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Ilya María Espino Cruz

Dimensions of gender inequality in Central America: family, work, and income

Belo Horizonte, MG
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Ilya María Espino Cruz

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Tese apresentada ao Programa de Pós-Graduação em Economia do Centro de Desenvolvimento e Planejamento Regional da Universidade Federal de Minas Gerais, como requisito parcial à obtenção do título de Doutora em Economia.

Orientadora: Prof.ª Dr.ª Ana Maria Hermeto Camilo de Oliveira

Co-orientadora: Prof.ª Dr.ª Luciana Soares Luz do Amaral

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BANCA EXAMINADORA

Dra. Ana Maria Hermeto Camilo de Oliveira
(Orientadora) (CEDEPLAR/FACE/UFMG)
(participação por videoconferência)

Prof. Gilberto de Assis Libânio
Coordenador do Curso de Pós-Graduação
em Economia

FACE | Av. Antônio Carlos 6627 | CEP 31270-901 | Belo Horizonte | MG | Brasil
Tel ++ 55 31 3409 7100 | Fax ++ 55 31 3409 7203 | www.cedeplar.ufmg.br

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BANCA EXAMINADORA

Dra. Luciana Soares Luz do Amaral
(Coorientadora) (CEDEPLAR/FACE/UFMG)
(participação por videoconferência)

Luciana Soares Luz do Amaral

Prof. Gilberto de Assis Libânio
Coordenador do Curso de Pós-Graduação
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Aprovada EM **22 DE MAIO DE 2020**

BANCA EXAMINADORA

Dra. Sibelle Cornélio Diniz da Costa
(CEDEPLAR/FACE/UFMG)
(participação por videoconferência)

Sibelle Cornélio D. da Costa

Prof. Gilberto de Assis Libânio
Coordenador do Curso de Pós-Graduação
em Economia

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Aprovada EM **22 DE MAIO DE 2020**

BANCA EXAMINADORA

Dra. Anne Caroline Costa Resende
(participação por videoconferência)

Anne Caroline C. Resende

Prof. Gilberto de Assis Libânio
Coordenador do Curso de Pós-Graduação
em Economia

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Aprovada EM **22 DE MAIO DE 2020**

BANCA EXAMINADORA

Dra. Danyella Juliana Martins de Brito
(UNIVERSIDADE FEDERAL DE PERNAMBUCO/UFPE)
(participação por videoconferência)

Danyella Juliana Martins de Brito

Prof. Gilberto de Assis Libânio
Coordenador do Curso de Pós-Graduação
em Economia

Universidade Federal de Minas Gerais | Faculdade de Ciências Econômicas |
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Aprovada EM **22 DE MAIO DE 2020**

BANCA EXAMINADORA

Dr. Alexandre Gori Maia
(UNIVERSIDADE ESTADUAL DE CAMPINAS/UNICAMP)
(participação por videoconferência)

Prof. Gilberto de Assis Libânio
Coordenador do Curso de Pós-Graduação
em Economia

FACE | Av. Antônio Carlos 6627 | CEP 31270-901 | Belo Horizonte | MG | Brasil
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Acronyms and Abbreviations

CELADE	Centro Latinoamericano y Caribeño de Demografía (Latin American and Caribbean Demographic Center)
ECLAC	Economic Commission for Latin America and the Caribbean
GDP	Gross Domestic Product
ICEFI	Instituto de Estudios Fiscales (Institute of Fiscal Studies)
IFAD	International Fund for Agricultural Development
IMF	International Monetary Fund
ILO	International Labour Organization
INE	Instituto Nacional de Estadísticas (National Institute of Statistics)
IZA	Institute of Labour Economics
OECD	Organisation for Economic Cooperation and Development
SEDLAC	Socio-Economic Database for Latin America and the Caribbean
SEFIN	Secretaría de Finanzas (Secretariat of Finance)
TFR	Total Fertility Rate
UNDP	United Nations Development Programme
UNFPA	United Nations Population Fund
UN Women	United Nations Entity for Gender Equality and the Empowerment of Women
USD	United States Dollar
WDI	World Development Indicators

1. INTRODUCTION

1.1. Motivation

Societies have experienced remarkable transformations such as demographic changes, the expansion of education, cultural changes, the outsourcing of employment, and the urbanization process, which have been accompanied by a feminization of the labor force. These processes have reflected fundamental changes in women's lives, including the rise in educational attainment and in labor force participation. Although families have adapted to these transformations, there are still significant continuities in family patterns and gender inequalities. In this regard extending the discussion on dimensions of inequality in Central America is the main objective of this dissertation. The dissertation contains three papers, each of them uses different time periods and methods, and attempt to contribute to a broad understanding of the dimensions of gender inequality in both private and public spheres. The first paper aims to discuss the effects of changes in the family structure and the living arrangements on the evolution of income inequality. The second and third papers focus primarily in examining the drivers of gender inequality in the market and non-market work. Specifically, the second paper aims to investigate differences in time allocation to unpaid and paid work, it focuses on a longer term frame (2000-2014). The third paper analyzes the relationship between occupational intensity and pay gaps, and it concentrates on 2014. The reasons for the interest in the region are the following: first, for many years, Central American countries have been characterized by very high levels of poverty, lagging social indicators, and high inequality. Second, particularly, Guatemala suffered a 36-year long civil war that ended in 1996, which severely affected the economy and caused social inequality (CHAMARBAGWALA; MORÁN, 2011). Nonetheless, its economy has grown in the recent decade, and nowadays, Guatemala is the largest economy in Central America. Furthermore, the country has shown a decline in inequality during the period 2000-2014, however, Guatemala is one of the most unequal countries in Latin America in terms of income distribution (WORLD BANK; SEDLAC, 2017).

Changes in social and income inequality have been accompanied by changes in family structure. But these changes have occurred with different intensities among population subgroups across

regions. This issue has motivated several works that analyze the links between the dynamics of household structure and the distribution of income to extent that household income reflects economic opportunities, but also the choices, preferences, and decisions related to the income of household members. Previous studies have found that demographic changes and family arrangements play an important role in the reproduction of socioeconomic inequalities across countries (MCLANAHAN; PERCHESKI, 2008; OECD, 2011).

In recent years, literature has examined the drivers of gender inequality in both family and work spheres. This topic is of special interest because gender inequalities represent significant barriers to human development by limiting access to similar opportunities in the labor market. Responsibilities are not distributed equitably within households; women continue to devote long hours to domestic chores, while men tend to specialize in the market work. Moreover, although women are increasingly engaged in the labor market, they also must be available to comply with their family responsibilities: housework and care activities. Although women have reduced the amount of time spent on housework, and men have increased their hours in housework and childcare over the past several decades, gender differences in time allocation remain over time. This trend is shared by developed and developing countries (see, e.g.; BIANCHI et al., 2000; SULLIVAN, 2011; FERRANT et al., 2014; SAYER, 2016; RUBIANO-MATULEVICH; VIOLLAZ, 2019).

Gender inequalities persist in the labor market, particularly, in earnings and occupations. Gender differences in pay are generally attributed to a variety of factors: differences in educational attainment and work experience, employer discrimination, and occupational segregation. The existing literature reports large and persistent gender differences in the distribution of occupations. In general, women are underrepresented in high-paying ones, and are more likely to work in part-time jobs. Furthermore, female-dominated occupations tend to receive low returns, even after controlling for human capital characteristics, and other factors such as race, household composition or job-related characteristics, which widens the gender pay gap (see, e.g., MACPHERSON; HIRSCH, 1995; COTTER, HERMSEN; VANNEMAN, 2003; BAYARD et al., 2003; SALARDI, 2013; ESPINO, 2013).

In this context, this dissertation's contribution is three-fold: (i) exploring the links between the changes in family structure, living arrangements and income distribution, (ii) examining the effects of individual and household characteristics on the time allocation decision for both women and men, and how these effects have evolved over time, and (iii) analyzing the role of the gender occupational intensity on pay gaps. Especially, this dissertation addresses these topics for Guatemala, although the third paper attempts to bring an overview of the gender differences in the labor market across Central American countries, including Honduras and El Salvador (this region is known as the Northern Triangle of Central America).

In addition, this dissertation intends to capture time use trends, family and work patterns that may contribute to both policy-makers and society. Findings in this line may help to promote a more equal pay structure for men and women, as well as family policies that facilitate the reconciliation between work and family (e.g. provision of quality daycare services for young children, parental leave, and promotion of caring responsibilities within the family). Given that research on these topics is still limited for Latin American countries and especially for Central American countries, the key findings present challenges for future research on social changes and economics related to gender inequalities.

In this sense, this dissertation may constitute reference material for researchers, policy-makers, and activists interested in promoting developing policies to reduce gender inequalities in both private and public spheres in Latin America, especially in Central America.

Finally, additional concerns emerge about the economic instability caused by exogenous shocks such as the current COVID-19 pandemic, as governments implement social distancing measures and instruct non-essential businesses to close to reduce disease transmission. The crisis can lead to unprecedented shock on the economy and the labor market, impacting the supply but also demand, which will worsen living conditions in the immediate future for countries, mostly in developing nations.

The impact on the labor market can translate into an increase in the unemployment and informality rate. Also, other possible scenarios such as adjustments to wages and working hours,

and deterioration in the quality of employment need to be considered. The effects may be larger in vulnerable groups, particularly women. This situation will demand policy responses at the national level to mitigate the effects on working women and their families.

Socioeconomic effects could be immense, including increasing gender inequality in the labor market, poverty, and income inequality. The COVID-19 crisis can also compound economic vulnerabilities in different intensities across households. Job loss, school closures, unavailability of childcare, and increases in demand for care for both young children and elderly members of households can affect income disparity and increase poverty. Particularly, low income households and single-mother families need support to protect their employment and earnings from this severe shock. Hence, these important issues should be at the center of public discussion.

The dissertation encompasses three papers presented in the next chapters. The first paper attempts to discuss changes in household structure and income inequality in Guatemala, using the National Survey of Living Conditions (Encuesta Nacional de Condiciones de Vida-ENCOVI) from 2000 and 2014. The second paper investigates gender differences in time allocation to housework, childcare, and paid work in Guatemala (2000-2014). The third paper explores the role of gender occupational intensity in pay gaps in the Northern Triangle of Central America (2014).

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2. STUDY 1 FAMILY STRUCTURE AND LIVING ARRANGEMENTS AND INCOME INEQUALITY IN GUATEMALA BETWEEN 2000 and 2014

ABSTRACT

This paper explores the role of changes in family structure and living arrangements on shaping income distribution in Guatemala using data from the national sample survey ENCOVI (2000 and 2014). Specifically, a 12 groups household typology including a gender dimension is proposed, which proved to be useful to illustrate the diversity of Guatemalan households, and how they have changed over these 14 years. The most common household types are couples with children and three-generation families (each one accounting between 24-29 percent of the total), what indicates that two parents-nuclear families are an important feature in Guatemala. Furthermore, although modest, important trends have been observed; a decline of couples with children under 15, an increase in three-generation families, and an increase in lone-person households and single-parent families, especially households headed by women. In order to examine the effects of changes in family composition and living arrangements on income inequality, a decomposition of the distributional changes by population subgroups is applied, it considers that total inequality is the sum of the inequalities "within" each group and the inequality that exists "between" the groups. The decomposition analysis suggests that distance "within-groups" included in the analysis matter more on income household distribution in Guatemala. Therefore, trends in family structure and living arrangements associated with the decline of fertility rates and aging do not seem to have contributed to changes in income inequality experienced by Guatemala for the period from 2000 to 2014.

Keywords: Family structure, living arrangements, income inequality, Guatemala

RESUMO

Este artigo explora o papel das mudanças nas estruturas familiares e arranjos de vida na determinação da distribuição de renda na Guatemala usando dados da pesquisa de amostragem nacional ENCOVI (2000 e 2014). Especificamente, propõe uma tipologia de 12 grupos domiciliares incluindo uma perspectiva de gênero, que provou ser útil para ilustrar a diversidade de domiciliares Guatemaltecos, e como eles mudaram nesses 14 anos. Os tipos mais comuns de domicílios são casais com crianças e famílias tri-geracionais (cada uma representando entre 24 a 29 porcento do total), o que indica que famílias nucleares são uma importante característica na Guatemala. Além disso, embora modestas, importantes tendências têm sido observadas; uma diminuição de casais com crianças com menos de 15 anos de idade, aumento em famílias tri-geracionais; e aumento em domicílios de uma pessoa e famílias monoparentais, especialmente domicílios chefiados por mulheres. A fim de examinar os efeitos das mudanças nas composições familiares e os arranjos domiciliares com relação à desigualdade de renda, uma decomposição de mudanças distributivas em subgrupos da população foi aplicada, e considera que a desigualdade total é a soma das desigualdades "dentro" de cada grupo e a desigualdade que existe "entre" grupos. A análise de decomposição sugere que o intervalo "dentro grupos" incluído na análise importa mais na distribuição de renda domiciliar na Guatemala. Portanto, tendências na estrutura familiar e arranjos domiciliares associados com o declínio nas taxas de fertilidade e envelhecimento não parecem ter contribuído para mudanças na desigualdade de renda experienciada pela Guatemala no período de 2000 a 2014.

Palavras-chave: Estrutura familiar, arranjos domiciliares, desigualdade da renda, Guatemala

2.1.Introduction

Latin American countries, in general, have experienced important demographic shifts over the past decades. Fertility rates have dropped sharply concomitantly with lower mortality. Consequently, the average family size has fallen and life expectancy has increased - these changes are associated with the first demographic transition (FDT) (LESTHAEGHE, 2014). Even with stronger heterogeneities among countries, on average the region has converged at the rates of the most developed countries (UNITED NATIONS, 2017b). Historically, it has been reported in Guatemala, higher fertility rates than those observed in some neighboring Central American countries such as El Salvador, Nicaragua, and Honduras and higher than the majority of South American countries. However, the TFR has been declining in the last decades, it declined from 5.44 in 1990 to 3.09 recorded in 2014 (WORLD BANK, 2020). The reduction in fertility is associated with a rise in life expectancy, Smith et al. (2018) report that life expectancy is 71.8 years in Guatemala. The authors also suggest that Guatemala's demographic window of opportunity has already opened. The child dependency ratio has begun its decline, and the old-age dependency ratio has not yet started to increase, resulting in a temporary dip in the total dependency ratio (the size of the working age population is growing and the young cohort decreasing, while the old cohort is still small).[1] In fact, the workforce in Guatemala remains quite young (INE, 2014).

