect that the presence of infants may reduce the supply of time for market activities, while the presence of elderly in the

¹¹ Predicted hourly wages were calculated from a wage equation also using the Heckman model.

¹² See chapter VII in D'Souza (2011).

household may have the opposite effect as they collaborate, relieving this workload. The type of household to which individuals belong as well as their position within the household may also determine the time allocation and division of work. We take as reference for these factors the couple without children type of household and the household head position in the household.

Although the colonization process by the Spaniards around the 16th and 19th centuries resulted in the death of large numbers of indigenous people, it did not exterminate the cultural identity and practices of those indigenous groups. Moreover, it also resulted in a biological and cultural mix. Consequently, the coexistence of multiple cultures is a main feature of the Peruvian nation. Therefore we take into account ethnicity as a variable that recalls cultural patterns. We consider the Creole group (Spanish speakers) as the reference group as it refers to the majority of the sample. The impact of ethnicity on the working hours may show some particular time allocation patterns.

Finally, we also take into consideration the access to public services such as water and electricity. The access to electricity and direct water supply should have a negative effect on time spent in non-market activities, as it should reduce the time required for the performance of domestic work. As seen in the descriptive statistics, there is a female specialization on domestic activities; therefore we can expect that the access to public services may have a greater negative impact on time oriented to non-market activities for women than men. Since these variables may reflect the income level of the household they may have a positive impact on the supply of time to market activities. Regarding to location of the household, we expect to find a positive impact of urbanization on hours dedicated to market activities since urbanization implies more developed markets. However, since rural areas are characterized by the absence of the state and the services it provides, location in this area is expected to have a positive impact in the supply of time oriented to non-market activities.

6. Results

The estimations are attempting to answer the main question of this study: what are the determinants of time allocation between market and non-market activities and the gender inequalities in this? The results of the estimation of the marginal effects after using the Heckman model are presented in Annex 3. We use the sampling weight therefore the results are representative for the whole population over 12 years. The first two columns (Eq. 1 and Eq. 2) correspond to the regressions of the whole sample using a dummy for sex. The third and fourth columns (Eq. 3 and Eq. 4) correspond to the regressions only for

market activities for men and women separately. And the fifth and sixth columns (Eq. 5 and Eq. 6) correspond to the regressions only for non-market activities also for each sex.

The first two regressions show that being women decreases the engagement in market work by 10.3 hours weekly but increases the time dedicated to non-market activities by 17.6 hours weekly. This result, consistent to the descriptive statistics, clearly shows a female specialization in non-market activities, meaning that the major economic contribution of women is not remunerated and underestimated. The result shows that all variables groups are relevant for the determination of time allocation, except of the type of household dummies which are not significant determinants for supply time for market activities.

The level of education and the potential hourly wages have highly significant impacts on market and non-market working time for men and women. There is a strong positive effect of education on time oriented to market activities, especially for women. At the highest levels of education it is interesting to see that while the increase in market working hours for a postgraduate man is less than that of a graduate man, the increase for a female postgraduate is higher. This reveals that the opportunity cost of education is always higher for women than men. We can observe that the figures for the level of education are very high. This might show the substitution effect between working in the labour market vs. leisure and working in non-market activities based on the increase of the opportunity cost due to education. Conversely, the predicted hourly wages show the income effect: For women as well as for men, the higher the potential hourly wages, the fewer hours are engaged in market activities. The effects of these variables are the opposite for non-market activities: the level of education has a negative impact while the level of potential wages has a positive impact on the amount of hours oriented to non-market activities. It is important to see that while the marginal effects of education and potential wages tend to be of similar magnitude among genders for market activities, the impact of those variables on non-market activities for women are much larger (around double) than for men. These results reveal while for market activities the traditional economic factors have a similar impact among genders, in the case of non-market activities women's time allocation is much more sensitive than men's. This evidences some clear gender inequalities in allocation of time oriented to non-market activities.