These demographic trends can be linked to the recent changes in the family sphere (ESTEVE et al., 2012; LESTHAEGUE, 2014; BIANCHI, 2014). The average household size has fallen due to couples having fewer children, and in other cases, women deciding not to have any children at all. Consequently, in most European countries, the proportion of households with children is low (e.g. less than 20 percent in Bulgaria and Germany) and the proportion of households with no children is high (e.g. 29 percent of men and 20 percent of women were childless at the age of 42 in Finland) (see, UNITED NATIONS, 2017b; JALOVAARA; FASANG, 2017). Furthermore, multigenerational family relationships become relevant. The concept of "generation" is typically captured by terms such as grandparent, parent, child, and grandchild (BENGTSON, 2001; MARE, 2011; GILLIGAN et al., 2018). The so called "Skipped Generation" (households with

[1] The analysis included data from 1990-2100 (SMITH et al., 2018).

children and grandparents but no parents) has also been emerging, which is prevalent in Asia countries (see, KNODEL; NGUYEN, 2014; INGERSOLL-DAYTON, 2016; INGERSOLL-DAYTON et al., 2018). Living arrangements are also changing, lone-person households have increased dramatically in recent decades, particularly among younger cohorts living in cities from Asian countries (RONALD, 2017). Nevertheless, it has also been reported in European countries higher rates of elderly people (aged 60 or over) living alone, for example, 32.4 percent in the United Kingdom, and 29.2 percent in Switzerland (UNITED NATIONS, 2017a).

The diversification of family living arrangements is a shared trend across Latin American countries (ULLMANN; MALDONADO; RICO, 2014). In all countries (regardless of their level of economic development or their stage of demographic transition) the decline of two-parent nuclear families is one of the most important changes experienced in the region, on average the proportion of nuclear families has decreased by 10.2 points from 1990 to 2010, consistent with this decline, the proportion of households with no children has increased by 2.6 points for the same period. For Guatemala, the increase was 1.3 points.

In addition, more children were born out of wedlock (LAPLANTE et al., 2015), unions have become more unstable, and more households are now headed by women (LIU; ESTEVE; TREVIÑO, 2017). Female headship has increased dramatically since the 1970s, for example, in Brazil, female-headed households have tripled from 10.6 percent in 1980 to 33.2 percent in 2010 (LIU; ESTEVE; TREVIÑO, 2017). The extended family (comprising different types of relatives and non-relatives or both) is prevalent in most Latin American countries, and on average it continues to represent around twenty percent of all household arrangements (ESTEVE; GARCÍA-ROMÁN; LESTHAEGHE, 2012). Living alone is spread across Latin American countries. In Guatemala, lone-person households increased by 1.4 points from 2000 to 2010. With regard to that, a study by the United Nations (2017) observed that lone person households with occupants aged 60 or older are prevalent in Latin America, around 13.4 percent in Guatemala (UNITED NATIONS, 2017a).

Changes in social and economic inequality have been accompanied by changes in families. Thus, scholars have been paying attention and examining the changing demographic composition of

households and its effects on income distribution. Previous studies have found that demographic changes and family forms play an important role in the reproduction of socioeconomic inequalities across countries (MCLANAHAN; PERCHESKI, 2008; OECD, 2011). Several studies have focused on the following features: changes in demographic structure, for example, household size, age of household head (see, e.g., JENKINS, 1995; BRANDOLINI; D'ALESSIO, 2001; GRAY MOLINA; YAÑEZ, 2010). For instance, a study documented by OECD (2011) found that a share of 88 percent of total (absolute) change in the Gini coefficient of disposable incomes in West Germany from 1985 to 2005 is due to changing population structure with respect to household features.

Studies have consistently found a positive link between the prevalence of single-mother families and income inequality, particularly in the United States (U.S) (see, e.g., KAROLY; BURTLESS, 1995; NIELSEN; ALDERSON, 1997; BURTLESS, 1999; CHEVAN; STOKES, 2000; DALY; VALLETTA, 2006; MARTIN, 2006; ALBRECHT; ALBRECHT, 2007; BREEN; SALAZAR, 2011). For instance, Western, Bloome, and Percheski (2008) find that the growing share of single-parent families explains one-fifth of the increase in family income inequality between 1995 to 2005 in the U.S. The comparative study by Bradley et al. (2003) also finds the prevalence of single-mother families is positively associated with income inequality within a sample of 14 Western countries.

Most of the studies have used decomposition techniques to quantify how changing household composition has influenced the change in income distribution across countries. O'Dea (2000) (2000) found that increases in the proportion of single-parent households and older households without children contributed to the increase in inequality between families in New Zealand during the period from 1981 to 1996. Later, Peichl, Pestel, and Schneider (2010) showed that the growth of the income gap is partly (it accounted for about 15 percent) related to the changing household structure in Germany. Nevertheless, the literature also provides evidence that changes in household structure play a secondary role in income inequality. For instance, Brandolini and D'Alessio (2001) showed that it exists a limited association between household structure and income inequality in Italy during the period 1977 to 1995, except for a slight bias towards greater inequality imparted by the increase in the share of female heads of household (11.8 in 1977 to

28.3 in 1995). Albertini (2008) finds that the equalizing power of Italian families has decreased during the period and that the most recent changes in household forms do not have a clear equalizing effect. While Zagel and Breeen (2019) used a counterfactual method to show that changes in family demography between the 1990s and the 2000s explain inequality growth in West Germany, it is not the same in the U.S, where the effects of gendered changes in education and employment offset each other.

Beyond demographic trends, most of the American countries have experienced notable changes in their living conditions over the past years (including Guatemala), however, the existing literature on this topic is limited. Gray Molina and Yañez (2010) find that demographic changes and greater female labor force participation tend to explain much of the remaining income inequality in Bolivia (1997-2007). For Brazil, Wajnman, Turra, and Agostino (2006) find a negative relationship between demographic variables and inequality. They show that demographic changes slightly increased household income inequality by 2 points of the total variation from 2001 to 2005. Later, Maia and Sakamoto (2016) analyzed this issue using a longer period of time (1981-2011). Their results reveal that changes in family structure are more intense among the richest, contributing to an increase in the income of richest families and in the income inequality between the richest and the poorest.

In this context, this paper contributes to the literature in several ways. First, it has been observed in Guatemala as well as in most Latin American countries, a decline of two-parent nuclear families, and an increase s in lone-person households and single-parent families, especially those headed by women (ULLMANN; MALDONADO; RICO, 2014). Thus, this an attempt to provide a broad overview of changes in family structure and living arrangements experienced in Guatemala throughout 14 years (2000-2014). Indeed, this study proposes a household typology based on a variety of criteria: (a) households structure with respect to family composition (single-headed and couples), (b) parenthood (differentiating nuclear families and single-parents according to their children age), (c) gender (female-headed), and (d) type of generation (e.g. two-generation (couples), three-generation and skipped generation) including a gender dimension, which is useful to illustrate the diversity of Guatemalan households.

Second, Guatemala suffered a 36-year long civil war that ended in 1996, which severely affected the economy and caused social inequality (CHAMARBAGWALA; MORÁN, 2011). Nonetheless, its economy has grown in the recent decade and, nowadays, Guatemala is the most prominent economy in Central America (WORLD BANK, 2017). The country has shown a decline in inequality during the period 2000-2014, however, it continues to be listed as one of the most unequal countries in Latin America (WORLD BANK; SEDLAC, 2017).[2] Third, from a methodological point of view, a decomposition analysis allows disaggregating the contribution caused by the inequality in variations within the groups and the contribution caused by variations between groups. This shapes the effects of changes in the family structure and the living arrangements on the evolution of income inequality. Fourth, this study can capture family patterns that may attract the attention of both policy makers and society. Finally, given the research on this topic is limited to Latin American countries and especially to Guatemala, the key findings represent challenges for new researches by exploring the role of the changes in the family structure and living arrangements in shaping income distribution.

By means of these contributions, this dissertation aims to answer two questions. Which family and living arrangements changed in Guatemala from 2000 to 2014? How did the changes in family structure and living arrangements contribute to changes in income inequality in Guatemala over these years?

In order to answer these questions, first, this study presents a descriptive analysis of socio-demographic characteristics of the population and households and their changes over time. Second, it examines the effects of the changing family structure and living arrangements in income distribution in Guatemala between 2000 and 2014. For this task, a decomposition of the distributional change by population subgroups is applied, decomposing changes in overall inequality into changes within different groups and changes between those groups (SHORROCKS, 1984; JENKINS, 2006).

[2] According to the World Bank, the incidence of poverty was 56.19 percent in 2000, and it was about 59.3 percent in 2014 (See the report of these indicators in SEDLAC (Socioeconomic Database for Latin America and the Caribbean, CEDLAS at Universidad de La Plata and The World Bank, 2014).

The paper is organized as follows. The next section first provides a summary overview of trends in family forms and living arrangements trends in developed countries and Latin American countries and then reviews previous empirical studies that analyze the links between changes in household structure and income inequality across countries. Section 3 illustrates the data; section 4 describes the empirical strategy used in the analysis; section 5 presents the results; section 8 concludes the paper with a discussion of the main findings.

2.2.Background

Important demographic changes have been affecting human society from the 18th century. Central among these changes was the decline in fertility combined with lower mortality, and an increase in life expectancy. These changes are associated to the first demographic transition (FDT) (LESTHAEGUE, 2014). The reduction in birth rates has altered the size, growth, and age structure of the world population (UNFPA, 2009). The global total fertility rate is estimated at 2.4 live births per woman, almost half of the level observed in 1970-1975 (UN WOMEN, 2019).[3] The rapid population aging observed principally in European countries and Japan is another issue to consider (BIANCHI, 2014).

In that regard, family arrangements have changed dramatically (e.g. childless couples, consensual unions increasingly seen as an alternative to marriage, divorce, and an increase in the number of children born and raised out of wedlock, either of cohabitating couples or single mothers), which is frequently referred to as the second demographic transition (SDT) formulated by Lesthaeghe and van de Kaa in 1986. Later, Lesthaeghe (2010) pointed out the SDT has also been contingent on the major demographic and social shifts that shaped the initial fertility transition of the FDT.

Family forms and living arrangements have been diversified in the past decades. The first and remarkable change in family structure is the relative decline in the nuclear family (it consists of two adults living together with children) and the associated rise of the single-parent family

[3] According to a United Nations study, almost half of the world population lives in low fertility countries, particularly in European nations, and some Asian countries (UNITED NATIONS, 2017b).

(MARTIN, 2006; OECD, 2011). Recently, a Pew Research center study (2019) found that almost a quarter of the children under the age of 18 lived in single-parent families in the U.S.

The average household size has dropped because couples are having fewer children, and in other cases, women have decided not to have any children at all. This is remarkable in most European countries; in Bulgaria and Germany, the proportion of households with children is particularly low, less than 20 percent (UNITED NATIONS, 2017b).[4] Thus, the family composition is increasingly made up of older adults and childless households. Childlessness has increased in many European countries, although the trends may vary substantially (MIETTINEN et al., 2015). For instance, at least 20 percent of women aged 25-49 live in households with no children in European OECD countries (OECD, 2011). Meanwhile, Jalovaara and Fasang (2017) find that 29 percent of men and 20 percent of women were childless at the age of 42 in Finland.

Furthermore, the changing living arrangements include the remarkable incidence of solitary living arrangements in modern societies. This trend is also spreading to developing countries.[5] According to Snell (2017) the dramatic rise across many countries in lone-person households during the twentieth century, notably since the 1960s, especially in Western countries (e.g. 31 percent in the United Kingdom (UK) in 2011), and European and North American cities (e.g. Stockholm recorded its highest share, 60 percent of households consisting of one person in 2012). The largest increase in living alone is amongst men, but once women live alone, they are likelier to continue living alone (CHANDLER et al., 2004). The number of one-person households in East Asia has expanded dramatically in recent decades, especially among younger cohorts living in cities (RONALD, 2017). Even though, European countries also report high rates of older people (aged 60 or over) living alone. For example, 32.4 percent for the UK and 29.2 percent for Switzerland (UNITED NATIONS, 2017a).[6]

[4] For example, the average household size fell in France from 3.1 people per household in 1968 to 2.3 in 2011 (UNITED NATIONS, 2017b).

[5] The demographic perspective beyond issues such as divorce, re-marriage rates, widowhood, and loneliness risk aversion function as incentivizing marriage or other forms of kinship or friendship-related behavior (SNELL, 2017). In addition, scholars have largely connected the increase in lone-person households to changes in socioeconomic and policy conditions that have interacted with family and marriage norms (RONALD, 2017).

[6] The estimates of the number and proportions of elderly people in 2010 are from the United Nations (2017a).

As family structure has become increasingly diverse, multigenerational family relations will become more important in the 21st century. The concept of "generation" is typically captured by terms such as grandparent, parent, child, and grandchild (BENGTSON, 2001). Some reasons beyond multigenerational families are emerging: (a) demographic changes of aging populations; (b) the increasing importance of grandparents and other kin members in fulfilling family functions; (c) the strength and resilience of intergenerational solidarity over time (see, BENGTSON, 2001; MARE, 2011; GILLIGAN et al., 2018).[7] Another type of living arrangement emerging is named "Skipped Generation", in which grandparents raise their grandchildren. Grandparents in this type of family provide extensive support to grandchildren due to parents' absence (see, MILLS; GOMEZ-SMITH; DE LEON, 2005). In Asian countries such as Vietnam, China, and Thailand, skipped generation households are particularly prevalent (see, KNODEL; NGUYEN, 2014; INGERSOLL-DAYTON, 2016; INGERSOLL-DAYTON et al., 2018).[8] Grandparents act as primary caregivers due to the migration of their adult children and other causes (KNODEL; NGUYEN, 2014). In that regard, Tach (2015) points out that this growing diversity of family forms has the potential to increase inequality between families and these inequalities can become further reinforced through generations.

Lesthaeghe and Van de Kaa (1986) and Lesthaeghe (2010) have also discussed the possible convergence of several Latin American populations to the pattern of the SDT. In this context, most of the Latin American countries reported low fertility rates, sinking below replacement levels in a growing number of countries (CELADE, 2013; CABELLA; PARDO, 2014; UNITED NATIONS, 2017b).[9] This situation has reflected changes in household size over time, although it varies also according to socio-economic status; shrinking household size has been mostly led by higher-income groups. Low-income households have remained significantly large (UN WOMEN, 2019, p. 61).

[7] Bengtson (2001) also notes the increased importance of intergenerational support within families.
[8] The proportion of older people in Thailand who live in these families is around 15 percent in rural areas (KNODEL et al., 2015).
[9] Although the levels can still be heterogeneous among countries. A recent United Nations study estimated that 18 Latin American countries have experienced a decline in TFR below the replacement level. These countries have crossed the limit of 1.5 children per woman (very low fertility) (UNITED NATIONS, 2017b).

Cohabitation has been highlighted by scholars as an important feature in Latin American families (ESTEVE; GARCÍA-ROMÁN; LESTHAEGUE, 2012; ESTEVE et al., 2016).[10] Other important changes include: more children born out of wedlock (CASTRO et al., 2011; LAPLANTE et al., 2015), more unstable unions, and more households frequently headed by women (LIU; ESTEVE; TREVIÑO, 2017). Female headship has increased dramatically since the 1970s in Latin America. For example, in Brazil, female-headed households have tripled from 10.6 percent in 1980 to 33.2 percent in 2010, while in Costa Rica this percentage grew from 13.1 to 25.9 percent between 1973-2011 (LIU; ESTEVE; TREVIÑO, 2017). However, this historically high level of female headship still continues to be associated with the prevalence of single mothers in Latin America (ESTEVE; FLOREZ-PAREDES, 2018).

More recently, Ullmann, Maldonado, and Rico (2014) observed that the diversification of family forms and household structures is a shared trend across Latin American countries. In all countries (regardless of their level of economic development and the stage of demographic transition) it is observed the decline of two-parent nuclear families, and the increase in lone-person households and single-parent families, especially the ones headed by women.[11] For instance, they observe that on average the proportion of two-parent nuclear families has decreased by 10.2 points from 1990 to 2010. Consistent with the decline of two-parent nuclear families, the proportion of households with no children has increased by 2.6 points. While the proportion of lone-person households has increased from 7.4 in 2000 to 11.4 in 2010. With regard to that, a study by the United Nations (2017a) observed lone-person households with occupants aged 60 or older are prevalent in Latin America (e.g. 15.9 percent in Ecuador, 13.4 percent in Brazil, and 11.2 percent in El Salvador).

The extended family (comprising different types of relative members and non-relatives or both) is also a particular trend in Latin America; on average it continues to represent around twenty percent of all the family structures (ESTEVE; GARCÍA-ROMÁN; LESTHAEGUE, 2012). Finally, migration, which may occur for a variety of reasons (economic causes, armed conflicts,

[10] According to Esteve et al. (2012) the substantial rise in cohabitation during the 1990s (2000 census round) increased the percentages to levels between 25 and 42 percent in several countries.

[11] According to Ullmann, Maldonado, and Rico (2014), Uruguay, Chile, and Brazil are countries at "more advanced" stages of demographic transition, while most of the countries are at a "midst transition" (e.g., Colombia, Ecuador, El Salvador, Honduras, Perú, Nicaragua, Paraguay, and Venezuela).

among others) is another factor related to changing families (ARRIAGADA, 2002; IFAD, 2014).[12]

Family structure and income inequality

The main factors emphasized in traditional analyses of inequality are economic and demographic. The economic inequality analysis was developed by Kuznets (1955). He postulated that the relationship between economic development and inequality has the shape of an inverted U curve, with inequality rising in the early stages of industrialization, leveling off at intermediate stages, and then declining in advanced stages. However, Kuznets' hypothesis has been questioned, as economic inequality affects the pace and the nature of economic growth (STIGLITZ, 2012). Literature has devoted much attention to the mediating mechanisms such as shifts in the sectoral composition of the labor force, the demographic transition, and the spread of education (NIELSEN; ALDERSON, 1997). Meanwhile, Atkinson and Bourguignon (2000) have noted complex patterns between individuals and households affecting income distribution. In this line, Brunori, Ferreira, and Peragine (2013) have found that a remarkable percentage of income inequality can be explained by exogenous factors such as birthplace, gender, race, and family background.

Scholars have been paying attention to the income inequality rising in advanced economies since the 1980s. The earlier study by Milanovic (2005) compared different systems of measurement to analyze the evolution of inequality; it found that "Global inequality" increased in most of the countries.[13] The recent book by Piketty (2014) "Capital in the twenty-first century" also examined this issue. Piketty defines two basic categories, wealth and income, and analyzes the long-run evolution of the functional distribution.[14] He argues that the tendency of capital revenue

[12] The migration phenomenon has characterized Central America for generations. Particularly, Guatemala, El Salvador, and Nicaragua have reported a higher level of migration since the 1980s due to armed conflict (MALHER; UGRINA, 2006). Later, in the summer of 2014, record numbers of migrants, mostly unaccompanied minors from Guatemala, El Salvador, and Honduras attempted to cross the U.S.-Mexican border (LORENZEN, 2017).

[13] Global inequality by definition is composed by population-weighted international inequality, and inequality due to income differences within countries (MILANOVIC, 2005). He finds the Gini index for the global population at 64, for the U.S at 80 and for the countries of the world taken as a whole at 53.

[14] Piketty (2014, chapter 7) notes that in all societies, income inequality is the result of adding up these two components: inequality of income from labor and inequality of income from capital. Thus, the more unequally distributed each of these two components, the greater the total inequality.

to exceed the rate of economic growth generates more wealth concentrated at the top of society. Nevertheless, the level of inequality can fall as well. In that regard, Piketty also suggests that the rising equality experienced in the mid-20th century in industrialized countries was produced by diverse factors: the exigencies of war, the power of organized labor, the need for high taxation, and demographics and technical innovation.

Thus, inequality levels can differ across countries and regions (ATKINSON; BOURGUINON, 2000; ALVAREDO et al., 2018). A recent study by the World Bank used data from 1993 to 2008 to show that income inequality fell (by more than one Gini point) in 39 out of 91 countries, most of the countries that experienced a decline were emerging and developing countries. For instance, inequality decreased in 10 African and 11 Latin American countries (WORLD BANK, 2016).

Changes in social and economic inequality have been accompanied by changes in families, particularly, aspects related to the SDT. Furthermore, these changes have occurred with different intensities among population subgroups across regions (ECLAC, 2005; BLOOM et al., 2012; BIANCHI, 2014). In this context, scholars have paid attention to the role of changes in family composition and the distribution of household types on income inequality. Shorrocks (1980, 1984) developed decomposition techniques to measure the level and change of inequality in population subgroups (e.g. single persons, married couples, and families with children; or by subgroups of observations, which share common characteristics like age and household size). Later, Jenkins (1995) developed a consistent procedure for accounting inequality trends. A similar approach was described by Jenkins and Van Kern (2005), which has the advantage that it does not depend on a specific choice of summary index, although it does not provide summary measurements of the decomposition, allowing cross-country comparisons. Cowell and Fiorio (2009) developed an approach to reconcile the various strands of inequality-decomposition analysis based on a single-equation regression model, it is built on the Shorrocks' (1982) methodology and it is aimed at providing a tool for understanding inequality, especially when the data are not sufficiently detailed to allow a structural model specification.[15] The regression-based decomposition technique developed by Fields (2003) has also been used to explore the

[15] Previous studies that have used decomposition methods: e.g. Danziger and Plotnick, 1977; Mookherjee and Shorrocks, 1982; Cowell, 1984; Tsakloglou, 1993; Goodman, Johnson and Webb, 1994; Jenkins, 1995; Asher and Defina, 1995; Rainwater and Smeeding, 1998.

contribution of household characteristics (such as age, education, and sex). Other researchers have used a regression framework, including demographic and labor market factors as control variables, but their findings tend to report smaller estimated effects on family structure than decomposition analyses (see, MCLANAHAN; PERCHESKI, 2008).

Most of the studies have focused on the following features: changes in demographic structure (JENKINS, 1995; BRANDOLINI; D'ALESSIO, 2001); particularly, changes in the number of households headed by a single person with dependents (MARTIN, 2006; ALBRECHT; ALBRECHT, 2007; BREEN; SALAZAR, 2011), and "diverging destinies" (MCLANAHAN, 2004).[16] Other scholars have investigated how population processes affect socioeconomic inequality through generations (MARE, 2011). Later, others have addressed the interplay between women's earnings and household income (see, e.g., GOTTSCHALK; DANZIGER, 2005; DALY; VALLETTA, 2006; PASQUA, 2008; LARRIMORE, 2014; NIEUWENHUIS et al., 2017).

Previous studies have found that demographic changes and family forms play an important role in the reproduction of socioeconomic inequalities across countries (MCLANAHAN; PERCHESKI, 2008; OECD, 2011; HARKNESS, 2013). Thus, the diversity of family structures may contribute to better understandings of the dynamics of income inequality across time or countries.

Early findings in the light of this matter show that changes in family structure have contributed from 15 to 40 percent in the growth in inequality since the early 1970s in the U.S (KAROLY; BURTLESS, 1995; LERMAN, 1996; MARTIN, 2006). The main change in family composition is related to the rise in prevalence of single-parent families, in fact, several studies have consistently found a positive link between the prevalence of single-mother families and income inequality in the U.S (see, e.g., KAROLY; BURTLESS, 1995; NIELSEN; ALDERSON, 1997; BURTLESS, 1999; CHEVAN; STOKES, 2000; DALY; VALLETTA, 2006; MARTIN, 2006; ALBRECHT; ALBRECHT, 2007; BREEN; SALAZAR, 2011). For instance, Western, Bloome,

[16] The framework developed by McLanahan (2004) argues that inequality widens due to the behavioral polarization of lower-educated and higher-educated mothers' family formation.

and Percheski (2008) find that the growing share of single-parent families explains one-fifth of the increase in family income inequality between 1995 to 2005. The comparative study by Bradley et al. (2003) also finds the prevalence of single-mother families associated positively with income inequality within a sample of 14 Western countries. Later, Kollmeyer (2013) used regression models to show that the increased prevalence of single-mother families heightens income inequality across 16 Western countries. This was mainly true to the UK and the U.S, the two countries in this study with the highest levels of income inequality during the mid-2000s.
Decomposition techniques show that the increase in the proportion of single-parent households and older households without children contributed to the increase in inequality between families in New Zealand during the period from 1981 to 1996 (O'DEA, 2000). Meanwhile, these results also suggest that changes in the proportions of different kinds of couples' households ("no income", "one income", 'double income") have made a contribution to the increase in household income inequality, perhaps of the order of 15 percent.

The study by the Organisation for Economic Co-Operation and Development (OECD, 2008) shows that a share of 88 percent of total (absolute) change in the Gini coefficient of disposable incomes in West Germany from 1985 to 2005 is due to the changing population structure with respect to household characteristics (the number of household members and the age of the household head). Peichl, Pestel, and Schneider (2010) use decomposition techniques to quantify how the trend towards smaller households has influenced the change in income distribution in Germany between 1991 and 2007. For that, they distinguish 14 population subgroups according to household composition (based on this information: the first criterion is the number of adult household members, the second one is the number of children living in the household). Their findings show that the growth of the income gap is partly (accounts for about 15 percent) related to changing household structure.

Garner and Terrell (2001) carry out decompositions (of Theil and the mean logarithmic deviation indices) for six population groups.[17] Their results suggest that these shifts in the households demographic composition including far fewer households with children, far more households

[17] The classification of households is based on the following characteristics: age of household head, size of households, number of economically active members and the number and age of adults and children (GARNER; TERRELL, 2001).

headed by pensioners, increases in the number of one-person households and decreases in large (five person) households contribute to an overall increasing inequality, by increasing between group inequality, relatively more of the change in inequality over time is accounted for by increases in within group inequality in Slovakia from 1988 to 1996.[18] However, the literature has also provided evidence that changes in family composition and household structure play a secondary role on income inequality. For example, Brandolini and D'Alessio (2001) used decomposition method (the measure used in this paper is the mean logarithmic deviation) to show that it exists a limited association between household structure and income inequality in Italy during the period 1977 to 1995, except for a slight bias towards greater inequality imparted by the increase in the share of female heads of household (11.8 in 1977 to 28.3 in 1995).[19] Likewise, Albertini (2008) examined this issue during a much longer period of time: 1977-2000. His results show that the equalizing power of Italian families has decreased during the analyzed period and that the most recent changes in household forms do not have a clear equalizing effect.[20] Recently, Zagel, and Breeen's comparative study (2019) used a counterfactual method to show that changes in family demography between the 1990s and the 2000s explain the inequality growth in West Germany but not in the U.S, where the effects of gendered changes in education and employment offset each other.

Latin America is considered the most unequal region in the world. However, over the last years, the region has achieved success in reducing extreme poverty and inequality (e.g. LÓPEZ-CALVA; LUSTING, 2010; GASPARINI et al., 2011; GASPARINI; LUSTING, 2011, AZEVEDO et al., 2013; CORD et al., 2014, ECLAC, 2014; SZÉKELY; MENDOZA, 2015, GASPARINI et al., 2016; SZÉKELY; MENDOZA, 2016).[21] For example, Gasparini et al. (2016) find that the average Gini index for Latin American countries decreased from 54.0 in 2000 to 47.5 in 2014. Most of the empirical literature has investigated the role of diverse factors

[18] The Slovak economy experienced an enormous transformation during the 1988-1996 period (see, GARNER; TERRELL, 2001).

[19] Italian households are classified in categories which combine various demographic characteristics, such as the sex and age of the household head and the presence of the spouse, an adult or younger child or another member (BRANDOLINI; D'ALESSIO, 2001).

[20] Italy experienced a remarkable decline in inequality from the early/middle 1970s to the early-middle 1980s. Meanwhile the level of inequality increased from 1991-1995 and it remained relatively stable until 2000 (ALBERTINI, 2008).

[21] Most of these studies have shown that almost all Latin American countries have enjoyed a strong process of reduction in income inequality since the beginning of this century.

in income inequality, e.g., a reduction in hourly labor income inequality (BARROS et al., 2010; AZEVEDO et al., 2013), and more progressive government transfers (LÓPEZ-CALVA; LUSTING, 2010; LUSTING et al., 2013). Nonetheless, a few scholars have explored the links between changes in family structure and income inequality.

Gray Molina and Yañez (2009) examine the dynamics of inequality in Bolivia between 1997 and 2007 using a regression-based decomposition technique. Their results suggest that demographic changes and greater female labor force participation tend to explain much of the remaining income inequality.[22] For Brazil, Wajnman, Turra, and Agostino (2006) simulated the impact of changes in the age-gender composition of adults on inequality levels between 2001 and 2005. They found a negative relationship between demographic variables and inequality; in particular, demographic changes slightly increased household income in inequality by 2 points of the total variation. Later, Maia and Sakomoto (2016) analyzed this issue using a longer period of time (1981-2011). They distinguished 12 groups of household types and used decomposition methods to show that demographic changes had an important role on income distribution in Brazil. Furthermore, their results reveal that changes in family structure are highly greater among the richest, which contributes to an increase in the income of the richest families and income inequality between the richest and poorest.

Demographic shifts and inequality in Guatemala

Guatemala is the most populous country in Central America, the estimated population was 15,923,237 in 2014 (WORLD BANK, 2019). The fertility rate remains higher than that in the neighboring Central American countries of El Salvador, Nicaragua, Honduras and higher than most other South American countries (DE BROE; HINDE; FALKINGHAM, 2004; SMITH et al., 2018), although it has been declining over the last decades. The TFR declined from 5.44 in 1990 to 4.56 in 2000, while the TFR of 3.09 recorded in 2014 (WORLD BANK, 2020). Concerning the stages of demographic transition, Ullmann, Maldonado, and Rico (2014) suggest that Guatemala is within a "moderate transition". The reduction in fertility is associated with a rise in life expectancy, Smith et al. (2018) report that life expectancy is 71.8 years in Guatemala,

[22] Gray Molina and Yañez (2010) include the following household characteristics: household size, age of head of household, and female-headed household.

even though it is low if compared to other countries in the Central American region (e.g. Costa Rica: 79.4, Nicaragua: 74.9; Honduras: 73.1 and El Salvador: 73 years). The authors also suggest that Guatemala's demographic window of opportunity has already opened. This demographic situation refers that child dependency ratio has begun its decline, and the old-age dependency ratio has not yet started to increase, resulting in a temporary dip in the total dependency ratio (the size of the working age population is growing and the young cohort decreasing, while the old cohort is still small).[23] Generally, the demographic window is associated to a high productive capacity, in fact, the workforce in Guatemala remains quite young (INE, 2014).[24]

These demographic changes are related to the diversification of family forms and household structures. It has been observed in Guatemala as well as in most Latin American countries (ULLMANN; MALDONADO; RICO, 2014) the decline in two-parent nuclear families, and the increase in lone-person households and single-parent families, especially headed by women. These changes are still modest in countries within a "moderate transition" as it is Guatemala's case. It reported an increase in the proportion of couples without children by 1.3 points and an increase in the proportion of lone-person households by 1.4 points from 2000 to 2010. With regard to that, a recent United Nations study finds that one person households present a particular feature, their occupants usually aged 60 or older, around 13.4 percent for Guatemala (UNITED NATIONS, 2019).