As mentioned before, the variables regarding to the type of household are not significant in the determination of working hours oriented to market activities but they are statistically significant for non-market activities. The reference household type is "couples without children" and in that case men and women work the least amount of hours. This variable reveals an important pattern: men work the largest amount of hours when they are leaving by themselves, and reduce these hours as more members are present in the household. This means that men share the non-market workload with other household members. For women the exact opposite effect is observed: as more household members

are present (“extension” increases), they dedicate larger amount of hours to non-market activities. This evidences gender inequalities in time allocation on non-market activities.

The increase in the number of children in the household increases the men’s and women’s participation to non-market activities, but inequalities remains as each child under 5 years represents 6.1 hours weekly more for women but only 1.8 hours weekly for men. While the presence of adult women (over 18) reduces the non-market working hours for both genders, the impact of the presence of adult men over 36 is not clear as it is not significant. However, the presence of young adult males (18-25 years) increases the non-market working time for men and women. Again, the magnitude of the effects is larger for women than men, this shows that the supply of hours for non-market work is more elastic for women than for men. In the case of market activities, we can see that these variables have the opposite effect: if the presence of household’s members has a positive effect on the supply of time oriented to non-market work, it has a negative effect on the supply of time dedicated to market work.

The majority of dummies regarding the relationship to household head are not significant for the market activities. We can just observe that being son or daughter (or “other relative”) reduces the time devoted to market activities by almost 3 hours weekly compared to the household head for these activities. In the case of non-market activities, that being son or daughter, mother or father, or other relative to the household head is significant and the impact of these variables are different among genders. Given the higher elasticity of the female supply of time oriented to nonmarket activities to these variables, we can interpret that those position within the household are determinant for gender division of work.

Regarding the marital status compared with the single status, gender inequalities are evident in market as well as non-market activities. In the case of market activities, married men work 4 hours weekly more than married women respect to their single counterparts. The difference is even larger for non-market activities: married women work 7 hours weekly more than married men compared to their single counterparts. In the case of separated, divorced or widow individuals, the differences remain in the same direction although they are not that large; around an hours of difference between genders for both activities.

All dummies regarding age are significant for market activities and their impact on hours devoted to these activities are of similar magnitude for both genders. For non-market activities the results are different. Taking as reference the age bracket 26 to 35 years, we can see that after the age of 35 years the hours spent in non-market activities are less than those spent before the age of 26 years for women. This means that especially young women are responsible for an unobservable (in terms of accountability) contribution to the household welfare. In the case of men, age does not appear to be that relevant. They

seem to have a very constant participation in non-market activities as the hours dedicated to these activities are only reduced by one or two hours weekly after the age of 35 years.

Access to electricity is significant for the supply of time oriented to market work for both genders, decreasing it by around 2 hours weekly. The same can be observed for non-market activities but just for the case of men, while for women it is not significant. Direct access to water reduces non-market working time by 4.2 hours for women and only 2.7 hours weekly for men and increases market working time for both genders. While the effect of the access to electricity cannot be easily interpreted, the direct access to water is relevant on the division of non-market work among genders.

The variable regarding location is significant for both markets. Urban households' men and women dedicate around 11 hours weekly more than their rural counterparts in market activities, not showing any inequalities among genders. However, we can see that this variable determines gender division of work for non-market activities, as rural men orient 5 hours and rural women 10 hours more than their urban counterparts in this type of work. Regarding ethnicity, this variable is mainly significant for market activities. Based on the reference group "Creole", we can see that there are some gender inequalities for two particular cases. First, in Ashaninka group, women devote around 8 hours weekly less than men to market activities, and spend almost 10 hours weekly more than men in non-market activities. Second, foreign women work around 13 hours weekly more than foreign men in market activities. We can say that especially the Ashaninka ethnic group have particular costumes that determine a gender division of work for both types of activities. While it appears that some foreign cultural standards tend to impact in a female-friendly division of labour for market activities.