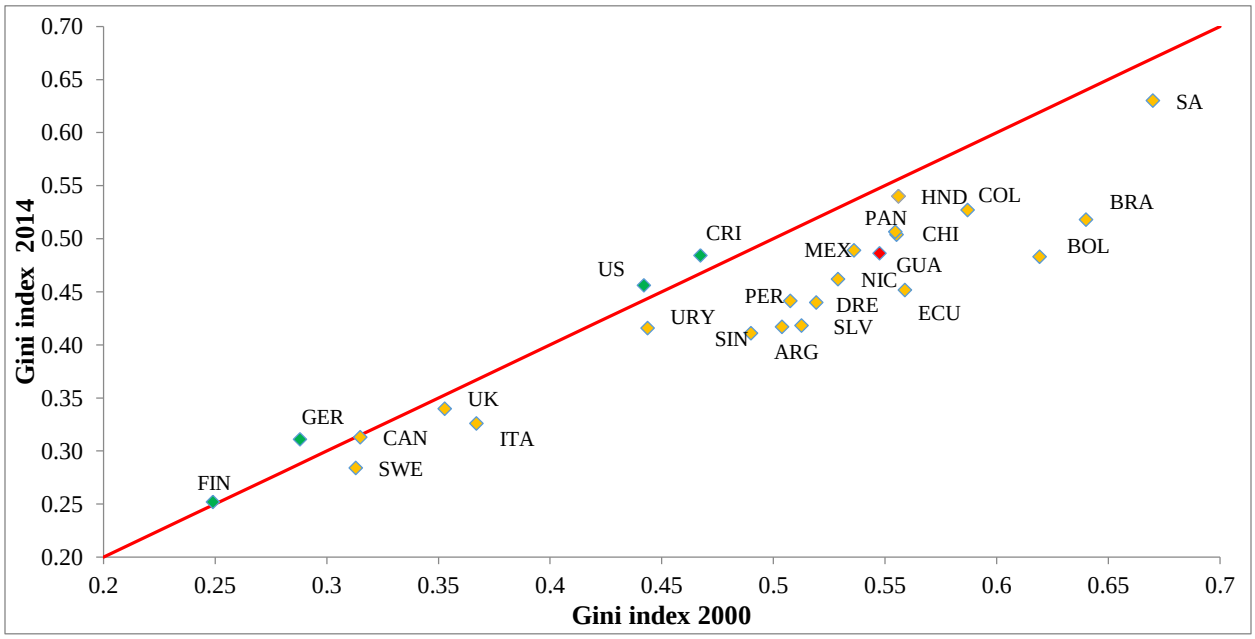
Beyond these demographic trends, Guatemala has experienced notable changes in their living conditions over the past years, however, it continues reporting higher levels of inequality and poverty. The country has reported some of the worst poverty, malnutrition and maternal-child mortality rates in the region, especially in rural and indigenous areas. Guatemala is characterized by a large indigenous population (around 30.56 percent in 2000, and 39 percent in 2014), and this group has a higher poverty and inequality rate than non-indigenous population (CABRERA; LUSTING; MORAN, 2015). Despite the country having reduced its poverty rate from 56 percent to 51 percent between 2000 and 2006, this rose to 59.3 percent in 2014 (WORLD BANK, 2017).

[23] The analysis included data from 1990-2100 (SMITH et al., 2018).
[24] Scholars have explored the effect of the demographic window of opportunity on economic growth (see, BLOOM; SACHS, 1998; MASON, 2001).

Guatemala has also reported the most unequal distribution of education and health in Latin America (SAHN; YOUNGER, 2006).[25]

Guatemala is a lower middle-income country, with a GDP of 58.7 billion USD and a GDP per capita of 3,687 USD (WORLD BANK, 2018), and it is the largest economy in Central America, but it is also considered one of the world's most unequal societies.[26] This is clearly illustrated in Figure 2.1, which shows the evolution of the Gini for household income in Guatemala. Even though inequality has declined substantially from 0.55 in 2000 to 0.49 in 2014 (SEDLAC; WORLD BANK, 2017), the level of income inequality has remained higher than most Latin American countries and Central American countries.[27] Figure 2.1 includes additional information, almost all Latin American countries showed a process of reduction in income inequality, but advanced economies experienced a rise in income inequality.[28]

Figure 2.1 Evolution of income inequality across countries (2000-2014)



Source: Own elaboration with data of SEDLAC (CEDLAS and The World Bank), OECD (2020), and ATLAS Brazil (2020).

[25] Sahn and Younger (2006) used Demographic and Health Surveys (DHS) from Latin American countries (Bolivia, Brazil, Colombia, Dominican Republic, Guatemala, Nicaragua, and Peru).
[26] In addition, Guatemala's inequality is ranked in the 91st percentile worldwide in 2014 (see WDI, 2015).
[27] Inequality remained stable over the period 2000 to 2006. The Gini is derived from the distribution of household equivalized income, data come from the ENCOVI (see, SEDLAC; WORLD BANK, 2019).
[28] All Latin American countries were not reported in Figure1.1 due to data limitations. Furthermore, data from Chile was only available for 2000 and 2013, and for Honduras for 2001 and 2014.

Empirical research on income inequality is very scarce for Guatemala. Aguirre (2007) suggests that family structure is important to determine both wealth and poverty levels in Guatemala. Moreover, married couples can likely buy their own house, and other assets (savings and others), at the opposite extreme, single mothers, divorced and separated people suffer the most. Later, ICEFI (2017) found that fiscal policy has a slight impact on reducing inequality through public spending, not through taxes. Government spending on education and health, as well as transfers, are the elements that most affect the reduction in inequality.[29]

2.3.Data

This study uses microdata from the ENCOVI carried out by the National Institute of Statistics (Instituto Nacional de Estadísticas-INE) to analyze two points in time in the year 2000 and 2014. The survey is representative of the Guatemalan population, at national level for rural and urban areas, and at the departmental level (the country is geographically divided into 22 departments). The questionnaire contains sociodemographic information about the household respondents: education, health condition, health expenditure, migration, food security and social programs, annual expenditure and auto-consumption, access to technology, type of income sources, both in cash and in other forms, employment, unemployment, sources of credits, and a time module is collected as well. Despite some minor divergences in the questionnaires, both surveys should be compatible and comparisons over time can be derived from them through the use of a set of harmonized variables.

The original sample contains information from 37,771 individuals from 7,276 households in 2000 and 54,822 individuals from 11,536 households in 2014. The analysis is at the level of the household. According to INE, a household is a group of one or more people living in a home and sharing expenses (individuals in the household may or may not be relatives). Boarders, domestic servants, households in which the individuals presented missing values in the variables used in the analysis, such as marital status or any relationship to the household head are not included.

[29] This study uses data from ENCOVI (2011).

The sample is restricted to households whose head is 20 years or over. The final sample for 2000 contains 37,058 individuals and 7,098 households. For 2014 it contains 54,225 individuals and 11,374 households. In addition, sampling weights provided by the survey are applied.

The inequality decomposition can be computed by any income. This study uses gross income (pre-tax, post-transfers income), which is computed from five important sources: labor income, retirement pensions, social transfers, remittances, and other income.[30] Then, household income is defined as the sum of all income from all sources from all household members, zero income households are included in the analysis.[31] Household per capita income automatically corrects the household size; however, here is an equivalence scale has been considered, it is described in the next section.

The analysis also seeks to explore the role of the changes in the family structure and living arrangements on income inequality using two points in time (2000 and 2014). For that, income needs to be converted from nominal (current) values to constant values (base period=2000) using the national consumer price index (CPI) provided by the Central Bank of Guatemala.

2.4.Methodology

This paper explores the role of the changes in the family structure and living arrangements in shaping income distribution in Guatemala from 2000 to 2014. For this task, first, a descriptive analysis of the socio-demographic characteristics of the population, and households, as well as changes in these characteristics over time is presented. Second, it examines the effects of changes in family composition and living arrangements on the level of income inequality using a decomposition of the distributional changes by population subgroups (SHORROCKS, 1984; JENKINS, 2006).

[30] This definition of gross income is the same used by Cancian and Reed (1998). Additionally, labor income includes: wages, salary, and self-employment. Other types of income include private pensions, alimony, and capital income (interest, dividends, income from estates and trusts, and net rental income).

[31] Usually, the respondent reports receiving a certain income source but does not report the value or reports a value of zero as their income from that source, in this case missing and zero incomes are regarded as zero (this convention is also used by SEDLAC).

2.4.1. Equivalized Income

Household income is widely used as a measure of income inequality in the literature about the topic (BRANDOLINI; D'ALESSIO, 2001; GOTTSCHALK; DANZINGER, 2005; TORNAROLLI; CISCH; GALEANO, 2018). Research on income inequality uses equivalence scales to adjust for the relative cost of living or assumed standard of household living. These equivalence scales may be seen as a deflator converting nominal income in proper measures of well-being (BELLU; LIBERATI, 2005).[32]

Equivalence scales assign a value to each household type in the population in proportion to its needs. The factors commonly taken into account to assign these values are the household size and the age of its members. The OECD scale is also commonly used. According to OECD (2005), the "modified scale" assigns a value of 1 to the household head, of 0.5 to each additional adult in the household (aged 15+) and of 0.3 to each child (aged 0-14). The first scale was proposed by Haagenars et al. (1994), who have argued to use the modified OECD scale due to it is proximity to the average scales derived in the literature.[33]

2.4.2. Population Subgroups

"The diversity of demographic structures may contribute as much to lessen as to amplify the differences observed in comparisons of economic inequalities across time or regions" argue (BRANDOLINI; D'ALESSIOl, 2001, p. 3). In this regard, the definition of "household types" becomes important to the present study, this definition is based on a variety of criteria of household structure (ARRIAGADA, 2002; ULLMANN; MALDONADO; RICO, 2014) with a gender dimension.

The typology proposed by this study is structured according to the following criteria (a) structure of households with respect to family composition (single-headed and couples), (b) parenthood

[32] Atkinson et al. (1995) and Bellu and Liberati (2005) have reviewed a wide range of existing equivalence scales. Nonetheless, some studies use per adult equivalent, in order to capture differences in need by age, and economies of scale in consumption (HAUGHTON; KHANDKER, 2009). With respect to this scale, it is not reported by INE.

[33] The "old OECD scale" was used in the 1980s and the earlier 1990s, the Statistical Office of the European Union (EUROSTAT) adopted in the late 1990s the so-called "OECD-modified equivalence scale" (OECD, 2005).

(differentiating couples and singles according to the age of children), (c) gender (female-headed), and (d) type of generation (e.g. two-generation (couples), three-generation and skipped generation). To characterize "children" this work has taken into account the definition from the modified OECD equivalence scale, a person is considered an adult at the age of 15 years old or older. Analogously, a person is defined a child if their age does not exceed 14 years old (OECD, 2005).[34] In addition, this paper classifies as "couples" those people that reported being married or cohabitating. As a result, eleven different household types are distinguished (plus the "residual" category other): *lone-person/women, lone-person/men, single mother with children under 15 years old, single father with children under 15 years old, single mother with children aged 15 years old or more, single father with children aged 15 years old or over, couples with children under 15 years old, couples with children aged 15 or more, couples without children, three-generation, skipped generation,* and "other".[35]

2.4.3. The Inequality Decomposition

Income inequality refers to the inequality of the distribution of individuals, household, or some per capita measure of income (HESHMATI, 2004). Multiple summary measures of income inequality such as; the Gini coefficient, the 75/25 ratio, the 90/10 ratio, the CV, Theil's entropy measure, mean log deviation (MLD) and the variance of the logarithm (VLN, Atkinson's measure of inequality) have been used by scholars (see e.g. ATKINSON; BOURGUIGNON, 2000). This study first estimates some inequalities indicators (e.g. Gini coefficient, Theil Index, and 90/10) on income Guatemalan samples, these measures are described in the appendix. The Gini is one of the most commonly used measures in empirical works (see, e.g., KAROLY; BURTLESS, 1995; DALLY; VALLETA, 2006; ESPING-ANDERSEN, 2007; TORNAROLLI, CIASCH; GALEANO, 2018). Nonetheless, a disadvantage of this indicator is that it is not easily

[34] It is also noted that the minimum age for employment established by the Ministry of Labor of Guatemala is 15 years old.

[35] This study defines as lone-person household a private dwelling, with only one person aged 15 or over. While category "other" can be complex since the household size, family relations and living arrangements are strongly diverse. The category "other" likely includes non-nuclear households (i.e., without a conjugal nucleus or parent-child relationship, although other kinship ties may exist, see ARRIAGADA, 2002) and non-family households (consist of two or more people who share a home and some expenses, but do not constitute a family, see ULLMANN; MALDONADO; RICO, 2014).

decomposable or additive across groups; that is, the total Gini for a group is not equal to the sum of the Gini for its subgroups (see, HAUGHTON; KHANDKER, 2009, chapter 6).

In this sense, this study focuses on the decomposition analysis, which is very important when one is interested in explaining the level and change of inequality by population subgroups (SHORROCKS, 1980; MOOKHERJEE; SHORROCKS, 1982; SHORROCKS, 1984). For that, the population is divided into various subgroups, considering that total inequality is the sum of the inequalities "within" each group and the inequality that exists "between" the groups. With respect to this method, Cowell and Fiorio (2009) suggest that "A coherent approach to subgroup decomposition essentially requires (1) the specification of a collection of admissible partitions ways of dividing up the population into mutually exclusive and exhaustive subsets and (2) a concept of representative income for each group" (COWEL; FIORIO, 2009, p. 1). Then, the class of Generalized Entropy (GE) inequality measures (SHORROCKS, 1980) can be decomposed in a way such that the total inequality results as the sum of inequality within and between population subgroups.

The general formula of General Entropy (GE) is given by:

$$GE\ (\propto) = \frac{1}{\propto(\propto-1)}\left[\frac{1}{N}\sum_{i=1}^{N}\left(\frac{y_i}{\bar{y}}\right)^{\propto} - 1\right]\ , \qquad (2.1)$$

where y_i is the mean income. The values of GE measures vary between 0 and ∞, with zero representing an equal distribution and higher value representing a higher level of inequality. The parameter α in the GE class represents the weight given to distances between incomes at different parts of the income distribution and can take any real value.

Following to Shorrocks (1984) and Cowell (1980) and the new inequality measures decomposable σ by population subgroups:

$$\sigma = \sum_j w_i\sigma_i + \frac{\lambda}{\beta}e^{\beta(\delta_0-\delta)}\sum_j w_j ln\left[\frac{1+e^{\beta\left(\delta-u_j\right)}}{1+e^{\beta(\delta-u)}}\right], \qquad (2.2)$$

where subscript j refers to the J mutually exclusive subgroups of the population, and w_i is the population share of subgroup j. The first term on the right side of equation (2) is the population-

weighted average of within-group inequalities; the second term is between-group inequality, calculated after attributing the group mean income to each member in a group.

The commonest values of α used are 0,1 and 2. GE (1) is Theil's T index, and GE (0), also known as Theil's L, and sometimes referred to as the mean log deviation measure (see, HAUGHTON; KHANDKER, 2009, p. 99). For the purposes of this study, the measure of inequality selected is GE (2), it is half the squared coefficient of variation (JENKINS, 2006).[36]

The next section turns to the results.

2.5.Results

First, this paper describes the main trends over time regarding the characteristics of the population, and as well as household types. Second, in order to answer the research questions, for both years 2000 and 2014, a decomposition of the income inequality by household types for the Generalized Entropy (GE) index is presented.

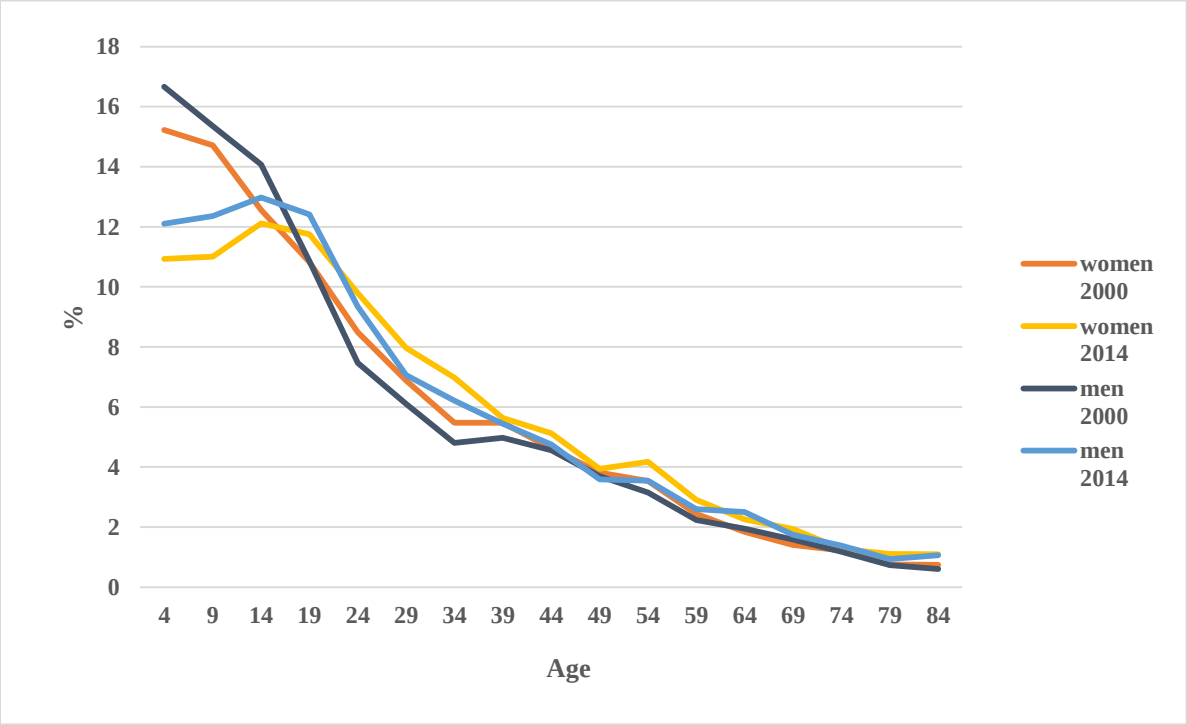
2.5.1. Descriptive Analysis

Despite, this study has focused on a short period of time, important demographic trends can be observed in Guatemala. The country has still a large rural population, in 2000, the rural population concentrated 61.9 percent of the total, but this ratio decreased to 50.7 percent in 2014.[37] With a median age of 17.7 in 2000 and 21.2 in 2014, the population structure remains quite young, people under 30 years of age represent approximately 60 percent of the total population in both years. Nevertheless, it is also possible to observe that the population is aging slowly (see Figure 2.2). In light of that, studies suggest that the fertility rate remains high (see SMITH et al., 2018) but it has been declining over the last decades (WORLD BANK, 2020).

[36] For decomposition by population subgroups, Stata provides a useful command ineqdec0, which is flexible and allows the use of weights. Also, observations with zero values on income can be included. For more details, see Jenkins (2006).

[37] The reduction in rural population is a product of an accelerated process of urbanization, and of new urban/rural classification implemented by the National Statistical Institute after the 2002 census (WORLD BANK, 2009, p.13).

Figure 2.2 Guatemalan population by gender and age (2000-2014)



Source: Authors' calculation based on ENCOVI 2000 and 2014.

In order to describe the role of family composition and living arrangements on income distribution across households twelve groups are identified. Then, it is possible to describe the distribution of these groups in rates. According to Brandolini and D'Alessio (2001), rates can be expressed in two ways; as the percentage of households that contain individuals and as the percentage of individuals who live within households. Figure 2.3 shows the percentage of households, concerning that, the most common types are couples with children and three-generation families (each one accounting between 20-31 percent of the total). This result confirms that two parents-nuclear families are an important Guatemalan feature, and it is also the most common family form across Latin American countries. Although this type of household tends to decline over time (ULLMANN; MALDONADO; RICO, 2014).

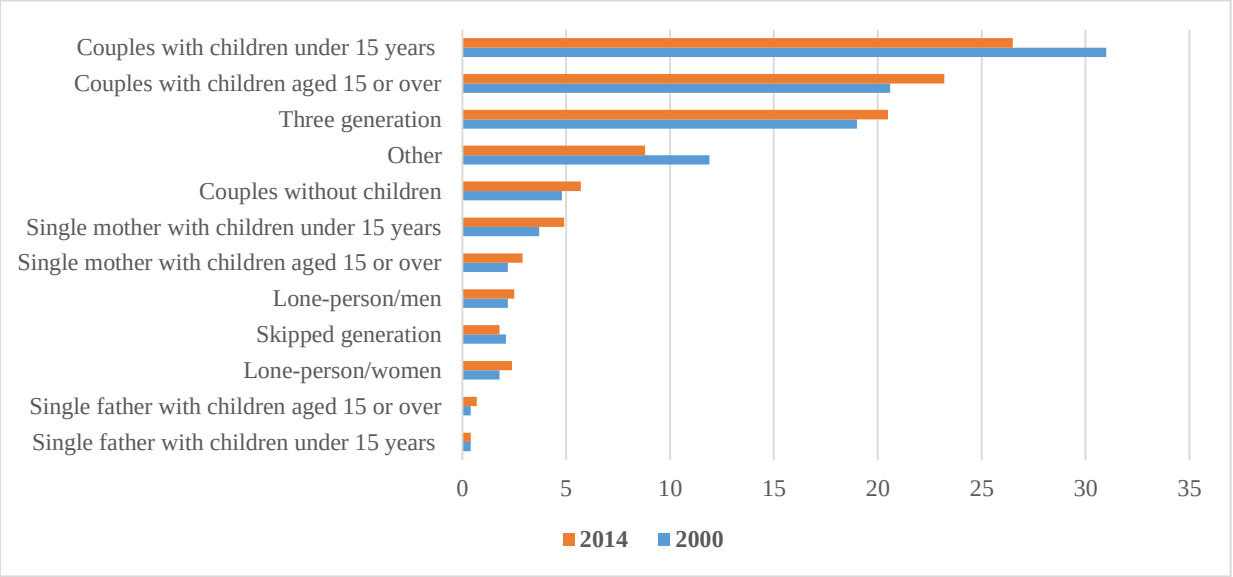
Modest but relevant changes are observed between groups. The most important change in family structure and living arrangements was the decline in the number of couples with children under 15 (years old), from 31 percent of all households in 2000 to 26.5 percent in 2014. This change is in correspondence with the increase in couples without children, which can be linked to two

reasons. First, the number of childless couples has grown and, second, the increase in life expectancy has led to a growing number of elderly two-person households. With respect to age structure, at least 46 percent of the total household head living in households without children are concentrated in the older group (see Table 2.5 in the appendix).

Furthermore, single parenthood is therefore strongly gendered, a similar result is reported by studies across all regions in the world (see, e.g., CASPER; BIANCHI, 2002; MARTIN, 2006; VILLAREAL; SHIN, 2008; OECD, 2011; KOLLMEYER, 2013; LIU; ESTEVE; TREVIÑO, 2017; NIEUWENHUIS; MALDONADO, 2018). Indeed, the proportion of single mothers with children also slightly increased in 2014 compared to 2000. Lone-person households are not a strong feature in Guatemala; however, it is important to note that the share of lone occupant households headed by women has risen slowly over the analyzed period. This trend towards living alone characterizes most of the countries, nevertheless, it is remarkable in developed countries (see, e.g. CHANDLER et al., 2004; RONALD, 2017, SNELL, 2017). Therefore, the results described above are consistent with the changing trends in family forms and household arrangements experienced in recent decades across developed and developing countries (see, e.g., ARRIAGADA, 2002; OECD, 2011; BIANCHI, 2014; ULLMANN; MALDONADO; RICO, 2014).

Another interesting result about the diversification in Guatemalan households, the proportion of three-generation households has risen by 1.5 points, while the proportion of skipped generation households has decreased by 0.3 points from 2000 to 2014 (Table 2.1). These small shifts would correspond to the share of children living with their parents and grandparents' tendency to rise, while the share of children living in skipped generation household tendency to slightly decrease over time. The proportion of children under 14 years old represented at least 17 percent for three-generation and around 15 percent for the skipped generation (see, Figure 2.4 and Figure 2.5 in the appendix).

Figure 2.3 Distribution by Household Types in Guatemala (2000-2014)



Source: Authors' calculation based on ENCOVI 2000 and 2014.

Regarding the characteristics of the head of the household, it is possible to observe that the process of ageing has involved the population as a whole, for instance, there is a rise in the share of household heads aged 60 or more across the majority of household groups. The rise of lone households mentioned previously concerns, especially, older women. At least 67.9 percent of women living in lone-person households were aged 60 or more in 2000, additionally, the share of this group grew by 1.4 points (see, Table 2.4 in the appendix).

2.5.2. Decomposition Results

This section begins by examining income inequality of the whole sample using different indexes. Guatemala has one of the most unequal income distributions in Latin America, but the level of inequality experienced a decline from 2000 to 2014. For instance, Gini coefficient fell by 0.1 point, as indicated in Table 2.5 in the appendix. These results are aligned with the literature (see LUSTING; LÓPEZ-CALVA; ORTIZ-JUÁREZ, 2013). Although the patterns of individual income inequality are important to illustrate the similarity between individual and household inequality, this work is focused on observing income distribution across the 12 groups described above.

As it is expected, equivalent household income and the share of income vary among the analyzed groups. From 2000 to 2014, in relative terms, the mean equivalent income has barely increased for three groups: couples with children under 15, skipped generations, and couples without children. While single-mother with children under 15 and lone-person households suffered a worsening of their economic position. When compared to other household types, the equivalent household income shows lower values in these groups. These results are consistent with the literature. Single mothers are generally at more disadvantage than other household types (see, e.g., MARTIN, 2006; KOLLMEYER, 2013; MAIA; SAKAMOTO, 2016). In addition, couples with children and three generation-families account for the bulk of total income in both periods, but looking at the evolution of income share, the age structure becomes relevant. The share of income has especially increased for two groups: couples with children aged 15 or over, and couples without children (see, Table 2.1).

Table 2.1 Relative mean of equivalized income (in real quetzal) and income share by Household type, Guatemala (2000-2014)

	Relative mean		Income share	
Household Structure	**2000**	**2014**	**2000**	**2014**
Couples with children under 15 years	0.9480	1.0282	27.73	24.84
Couples with children aged 15 and over	1.0669	1.0533	25.95	28.95
Three-generations	0.9259	0.8836	24.38	25.66
Skipped generations	0.5931	0.7003	0.87	0.94
Lone-person/women	1.0315	0.8430	0.35	0.42
Lone-person/men	1.8985	1.4600	0.81	0.75
Couples without children	1.0644	1.4782	1.95	3.51
Single mother with children under 15 years	0.8280	0.8682	2.49	3.39
Single father with children under 15 years	0.9706	0.9327	0.29	0.32
Single mother with children aged 15 and over	1.7145	1.1712	1.93	1.92
Single father with children aged 15 and over	2.5609	0.8013	0.54	0.29
Others	1.1162	1.0804	12.69	9.02

Source: Authors' calculation based on ENCOVI 2000 and 2014.

Table 2.2 reports the measures of inequality computed in each subgroup (for the Gini coefficient and GE (2) index). Differences in the levels of inequality can be observed among groups. Furthermore, it is possible to observe that some patterns remain stable for the analyzed period.

For instance, couples without children, lone-person, and single-mother with children under 15 years old households are likely to report higher income inequality than the rest of the household types. From a gender perspective, interesting results emerge, for example, inequality for women living alone increased considerably in 2014 in relation to 2000. While single mothers with children under 15 are associated with higher levels of inequality as compared to single fathers.

Table 2.2 Inequality index, according to Household type, Guatemala (2000-2014)

Household Structure	Inequality Index			
	GE (2)		GINI	
	2000	2014	2000	2014
Couples with children under 15 years	1.5002	1.6158	0.5900	0.5017
Couples with children aged 15 and over	1.1144	0.8155	0.5738	0.4761
Three-generations	1.2373	0.4333	0.5509	0.4138
Skipped generations	0.5269	1.1924	0.4752	0.4874
Lone-person/women	1.1577	6.0215	0.6339	0.7643
Lone-person/men	1.9456	1.5038	0.6582	0.5995
Couples without children	2.1543	5.0160	0.6525	0.6697
Single mother with children under 15 years	5.0854	1.2204	0.4997	0.4818
Single father with children under 15 years	0.2950	0.5770	0.3992	0.4837
Single mother with children aged 15 and over	0.5088	0.5510	0.4883	0.4986
Single father with children aged 15 and over	0.5591	0.7381	0.5596	0.5050
Others	0.8951	0.7619	0.5482	0.4628

Source: Authors' calculation based on ENCOVI 2000 and 2014.

Total inequality is disaggregated into the contribution due to the inequality in variations within these groups and the contribution due to variations between groups. This then shapes the effects of changes in family structure and living arrangements on the evolution of inequality. The decomposition of household equivalized income is indicated in Table 2.3. In Guatemala, inequality within groups and inequality between groups declined, nonetheless, differences 'within-groups' tend to be greater than those 'between-groups'. Therefore, changes in the distribution of household types, particularly changes in family structure and living arrangements seem to play a secondary role in the decline of income inequality experienced by Guatemala during the period from 2000 to 2014. In that regard, several studies using decomposition

methods show similar results. For example, for UK (MOOKHERJEE; SHORROCKS, 1982; JENKINS, 1995), for Italy (BRANDOLINI; D'ALESSIO, 2001; ALBERTINI, 2008). Recently, for the U.S (ZAGEL; BREEN, 2019). Although most of these countries experienced a rise in income inequality during the period of analysis.