7. Conclusions

Non-market activities represent on average 48.2% of the total working time of the Peruvian population. According to the definition used in this paper, non-market production consists of domestic and care services, as well as consumption generating activities such as voluntary work and home farming and agricultural production. This study finds that there are gender inequalities in time allocation between market and non-market activities. Although there is high female participation in the labour force (59.7%), there specialization among females in non-market activities as they contribute to 70.7% of the total working time oriented to this type of work. Women dedicate on average 39.7 hours weekly to non-market activities, compared to only 20.5 hours weekly to market activities. This suggests that for the most part the economic contributions of females to

household's and society's welfare are not recorded in national accounts, and subsequently usually unobservable.

This study presents empirical evidence for the determinants of the supply of time to market and non-market activities, as well as the determinants of the gender inequalities in such time allocation. We find that not only traditional factors such as the level of education and potential wages impact time allocation, but others factors such as social norms and cultural standards also have a significant impact on time allocation between types of work and gender-based division of work. The most important findings are as followed:

For both men and women the supply of time oriented to market activities is similar in its sensitivity to age, level of education and predicted hourly wages. But for non-market activities, old age, higher predicted wages and higher level of education have a larger impact on women. Additionally, the impact of access to basic services is not relevant for gender inequalities in time allocation for market activities, but it is for non market activities.

Regarding social norms and cultural standards, the household type has not had a significant impact on the supply of time oriented to market activities; however it is very relevant for the determination of time oriented to non-market activities and gender inequalities in time allocation for such activities. One such determinant, household demographic structure, has a relevant role for the determination of time allocation. Specifically, the presence of infants and adult women has an important impact on the gender based division of work for non-market activities. In addition, marital status has a major effect on the gender inequalities in time allocation for both types of work: married women are more specialized in non-market activities and married men in market activities than their counterparts. Finally, while location is relevant for explaining the gender inequalities only in non-market time allocation among, the Ashaninka group, one of the many different ethnic groups, has a large impact on gender-based division of work.

This study is a first attempt at measuring the time allocation of nonmarket work and gender inequalities in time allocation in Peru and brings some light on this topic using the latest data available for this country. Based on our study we can say that Peruvian women are specialized in non-market activities and that there are determinants outside of traditional economic factors such as gender issues, which underlay this situation.

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Annex 1: Sample description

	Total		Total
Gender		Relation to the head of the household	
Men	49.8%	Head of the household	25.9%
Women	50.2%	Spouse	17.2%
Total	100.0%	Child	43.5%
		Son/Daughter in law	1.6%
Men over 12 years	49.3%	Grandchild	6.7%
Women over 12 years	50.7%	Father/Mother	0.9%
Total over 12 years	100.0%	Father/ Mother in law	0.4%
		Brother/Sister	1.5%
Age bracket		Brother/Sister in law	0.4%
		Other relative	1.6%
<= 5 years	11.0%	Other unrelated member	0.3%
6 to 9	8.1%	Total	
10 to 14	11.4%		
15 to 24	17.8%		
25 to 64	44.2%	Education level (over 12)	
Over 65	7.6%	No education	6.5%
Total	100.0%	Less than primary	0.2%
		Primary	30.3%
0 to 11	24.1%	Secondary	43.3%
Over 12	75.9%	Tertiary (non University)	10.4%
Total	100.0%	Tertiary (University)	9.0%
		Postgraduate	0.3%
Household size			
Average number of household's members	3.9		
Total number of households	4459		
Household with servant	45	Ethnicity (over 12)	
		Quechua	13.2%
Household type		Aymara	1.8%
One person (1)	10.8%	Ashaninka	0.4%
Couples without children (2)	7.6%	Other native	0.9%
Couples with children (3)	41.7%	Creole	83.4%
Nuclear lone parent (4)	10.0%	Foreign	0.1%

Extended lone parent (5)	11.5%		
Extended household (6)	18.5%		
Total household	100.0%		
Female Household Head	24.13%		
Male Household Head	75.87%		
Area			
Urbano (1)	67.2%		
Rural (2)	32.8%		