Table 2.3 Decomposition of income inequality (GE) 2, Guatemala 2000-2014

	Household Structure	
	Within group GE (2)	**Between group GE (2)**
2000	1.3210	0.0113
2014	1.1912	0.0073

Source: Authors' calculation based on ENCOVI 2000 and 2014.

Household types that represent a large share of the total population experienced a decrease in income inequality, which can affect the distribution of income throughout time. Nevertheless, the findings show that distance "within-groups" included in the analysis are more relevant to income household distribution in Guatemala. Thus, this may indicate that groups considered initially homogeneous still need to be explored (BRANDOLINI; D'ALESSIO, 2001).

2.6.Conclusions

This paper explores the role of the changes in the family structure and living arrangements on shaping income distribution in Guatemala using data from the national survey ENCOVI (2000 and 2014). For that, this work first proposes a household typology with a gender dimension which is useful to illustrate the diversity of Guatemalan households, and how they have changed over 14 years. Then, the effects of changes in family composition and living arrangements on the level of income inequality using a decomposition of the distributional changes by population subgroups are examined (SHORROCKS, 1984; JENKINS, 2006).

The descriptive analysis displays modest but important demographic trends shaping Guatemala. The population structure remains quite young, people under 30 years of age represent approximately 60 percent of the total population in both years, nevertheless, the population is

ageing slowly. These changes are likely a result of a decline in fertility rates experienced by Guatemala in the past decades, a similar trend across Latin American countries (PELLEGRINO et al., 2008; LESTHAEGHE, 2014). In addition, the typology proposed by this study evidences the diversification of Guatemalan households. Family structure and living arrangements are changing; although the most common household type continues to be "two-parent nuclear families", its importance is deteriorating over time. Thus, the most remarkable change is the decline in the number of couples with children under 15, from 31 percent of all households in 2000 to 26.5 percent in 2014. Looking at the diversity of households with a gender dimension; single-parent households are likely headed by women. Moreover, the proportion of single mothers with children increased slightly in 2014 compared to 2000, it is a phenomenon widely analyzed in the Latin American region (see, ARRIAGADA, 2007; VILLAREAL; SHIN, 2008; CHANT, 2009; ESTEVE et al., 2012; LIU; ESTEVE; TREVIÑO, 2017) and developed countries (see, MARTIN, 2006; OECD, 2011; KOLLMEYER, 2013). These trends in family forms and household arrangements experienced in recent decades are shared by advanced economies and developing countries (see, e.g., ARRIAGADA, 2002; OECD, 2011; BIANCHI, 2014; ULLMANN; MALDONADO; RICO, 2014).

Beyond these changes in household distribution, income inequality at national level experienced a decline over the analyzed period. But changes in household income inequality did not account for the same magnitude or, on the other hand, moved to the opposite magnitude across household groups. For instance, for couples with children aged 15 and over and three-generation families income inequality decreased, while for couples without children it increased for the analyzed period. Then, the decomposition analysis shows that changes in "within-groups" inequality matter more on income household distribution. In sum, the trends in family structure and living arrangements mainly associated with the decline in fertility rates and demographic aging do not seem to have contributed to changes in income inequality experienced by Guatemala for the period from 2000 to 2014. Thus, it is important to note that the results do not state a causal relationship between changes in family living arrangements and income inequality. Nonetheless, these results help to understand the dynamics of family structure and living arrangements in Guatemala. Also, these findings can be considered a "first step" in explaining distributional changes (BOURGUINON; FERREIRA, 2005).

Finally, this study contributes to the existing literature and also represents challenges for new research by examining changes in household composition in Guatemala and its link to income inequality. Furthermore, these results may have policy making implications. In that regard, the most important change observed is the decline in the number of couples with children under 15. Other changes that deserve more attention are the rise of single mothers with children households and three-generation households. With respect to income inequality, single-mother with children under 15 and lone-person households headed by women suffered a worsening of their economic position over the analyzed period. Single mothers are more likely to face economic disadvantages in relation to single fathers; thus, women are more disadvantaged at the job market. Therefore, these results show the importance of promoting the implementation of family policies. Certain policies focusing on work-life balance (e.g., paid parental leave and public childcare services) positively affect women's employment and earnings (OLIVETTI; PETRONGOLO, 2017), consequently the well-being of their families.

The aging population implies the rise in the proportion of people over 65 in the total population and shapes the demand for unpaid care activities within households. Hence, the promotion of caring responsibilities within the family becomes important in order to reduce gender inequalities once women and girls are commonly the ones responsible for providing care for both children and elderly people (AGUIRRE, 2007; FERRANT et al., 2014; ILO, 2018).

Future research should be oriented as follows. First, it should explore other characteristics related to household head such as work status or age, which would be relevant to older couples, older 'retired' couples without resident children or single-mothers with children living at home. More adults imply more potential earners and more economic security. Furthermore, women are more likely than men to be employed in part-time jobs, and these jobs usually offer low wages rates (MANNING; PETRONGOLO, 2008; FERNÁNDEZ-KRANZ; RODRÍGUEZ-PLANAS, 2011; BOLL et al., 2017). Second, since individuals receive income from different sources (e.g. labor, transfers, remittances, and pensions), extending the analysis to different sources of income and how it influences overall income inequality across households would be interesting.

2.7.References

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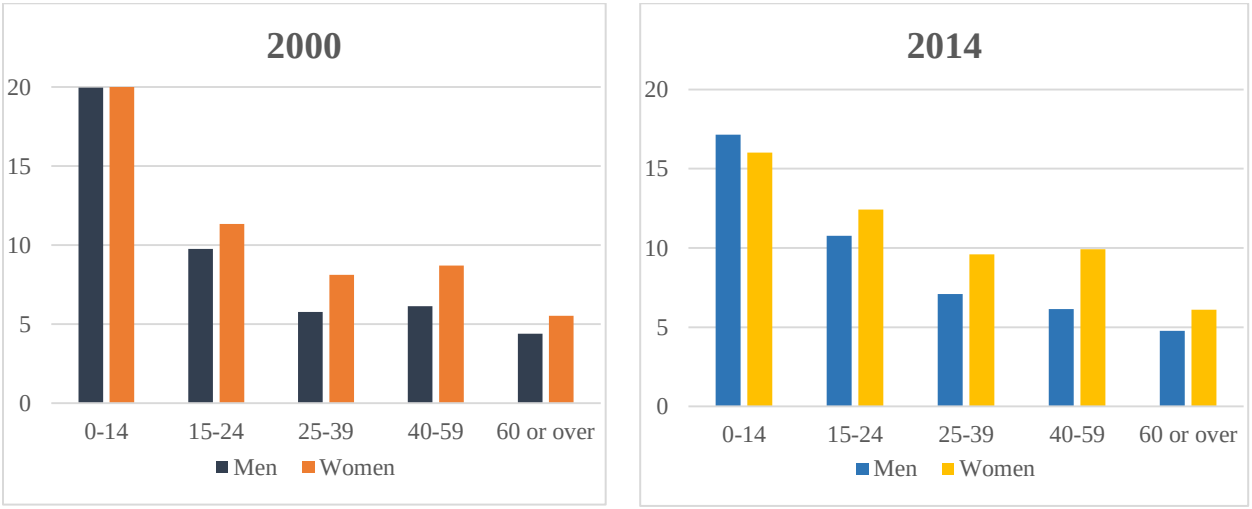
2.8.Appendix

Table 2.4 Distribution of heads of household by age group, Guatemala 2000-2014

	Age of head household										
	20-29		30-39		40-49		50-59		60 or older		Total
Household Structure	2000	2014	2000	2014	2000	2014	2000	2014	2000	2014	
Lone-person/women	9.5	3.0	3.8	6.5	6.4	5.4	13.2	15.8	67.0	69.3	100
Lone-person/men	15.6	6.8	13.9	16.0	13.3	13.3	17.7	14.5	39.4	49.4	100
Single mother with children under 15 years	9.6	16.6	49.0	40.5	32.8	31.2	8.5	11.5		0.2	100
Single father with children under 15 years	4.2	7.3	23.5	19.3	47.6	34.0	15.4	30.1	9.3	9.3	100
Single mother with children aged 15 and over			2.1	5.7	24.6	27.9	43.0	30.5	30.4	35.8	100
Single father with children aged 15 and over				2.6	10.0	7.2	21.1	17.5	69.0	72.7	100
Couples with children under 15 years	36.7	34.9	43.6	48.2	15.2	11.4	3.2	4.1	1.4	1.4	100
Couples with children aged 15 and over	0.2	0.4	15.3	16.3	44.5	39.9	24.9	25.9	15.1	17.4	100
Couples with children aged 15 and over	0.2	0.4	15.3	16.3	44.5	39.9	24.9	25.9	15.1	17.4	100
Three-generations	5.3	3.8	13.5	11.7	23.9	23.0	27.2	27.0	30.3	28.0	100
Skipped generations					2.5	3.0	24.7	13.0	72.8	84.0	100
Other	16.2	12.6	21.4	21.8	25.8	24.5	21.5	21.0	15.0	20.2	100

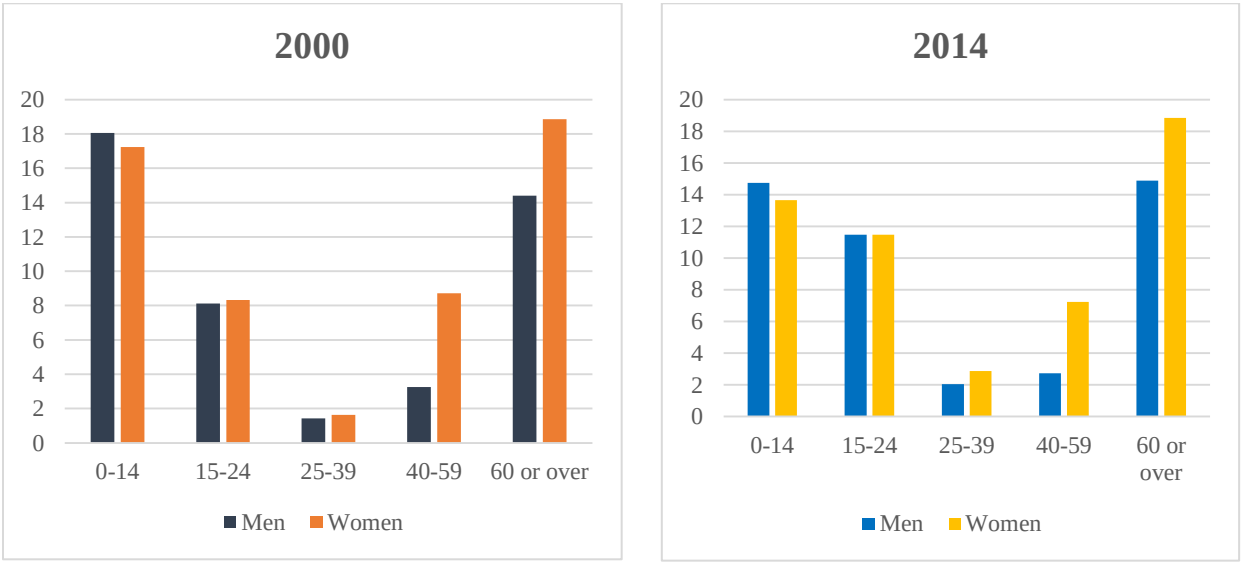
Source: Authors' calculation based on ENCOVI 2000 and 2014.

Figure 2.4 Share of population in three generation household (%), by age group and gender, Guatemala (2000-2014)



Source: Authors' calculation based on ENCOVI 2000 and 2014.

Figure 2.5 Share of population in skipped generation household (%), by age group and gender, Guatemala (2000-2014)



Source: Authors' calculation based on ENCOVI 2000 and 2014.

Gini Coefficient

The Gini is the most popular measure of inequality, which ranges from 0 (perfect equality) to 1 (perfect inequality). This Coefficient is derived from the Lorenz curve, which sorts the population from poorest to richest, and shows the cumulative proportion of the population on the horizontal axis and the cumulative proportion of expenditure (or income) on the vertical axis.
The Gini coefficient for distribution of household income y_i over n families (where $i = 1,2,3 \ldots n$) can be expressed as:

$$y_i = \frac{1}{2n^2\mu}\sum_{i=1}^{n}\sum_{j=1}^{n}|y_i - y_j| \quad (2.3)$$

Where; μ is the average income. The Gini coefficient is therefore exactly one-half of the arithmetic average of the absolute values of differences between all pairs of incomes (SEN, 1973).

Theil Index

Give some appropriate normalization this approach then found expression in the following expression (Theil, 1967):

$$T = \frac{1}{N} = \sum_{i=1}^{N}\frac{y_i}{\bar{y}} * ln\left(\frac{y_i}{\bar{y}}\right), \quad (2.4)$$

where, y_i corresponds to individual income, and $\bar{y}$ is average income of population. The index varies between 0 and 1. The higher index is the more unequal distribution of income.

Ratio 90/10

The decile dispersion ratio presents the ratio of the average income of the richest 10 percent by that of the poorest 10 percent. This ratio expresses the income of the top quantile as multiples of that of the poorest quantile. However, it ignores information about incomes in the middle of the income distribution and doesn't use information about the distribution of income within the top and bottom deciles or percentiles (HAUGHTON. KHANDKER, 2009).

Table 2.5 Inequality Index for Equivalent Household Income, Guatemala (2000-2014)

	Inequality index			
	All observations			
	Gini	GE	Theil	90/10
2000	0.5723	1.3324	0.7001	31.1230
2014	0.4785	1.1986	0.5177	8.8390

Source: Authors' calculation based on ENCOVI 2000 and 2014.

3. STUDY 2 GENDER DIFFERENCES IN TIME ALLOCATION TO PAID AND UNPAID WORK: EVIDENCE FROM URBAN GUATEMALA (2000-2014)

ABSTRACT

This paper examines the effects of individual and household characteristics on the time allocation decision for both women and men, and how these effects have evolved over time in Urban Guatemala using data from the National Survey of Living Conditions (ENCOVI, 2000 and 2004). A multivariate Tobit is built to model the decision of individuals to allocate time, distinguishing three time uses: housework, childcare, and paid work. The results reveal that time allocation is largely determined by gender. For both periods, on average, women devote more time to housework and childcare than men, while men spent more hours in paid work than their counterparts. Although offering less hours of paid work, women frequently accumulate both unpaid and paid work, while men specialize in the market work. Moreover, women's time allocation is more responsive to individuals and household characteristics than men's in both periods. Finally, this study finds that educational attainment plays an important role in shaping how individuals allocate their time between market and non-market activities, especially for women. For instance, while housework time is negatively associated with education level, time devoted to childcare increases with instruction.

Keywords: time use, gender, housework, childcare, paid work, Guatemala.