Annex 2: Average hours per activity

TYPE OF ACTIVITY	MEN	WOMEN	Total
MARKET WORK	39.90	20.48	30.21
NON-MARKET WORK	16.48	39.72	28.07
TOTAL DOMESTIC	11.54	29.28	20.39
Cooking	2.70	12.62	7.65
Cleaning	3.05	6.29	4.67
Cloths	1.71	5.24	3.47
Repare	0.72	0.12	0.42
Shopping	1.93	2.99	2.46
Managing	1.43	2.01	1.72
TOTAL CARE	2.95	7.75	5.35
Care of infants, children and adolescents	2.51	6.68	4.59
Care of sick family members	0.35	0.70	0.52
Care of totally dependent family members	0.09	0.38	0.24
TOTAL NON DOMESTIC	1.87	2.56	2.22
Farming	0.43	1.00	0.71
Helping other houshold	0.58	0.40	0.49
Voluntary work	0.86	1.16	1.01
OTHER NON MARKET ACTIVIES	0.12	0.13	0.12
TOTAL WORK	56.38	60.20	58.28
TERTIARY ACTIVITIES	107.02	103.78	105.40
Education	8.92	8.54	8.73
Jorb serch	0.13	0.08	0.11
Personal needs	66.58	67.78	67.18
Total leisure and social activities	31.39	27.39	29.39
Family time	13.27	13.78	13.53
Leisure	18.11	13.61	15.87

Annex 3: Results of estimations - Marginal Effects after Heckman

	Market Activities		Non-market Activities		Market Activities		Non-market Activities	
	Total Sample		Total Sample		Men	Women	Men	Women
	Eq. (1)	Eq. (2)	Eq. (3)	Eq. (4)	Eq. (5)	Eq. (6)	Eq. (5)	Eq. (6)
Sex								
Female	-10.28*** (0.42)	17.556*** (0.39)						
Age (ref. 26-35)								
Between 12 and 15 years	-32.34*** (0.879)	-2.718*** (0.642)	-32.072*** (1.136)	-32.01*** (1.541)	0.07 (0.707)	-6.478*** (1.087)		
Between 16 and 25 years	-15.397*** (0.561)	-0.094 (0.587)	-14.974*** (0.776)	-16.834*** (1.013)	-0.064 (0.637)	-2.118** (0.997)		
Between 36 and 45 years	9.687*** (0.394)	-3.999*** (0.479)	9.221*** (0.52)	9.422*** (0.604)	-1.338** (0.562)	-4.784*** (0.737)		
Between 46 and 55 years	12.186*** (0.468)	-5.915*** (0.566)	12.098*** (0.604)	11.544*** (0.746)	-2.096*** (0.659)	-6.996*** (0.89)		
Between 56 and 65 years	7.701*** (0.649)	-6.52*** (0.757)	8.256*** (0.933)	6.438*** (1.078)	-2.011** (0.901)	-9.961*** (1.26)		
Over 66 years	-6.102*** (0.833)	-5.62*** (0.868)	-5.896*** (1.117)	-6.628*** (1.387)	0.156 (1.018)	-9.966*** (1.385)		
Predicted hourly wages (ref. 1° quintile)								
2° quintile	-21.104*** (0.412)	6.684*** (0.392)	-20.352*** (0.525)	-21.804*** (0.666)	4.476*** (0.42)	8.521*** (0.647)		
3° quintile	-35.847*** (0.451)	13.24*** (0.451)	-34.685*** (0.602)	-36.823*** (0.696)	8.095*** (0.515)	16.228*** (0.743)		
4° quintile	-53.472*** (0.521)	21.398*** (0.547)	-51.61*** (0.71)	-54.829*** (0.781)	12.102*** (0.698)	26.526*** (0.814)		
5° quintile	-80.766*** (0.749)	30.542*** (0.759)	-78.592*** (1.026)	-81.971*** (1.084)	19.353*** (1.118)	36.23*** (1.052)		
Level of education (ref. less than primary)								
Primary	11.18*** (0.651)	-3.722*** (0.745)	9.292*** (1.13)	12.567*** (0.809)	-2.582** (1.08)	-5.27*** (0.943)		
Secondary	21.859*** (0.72)	-7.907*** (0.791)	19.801*** (1.196)	23.333*** (0.939)	-4.16*** (1.116)	-10.432*** (1.042)		
Non-university higher education	46.026*** (0.838)	-17.305*** (0.942)	43.072*** (1.333)	47.72*** (1.127)	-8.827*** (1.314)	-21.913*** (1.288)		
University higher education	62.291*** (1.047)	-25.671*** (1.096)	59.047*** (1.56)	63.882*** (1.492)	-14.776*** (1.545)	-31.481*** (1.503)		
Postgraduate	56.251*** (2.866)	-23.384*** (1.88)	49.793*** (3.105)	70.215*** (6.123)	-13.548*** (2.142)	-32.817*** (5.249)		