RESUMO

Este estudo examina o efeito das características individuais e domiciliares na decisão de alocação do tempo de trabalho para mulheres e homens. Adicionalmente, buscamos avaliar como esses efeitos evoluíram no decorrer do tempo, nas áreas urbanas da Guatemala, usando os dados da Pesquisa Nacional de Condições de Vida (ENCOVI, 2000 e 2004). Para tanto, utilizamos um Tobit Multivariado para modelar a decisão simultânea dos indivíduos na alocação do tempo em três possibilidades de uso: afazeres domésticos, cuidado com as crianças e trabalho remunerado. Os resultados mostram que a alocação do tempo é amplamente determinada pelo gênero. Em média, para ambos os períodos, mulheres dedicam mais tempo aos afazeres domésticos e ao cuidado com as crianças que os homens, enquanto estes dedicam mais ao trabalho remunerado. No entanto, mulheres frequentemente acumulam ambas as funções, enquanto homens apresentam elevado grau de especialização no trabalho remunerado. Cabe também destacar que, a alocação de tempo das mulheres é mais sensível às características individuais e domiciliares em comparação aos homens em ambos os períodos. Outro importante resultado deste estudo sugere que o nível educacional tem um papel relevante na decisão de alocação de tempo entre atividades remuneradas e não remuneradas, especialmente para mulheres. Por exemplo, o tempo dedicado aos afazeres domésticos tende a reduzir conforme o nível educacional. No entanto, o tempo dedicado ao cuidado com as crianças aumenta com o nível de instrução do indivíduo.

Palavras-chave: uso do tempo, gênero, afazeres domésticos, cuidado com as crianças, trabalho remunerado, Guatemala

3.1.Introduction

Time is a limited resource, which is divided between work in the market, domestic work, leisure, and productive and reproductive activities (BECKER, 1971; GRONAU, 1977). The time allocated to unpaid and paid work varies substantially across individuals, but the most notable disparities observed are gender-related. Although women have increased considerably their participation in the labor force, reduced the amount of time spent on housework, and men have increased their hours in housework and childcare over the past several decades, gender inequalities in unpaid and paid work have persisted over time (see e.g., BIANCHI et al., 2000; SULLIVAN, 2011; SAYER, 2016).

In addition to being actively part of the labor force, women are also expected to comply with their family responsibilities corresponding to housework and childcare, which leads them to a "double-shift" of work (BIANCHI et al., 2000; DAVIS; GREENSTEIN, 2004; SAYER, et al., 2009). In this regard, gender differences in the time allocated to non-market and market work are substantial with consequences in many areas of women's and men's lives. Therefore, measuring time use allows analyzing the impact of the gender gap in time allocation on gender inequalities in the labor market. Findings in this line may help to implement public policies that improve the well-being of women and their families.

In the last decades, examining the gender differences in time allocation has been under scholars' attention. The results of studies in developed countries show some similarities with those obtained in the developing world. Mostly, the fact that women contribute more to routine housework and childcare than men, who tend to specialize in market work (see, e.g., BLOEMEN et al., 2010; BIANCHI, 2011; BENERÍA, BERIK; FLORO, 2015; RUBIANO-MATULEVICH; VIOLLAZ, 2019).

On the other hand, personal characteristics and household composition can affect gender differences in time allocation to paid and unpaid work. Gender patters in time allocation vary over the life cycle (see, e.g., ANXO et al., 2007; KONGAR; MEMIŞ, 2017). Particularly, men spend long hours in the market and devote less time to unpaid household tasks than women in all

stages of the life cycle (ANXO et al., 2011). Several empirical studies have found that female education is associated positively with the allocated time to market work (KALENKOSKI et al., 2006; LAWSON, 2007; BIANCHI et al., 2015) and childcare (GRACIA; GHYSELSH; VERCAMMEN, 2011; MANCININI; PASQUA, 2012), but highly educated women tend to spend less time on domestic chores than women with lower levels of educational attainment (DAVIS; GREENSTEIN, 2004; SULLIVAN, 2010). On the other hand, highly educated men spend more time with childcare than lower educated individuals (GRACIA, 2014). The household structure also affects the time spent in unpaid and paid work for each member of the household. For instance, larger households demand more household production (STRATTON, 2015). The number and age of children in the household affect the time devoted to housework and childcare for women. Canelas and Salazar (2014) find that one additional infant (0-5 years old) in the household increases the time spent by women on domestic activities by more than double the effective increase of their partners. Meanwhile, Yeung et al. (2001) observe that on a typical weekday, infants and toddlers (aged 0-2) have their fathers accessible to them in all activities for a little more than 3 hours, although this level of involvement decreases, as the child's age increases, to 2 hours and 15 minutes for those aged 9-12.

In this context, the contribution of this study to the existing literature is twofold. First, it examines the effects of individual and household characteristics on the time allocation decision for both women and men, and how these effects have evolved in Urban Guatemala. Second, an important distinction of this work is that unpaid work time is divided between housework and childcare. Thus, three types of activities are distinguished: housework, childcare, and paid work. Finally, from a methodological point of view, most empirical studies examining gender inequalities in the time allocation in paid and unpaid work have estimated equations for each time use. Only a few scholars have used a multivariate Tobit model as this present research (see e.g., KALENKOSKI et al., 2006; BLOEMEN et al., 2010; MANCININI; PASQUA, 2012). Nonetheless, all have been carried out in developed countries.

Considering these contributions, this dissertation aims to answer two questions. First, do individual and household characteristics affect the division labor and unpaid work in Urban Guatemala? Second, is the behavior of the gender differences in unpaid and paid work stable

over time? In order to answer these questions, this study models the decision for both men and women to allocate time to housework, childcare, and paid work simultaneously, using the National Survey of Living Conditions (Encuesta Nacional de Condiciones de Vida-ENCOVI) from 2000 and 2014. The ENCOVI is not a Time-Use Survey, but it is representative of the Guatemalan population; its questionnaire contains sociodemographic information, and a module of time use as well.

The organization of this paper is as follows: section 2 provides a literature review, starting with the theories underlying time allocation and previous empirical studies that analyzed this topic in developed and developing countries; section 3 describes the data and variables; section 4 presents the methodological approach; section 5 discusses the results; section 8 concludes the discussion.

3.2.Literature Review

The seminal work by Becker (1965) integrated time allocation into a theoretical framework in economics. Becker's model assumes that time is a scarce resource that is allocated optimally among work and other activities. The household maximizes welfare subject to time and budget constraints where the welfare function depends on the consumption of time and goods, which are produced by household members themselves. Fundamental to this model is the assumption that there is a household welfare function, and that all resources--capital, labor, land, and information--are pooled.

Following this line, Gronau (1973) incorporated women's time in housework into the traditional analysis of labor supply and time spent working. Later, Gronau (1977) formalized the trichotomy of work in the market, work at home (housework and childcare), and leisure. The framework empathizes that time is used at home to produce home goods that are perfect substitutes for market goods and that it affects negatively the marginal productivity. Furthermore, the model assumes that this non-market time reacts to change in socioeconomic variables such as labor supply, specialization in the household, and demand for children.

On the other hand, three perspectives on the gender division of labor have dominated the literature (Bianchi et al. 2000). The first, the time availability perspective, argues that allocation time on domestic activities is related to the amount of time available for each family member and that hours spent on market work can constrain the capacity to respond to domestic demands (see Hiller, 1984). In this line, Coverman (1985) suggests that employment status and family composition may be treated as indicators of time availability.

The second, the relative resources perspective, suggests that the division of labor in a marriage depends on power relations between spouses. This power derives, to some extent, from resources that reflect general socioeconomic status in society such as education, earnings, and occupational position (BLOOD; WOLFE, 1960). Becker (1975, 1991) draws a second relative resource theory in which the efficiency of the family that works as a collective unit can be maximized through the intra-family specialization in tasks. Particularly, women spend much more time on housework and less time in paid employment compared to men, who tend to specialize in the labor market. Furthermore, a new theoretical approach has developed three broad categories of models of household decision-making. The first is the collective model developed by Chiappori (1997), which also recognizes the role of domestic production where each household member is characterized by his or her utility function and decisions are only assumed to result in Pareto-efficient outcomes. Apps and Rees (1997) extend this model, which allows them to distinguish work at home into elements of housework and childcare. The second and third models are, respectively, the bargaining cooperative model, developed by Manser and Brown (1980), and the noncooperative model, developed by Lundeberg and Park (1993). These three models include household labor supply into Becker's time allocation framework (DOSS, 2013).

The third, the gender perspective, suggests that gender differences in housework are socially constructed. Parsons and Bales (1955), who conceptualize and study gender roles, argue that the male's role is managerial and instrumental while the female's role is characterized by emotional, physical, and maintenance work. Indeed, men and women gradually build, from early childhood, a gender identity pattern that includes roles and role expectations (COVERMAN, 1985). Later, sociologists have combined gender ideology with the theoretical construct of "doing gender." According to these studies, the number of hours spent by women in household chores is higher

than the undertaken by men because society automatically associates housework and gender (BERK, 1985; WEST; ZIMMERMAN, 1987; GREENSTEIN, 1996; GREENSTEIN, 2000).

The great expansion of the female labor force also brings immense strides in modern labor economics, labor supply, and the decisions made by families and households have received attention from scholars (GOLDIN, 1995).[38] In this sense, the three perspectives described above have been tested and predicted the unequal division of labor between men and women across countries. Nonetheless, the time availability and relative resource perspectives have received strong criticism by feminists, who argue that the division of labor is not a simple tradeoff between the time spent in market and non-market work (WEST; ZIMMERMAN, 1987). For instance, the classic study by Hochschilds (1989) argues that despite their entrance into the labor force, employed women still comply with most of the household and childcare responsibilities, which have become known as "the second shift."[39] Moreover, men have increased their time in unpaid activities, but this has not compensated for the change in hours worked by women (SAYER, 2005). Other studies have observed that the time spent by women in housework gradually declined, but not enough to compensate for their increased work hours (BIANCHI et al., 2000). Later, Goldscheider, Bernhardt, and Lappegard (2015) developed the framework of two halves of the "gender revolution." The first half refers to the dramatic rise in labor force participation among women and the second to the increased involvement of men in the private sphere of home and family.[40] The authors suggest that female participation in labor markets has risen steadily. Nevertheless, there has been only a slight change in the division of unpaid invisible labor.[41]

[38]Goldin (1990) argues that the transition from the 1960s to the 1990s from male-breadwinner to dual-earner intensified driven by revolutionary changes in women's roles in the public sphere.

[39] According to Arlie Hochschild's classic study, "The Second Shift," the three marital roles - transitional, traditional, and egalitarian - are observed and associated with social classes. The working class and men preferred the traditional role while the middle class and women preferred the egalitarian one.

[40] Other authors on the gender revolution, alternatively described the period as the "quiet revolution" or "female revolution" (GOLDIN, 2006; ESPING-ANDERSEN; BILLARI, 2015).

[41] Goldscheider, Bernhardt, and Lappegard (2015) also argue that these findings require the expansion of the definition of invisible work.

Finally, another interesting aspect is that most studies have been applied to restrict samples of couples. However, each of the three perspectives can be adapted to apply to men and women in all household types (SHELTON, 1992).

Most of the previous empirical studies have focused on the determinants of time allocated to market and non-market work in developed countries (see, KOOREMAN; KAPTEYN, 1987; HILL; STAFFORD, 1980). Other studies have considered simultaneous time allocation to housework in terms of wife and husband couples (see JUSTER; STAFFORD, 1991; HERSH; STRATTON, 1997; GUPTA, 1999). Recently, much attention has been paid to address this topic. Particularly, gender differences remain in paid and unpaid work mostly due to women spending much more time on average on household and childcare tasks while men show specialization in paid work (see, BLOEMEN et al., 2010; BIANCHI et al., 2011; FERRANT et al., 2014).

From the relative resources approach, empirical studies show how diverse factors such as age, education attainment, and income can affect the allocation of time. The study documented by Anxo et al. (2007) finds that the gender gap exists at any stage of the life course, although it is usually smaller at the two ends of the age distribution and larger with parenthood in Italy, France, Sweden, and the United States. Particularly, men spend long hours in the market work in all stages of the life cycle (ANXO et al., 2011). Apps and Rees (2005) suggest that while domestic work excluding childcare tends to rise with age for both females and males in Australia and the United Kingdom, in Italy, France, and Sweden an increase in the number of hours devoted to housework and care by men is positively associated with retirement (ANXO et al., 2007).

Education plays an important role in the allocation of time; it increases the productivity of time in the labor market more than the time in unpaid work (LEIBOWITZ, 1972). For instance, several empirical studies have found that female education is positively associated with the time allocated to market work (see e.g. KALENKOSKI et al., 2006; BIANCHI et al., 2014). However, highly educated women tend to spend less time on domestic chores than women with lower levels of educational attainment (DAVIS; GREENSTEIN, 2004; SULLIVAN, 2010).

Among American couples where women's educational attainment is higher than men, the division of domestic labor tends to be more equal (BIANCHI et al., 2000).

Educational attainment also affects time spent on childcare. Consistent with this argument, several studies have found that parents with different education levels spend substantially different amounts of time on childcare in the United States--highly educated parents spend more time on childcare with their young sons (LUNDBERG, 2005; GURYAN et al., 2008; SULLIVAN, 2010). College-educated mothers devote more time to childcare than their lower educated counterparts in Flanders, Spain, and in the United Kingdom (GRACIA; GHYSELS; VERCAMMEN, 2011). For instance, mothers with a college education or greater spend roughly 4.5 hours more per week on childcare than mothers with a high school degree or less (GURYAN et al., 2008). Meanwhile, the comparative study by Sullivan, Billari, and Altintas (2014) notes that most young educated men dedicate more time to childcare and household tasks in 13 European countries. In this line, father's education has a significant positive effect on his physical care time with children aged 0-5 years in Spain (GRACIA, 2014).

The division of tasks can be influenced by other factors, such as household composition. The study documented by Mencarini and Tanturri (2004) shows that the presence of children in the household affects the time devoted to household activities by women, and the time allocation to the market by both partners in Italy. Similar results are found in the United States. This variable reduces the time a mother spends in the labor market (KALENKOSKI et al., 2005) and increases the average hours in domestic work (CRAIG; BITTMAN, 2008). Furthermore, the effect of children's age on time use may differ significantly across countries. In Sweden, women appear to adjust their housework hours to the number and age of children in the household, whereas men do not (BOYE, 2008). Anxo et al. (2007) show that there is no impact of young children on French fathers, while there is a positive impact on labor supply in Italy and the U.S. and a negative impact in Sweden. Consistent with these results, Yeung et al. (2001) find that on a typical weekday, infants and toddlers (aged 0-2) have their fathers accessible to them in all activities for a little more than 3 hours, while this level of involvement decreases as the child's age increases to 2 hours and 15 minutes for those aged 9-12 in the U.S.