	Market Activities	Non-market Activities	Market Activities		Non-market Activities	
	Total Sample	Total Sample	Men	Women	Men	Women
	Eq. (1)	Eq. (2)	Eq. (3)	Eq. (4)	Eq. (5)	Eq. (6)
Relation to the household head (ref. household head)						
Spouse	-3.392*** (0.497)	7.416*** (0.562)	-0.073 (1.107)	-1.243 (0.9)	-1.666 (1.104)	-1.271 (1.147)
Son/Daughter	-3.278*** (0.625)	-1.06 (0.673)	-2.748*** (0.794)	-2.794*** (1.043)	-1.746** (0.767)	-4.051*** (1.158)
Mother/Father	-1.668 (2.114)	-6.298*** (2.11)	4.494* (2.72)	-3.149 (2.574)	-5.89** (2.993)	-8.395*** (2.555)
Other relative	-3.19*** (0.712)	-1.773** (0.771)	-2.147** (0.901)	-3.803*** (1.195)	-2.226*** (0.789)	-4.352*** (1.372)
No relative	-4.892** (2.238)	-0.903 (3.019)	-2.344 (1.967)	-9.643* (5.126)	-0.926 (3.136)	-4.683 (5.894)
Household Type (ref. Couples without children)						
Only Household's head	0.418 (0.899)	7.845*** (1.03)	1.811 (1.148)	-0.279 (1.53)	3.784*** (1.144)	5.708*** (1.792)
Couple with children	-0.269 (0.638)	4.749*** (0.695)	0.795 (0.84)	-1.85* (0.975)	0.677 (0.804)	8.5*** (1.05)
Lone parent	0.07 (0.84)	7.991*** (0.851)	1.039 (1.188)	-0.636 (1.247)	3.121*** (0.972)	9.511*** (1.309)
Lone parent extended	-0.201 (0.785)	8.679*** (0.834)	1.438 (1.043)	-1.594 (1.206)	2.744*** (0.949)	11.132*** (1.305)
Extended	0.296 (0.721)	5.579*** (0.764)	1.041 (0.936)	-0.708 (1.11)	1.087 (0.871)	9.397*** (1.158)
Household demographic structure (Part I)						
Number of infants under 5 years	-1.654*** (0.218)	4.114*** (0.226)	-1.184*** (0.274)	-2.274*** (0.35)	1.832*** (0.236)	6.091*** (0.361)
Number of children between 6 and 9 years	0.582** (0.249)	1.302*** (0.261)	0.817*** (0.324)	0.172 (0.388)	1.297*** (0.286)	1.365*** (0.401)
Number of boys between 10 and 17 years	-3.412*** (0.218)	1.213*** (0.211)	-3.528*** (0.291)	-2.966*** (0.332)	0.499** (0.228)	0.81** (0.35)
Number of girls between 10 and 17 years	-2.693*** (0.229)	-0.382* (0.217)	-2.384*** (0.304)	-3.138*** (0.354)	0.57** (0.246)	-0.392 (0.339)
Number of men between 18 and 25	-2.48*** (0.269)	1.572*** (0.233)	-1.974*** (0.343)	-2.757*** (0.485)	0.495** (0.247)	1.179*** (0.393)
Number of women between 18 and 25 years	1.782*** (0.266)	-3.159*** (0.257)	0.466 (0.343)	3.04*** (0.465)	-1.389*** (0.286)	-3.792*** (0.421)
Number of men between 26 and 55 years	-2.359*** (0.29)	0.583** (0.288)	-2.102*** (0.381)	-1.946*** (0.491)	-0.12 (0.321)	0.522 (0.465)

	Market Activities	Non-market Activities	Market Activities		Non-market Activities	
	Total Sample	Total Sample	Men	Women	Men	Women
	Eq. (1)	Eq. (2)	Eq. (3)	Eq. (4)	Eq. (5)	Eq. (6)
Household demographic structure (Part II)						
Number of women between 26 and 55 years	-0.509* (0.31)	-2.755*** (0.297)	-1.01*** (0.375)	-0.423 (0.604)	-0.946*** (0.308)	-4.872*** (0.527)
Number of men over 55 years	1.201*** (0.419)	0.6 (0.413)	0.904 (0.609)	1.516** (0.659)	0.5 (0.477)	-0.541 (0.651)
Number of women over 55 years	1.151*** (0.412)	-1.723*** (0.416)	0.877* (0.518)	1.641** (0.763)	-0.763** (0.423)	-1.653** (0.77)
Marital Status (ref. Single)						
Married or Cohabitant	7.596*** (0.501)	5.355*** (0.606)	9.081*** (0.649)	5.04*** (0.875)	1.375** (0.696)	9.819*** (1.057)
Divorced, separated or widow	3.736*** (0.588)	5.109*** (0.741)	4.281*** (0.878)	3.376*** (0.817)	2.509*** (0.975)	4.248*** (1.052)
Ethnicity (ref. Creole)						
Quechua	-2.066*** (0.368)	3.826*** (0.443)	-2.796*** (0.494)	-0.912* (0.54)	3.902*** (0.515)	3.423*** (0.661)
Aymara	-5.75*** (0.706)	2.82*** (0.985)	-6.441*** (0.92)	-4.913*** (1.064)	3.593*** (1.013)	2.218 (1.485)
Ashaninka	-16.11*** (2.095)	5.63** (2.855)	-13.881*** (2.517)	-21.496*** (2.955)	-0.266 (2.84)	10.519** (4.714)
Other native group	-13.374*** (1.969)	0.901 (1.603)	-14.357*** (2.641)	-11.459*** (2.865)	-0.003 (2.001)	1.898 (2.455)
Foreign	5.717 (4.782)	2.105 (5.96)	-0.035 (6.096)	13.334*** (4.513)	-2.143 (4.857)	7.887 (10.443)
Area (ref. rural)						
Urban	11.483*** (0.355)	-8.252*** (0.387)	11.09*** (0.468)	11.796*** (0.539)	-5.605*** (0.437)	-10.29*** (0.607)
Access to Basic Services						
Access to electricity	-2.048*** (0.454)	-1.231*** (0.502)	-1.992*** (0.592)	-1.929*** (0.704)	-1.938*** (0.598)	-0.925 (0.78)
Direct access to water	7.911*** (0.371)	-3.869*** (0.392)	8.106*** (0.489)	7.376*** (0.558)	-2.696*** (0.474)	-4.151*** (0.599)

Source: Peruvian Time Use Survey 2009-2010; author's calculations. Note: Standards errors are in parenthesis. * Significant at 10%; ** significant at 5%; *** significant at 1%. Marginal effects are computed after estimating Heckman model for market and non-market activities accounting for sampling weights. Marginal effects are the marginal effect for the expected value of non-market and market work time conditional on being observed.