Young singles living with their parents do the least unpaid work, which is mainly strong for women in France and Italy (ANXO et al., 2007). Large households tend to demand more home production, "In multi-person households, individuals can specialize to take advantage of skill differentials, to save on the fixed costs associated with setting up, and to benefit from learning by doing." (STRATTON, 2015, p. 3) Besides, households can purchase goods and services in the market: maids clean, handypersons do repairs, gardeners provide lawn services, laundromats wash clothes, restaurants and care assistants provide other services (STRATTON, 2015). Moreover, care activities demand time and are potentially costly, which may lead to a rearrangement of employment schedules, unpaid leaves (BIANCHI et al., 2006) or a reduction in working hours (CRAIG, 2006; MOLINA, 2015). In other cases, childcare can also be provided informally within the family (KUHLTAU; MASON, 1996). As a result of the aging of the population, children are more likely to spend time in a three-generation family household, in which they co-reside with their parents and grandparents (MARE, 2011). Thus, the presence of other family members in the household would likely affect the amount of time spent by parents with their children. Grandparents and siblings do play an important role in childcare (HANK; BUBER, 2009; BYRSON et al., 2012). Moreover, grandparents are considered as an important support for female's employment (GARCÍA-MORÁN; KUEHN, 2012; ARPINO et al., 2012). Nonetheless, grandmothers are more likely to be engaged in childcare than grandfathers (GUZMAN, 2004).

Other studies highlight the effect of earnings on unpaid work among couples (see, GUPTA, 2006; BLOEMEN; STANCANELLI, 2008). In the U.S., women's earnings are related negatively to the time spent on household activities, which does not depend on their partners' earnings and the couples' total incomes (GUPTA; ASH, 2008). In contrast, Bianchi et al. (2015) find that Italian husbands' time allocation is more responsive to their wives' attributes: husbands' housework time increases with the wage of their wives.

On the other hand, there are very few scholars that have analyzed childcare and housework separately. Concerning this issue, some studies have been conceptualized as including childcare tasks (BADR; ACITELLI, 2008; HOOK, 2006), while others have highlighted the importance of analyzing household and childcare tasks as distinct activities (SULLIVAN, 2013), considering

that their nature and predictors differ (BIANCHI; RALEY, 2005; COLTRANE; ADAMS, 2001; MANNINO; DEUTSCH, 2007). In this line, the study documented by Kimmel and Connelly (2007) estimates equations in which the dependent variables are: home production, active leisure, market work, and childcare. Their findings show that the effect of an additional child in the household has a larger effect on childcare time for standard time workers than nonstandard workers, considering both weekday and weekend. Bloemen et al. (2010) modeled simultaneously three different time uses (paid work, childcare, and housework) for two spouses within each household in Italy. Their results reveal that there is a persistent role specialization and that education and place of residence make some differences. Mancini and Pasqua (2012) also use a simultaneous approach to analyze how parents allocate their time between work, domestic tasks, "basic" childcare, and "quality" time with children in Italy. They suggest that women's time allocation is generally more responsive to family and individual characteristics than men's time allocation.

Most studies have found that women spend more hours on domestic labor than men, although some of them have also observed that it tends to decline over time. Bianchi et al. (2000) indicate that this decline was more notable across women who were not employed during the period 1965-1995 in the U.S. In Britain, Ramos (2005) findings show that on average women (be them married or single) worked more at home and less in the paid work from 1992 to 1998. Likewise, several studies report that adults tend to spend more time with their children over time in the U.S. (BIANCHI et al., 2000; SAYER; BIANCHI; ROBINSON, 2004; AGUIAR; HURST, 2007). Others find that the number of hours allocated to domestic chores and childcare by men increased slightly in the last decade (SULLIVAN, 2011; SAYER, 2016).

Particularly, Mancini and Pasqua (2012) find that although the presence of children in the household did not affect fathers' working decisions in 1988, this becomes important in 2002 when fathers become more involved in childcare and education as a response to women's increased participation in paid work. Meanwhile, the study documented by Sullivan (2010) uses historical data to show a widening educational gap in childcare time and a narrowing gap in housework in Britain and the U.S (1970-1990).

The literature on this topic is limited for developing countries.[42] Nonetheless, this is consistent with the results from studies in the developed world. Although female participation in the labor market has increased in recent decades in almost all developing countries, women continue to assume the largest share of unpaid work (WORLD BANK, 2012b; RUBIANO-MATULEVICH; VIOLLAZ, 2019). For instance, the study that Medeiros et al. (2007) carried out in urban Bolivia shows high levels of within-group inequality in the distributions of paid and unpaid work for men and women. On average, women work more basically due to a double shift of work. In Peru, women spend 15-20 percent more time in all work activities, including unpaid and paid work (ILAHI, 1999). In Mozambique, men spent 6.4 hours per day in market work, while women put in almost double that time, an average of 11.54 hours per day (ARORA, 2013).

The descriptive study by Milosavljevic and Tacla (2007) shows that, from the eight domestic activities under analysis (cleaning the house, cooking, washing clothes and dishes, collecting water and firewood, taking out the trash, and childcare), men spend less than one hour in six of them while they allocate one and half hours in childcare and collecting wood. In contrast, women spend their time mostly in cleaning, washing clothes, cooking, and childcare. For this last activity, in particular, they devote about 5 hours per day in Guatemala.[43] The recent study by Rubiano-Matulevich and Viollaz (2019) documented that Iraq, Guatemala, and Mexico have the most unequal distribution of time in a sample that included 19 countries. Furthermore, in these countries, the average gender gap considering four activities (unpaid domestic work, personal care, market work, and leisure) is 2.7 hours per day.[44]

On the other hand, the relative resource perspective seems to explain gender differences in time use. Lawson (2007) finds that individuals who have university degrees undertake far more formal employment hours per day but spend less time cooking and cleaning and hardly ever

[42] One of these reasons is that time-use surveys have carried out in developing countries by the end of the 1990s (RUBIANO-MATULEVICH; VIOLLAZ, 2019). However, only a few Latin American countries have carried out these surveys. Generally, this basic module of time use is incorporated into the Continuous Household Survey (see MILOSAVLJEVIC; TACLA, 2007).

[43] The comparative study by Milosavljevic and Tacla (2007) included Mexico, Guatemala, Nicaragua, Ecuador, and Bolivia. For Guatemala, the authors used data retrieved from ENCOVI (2000).

[44] This study uses harmonized data from 14 stand-alone time use surveys and 5 household surveys with time use modules collected between 2006 and 2014. In particular, Guatemala data was retrieved from ENCOVI (2011). Also, the difference between women and men is calculated as the absolute value of the average gender gap across activities (see, RUBIANO-MATULEVICH; VIOLLAZ, 2019).

gather firewood in Lesotho. In Peru, the total work for both men and women increases with age but at a decreasing rate. Nonetheless, it peaks at middle age and then declines (Ilahi, 1999). In Turkey, men work longer hours in the marketplace and spend less time on unpaid domestic activities in all stages of the lifecycle (DAYIOĞLU; KIRDAR, 2010). Recently, Kongar and Memiş (2017) have also observed that employed men work long hours in each life stage in Turkey--the difference is the highest (3 hours) among parents of preschool children.

In Latin American countries, the lack of childcare services and the absence of public or private alternatives explain the low levels of female participation in the labor market (WELLER, 2009). Attanasio et al. (2017) suggest that the provision of childcare subsidies increased mothers' participation in the labor force as well as the worked hours in Brazil. In Chile, doubling the supply daycare center would increase women's labor force participation by 5.7 percent (BORDON, 2007). In Peru, while the presence of elderly women allows working-age women in the household to increase their time in self-employment activities in rural and urban areas, it also probably increases female participation in the wage labor market (ILAHI, 1999). Likewise, the time adult women allocate to childcare is inversely associated with the presence of other adult women in the household in Nicaragua (WORLD BANK, 1999).

Milosavljevic and Tacla (2007) have observed that the participation of women in care work increases when there are preschool children at home, while men's participation tends to remain the same in Latin American countries. Canelas and Salazar (2014) examine the structure and distribution of gender in paid and unpaid work among couples in three Latin American countries, including Guatemala. Their results indicate that women undertake most of the domestic activities of households. Particularly, the presence of children, one additional infant (0-5 years old) in the household increases the time spent by women on domestic activities by more than double the effective increase of their partners in Bolivia and Ecuador, while this does not an effect in the Guatemalan sample.

Some studies have supported the time poverty concept in African countries (see, BLACKDEN; WODON, 2006; BARDASI; WODON, 2009). In this line, Barnett and Whiteside (2002) show that the time spent on housework, cooking, and caring for children, the sick and the elderly household members are necessary for maintaining families. This time is usually positively

correlated with the poverty level of the household in South Africa. For Guatemala, Gammage (2010) finds that an investment in small infrastructure and ownership of an electric or gas stove has the potential to reduce time and income poverty, primarily by alleviating women's time burdens and making their unpaid household work more efficient. Household characteristics play a similar role for both, but social characteristics seem to play a stronger role for men who work at home in Ecuador (NEWMAN, 2002).

From a methodological point of view, most studies cited above have investigated the determinants of time allocation on paid and unpaid work estimating equations for each time use. A few scholars have used a multivariate Tobit model as this present research (see KALENKOSKI et al., 2006; BLOEMEN et al., 2010; MANCININI; PASQUA, 2012). Nevertheless, all studies have been carried out in developed countries.

The data and methodological procedures to investigate gender differences are presented in the next sections.

3.3.Data

This study uses data from the National Survey of Living Conditions (Encuesta Nacional de Condiciones de Vida, ENCOVI, for its acronym in Spanish) carried out by the National Institute of Statistics (Instituto Nacional de Estadísticas-INE) in 2000 and 2014. This is not a Time-Use Survey, but it includes a random sample with national coverage. Generally, ENCONVI collects sociodemographic information about the household respondents, including education, migration and social programs, expenditure, access to technology, sources of incomes (in cash and in-kind), employment and unemployment, and a module of time use. The time questionnaire is filled for all the members of the household aged 7 or over. Despite some minor divergence, both surveys should be compatible and comparisons over time can be derived using a set of harmonized variables. The original sample contains information of 37,771 individuals from 7,276 households for 2000 and 54,822 individuals from 11,536 households for 2014.

The analysis is restricted to the urban area because labor market characteristics in the rural area may differ in terms of productivity and remuneration in Guatemala.[45] The sample is restricted to individuals aged 15 and over who live in nuclear families either as a couple or alone. Borders, domestic workers, and individuals from which there is any missing value in the variables used in the analysis are excluded. The final sample for 2000 contains 5,233 women and 4,466 men, while the 2014 sample comprises 8,219 women and 7,226 men. In addition, sampling weights provided by the survey are applied.[46]

The survey reports directly the time spent on paid work and childcare, while housework time is computed as the sum of the main activities (house cleaning, cooking, laundry washing, ironing, dishwashing, water collecting, and wood collecting) that are coded by respondents. Household members report data for a weekday in the case of paid work while unpaid work is provided in hours per week. Therefore, the data are standardized to a weekly frequency. Thus, to examine gender differences in unpaid and paid work, this study has constructed three dependent variables: *housework*, *childcare*, and *paid work*.

Guatemala is a multicultural, multiethnic, and plurilingual country. In urban areas, the indigenous population comprised around 24.83 percent in 2000 and 29.01 percent in 2014. This group is also characterized by a higher rate of poverty and inequality (CABRERA; LUSTING; MORAN, 2015), which led to building, a dummy variable to identify the indigenous population. The female population is larger than the male, representing 52.28 percent in 2000 and 52.43 percent in 2014. In order to map the life cycle, three age groups are distinguished. Table 3.1 reports the age distribution by gender.

[45] While the urban population accounted for 38 percent of the total population in 2000, this ratio rises by 12 percent in 2014.
[46] Dropped observations with missing values represent less than 1 percent of each year's survey.

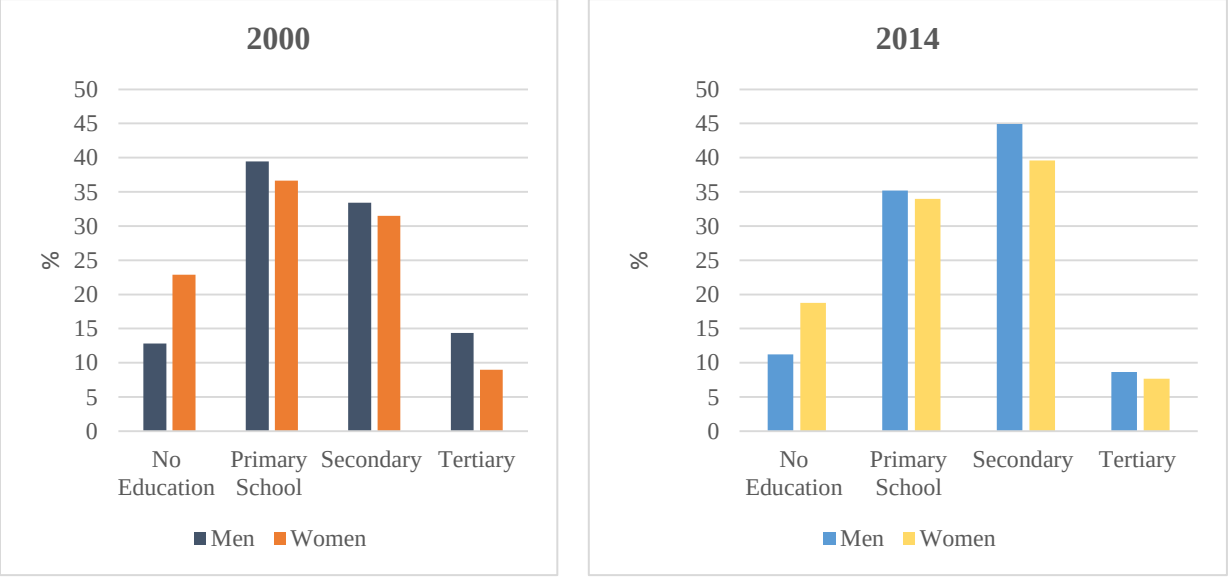
Table 3.1 Age distribution by gender (2000-2014)

	2000			2014		
	Whole	**Female**	**Male**	**Whole**	**Female**	**Male**
Age groups						
15-24	31.32	31.44	31.17	31.29	30.2	32.56
25-39	31.00	31.02	30.97	31.61	31.49	31.75
40-59	26.71	26.88	26.50	24.49	25.54	23.28
60 and over	10.97	10.65	11.36	12.60	12.77	12.41

Source: Authors' calculation based on ENCOVI 2000 and 2014.

Educational attainment is presented for four main categories: no education, primary, secondary, and tertiary. As noted below, there are differences in schooling levels between men and women, which remained stable over time. The participation rates in primary and tertiary education declined for both men and women. However, educational attainment levels of the Guatemalan population have improved significantly over the last years, especially the illiteracy rate has declined for both men and women, and the secondary rate that has increased (see Figure 3.1).

Figure 3.1 Education level by gender (2000-2014)



Source: Authors' calculation based on ENCOVI 2000 and 2014.

The time allocated to housework, childcare, and paid work varies substantially across individuals and within the household where each person may have different responsibilities. For instance, while young Guatemalans living with their parents may assume domestic tasks, siblings, grandmothers, or other relatives may provide childcare within the household. Regarding these living arrangements, a variable named "relation" is constructed and categorized into five groups: head household, spouse (partner), son (daughter), son-in-law (daughter-in-law) and other relatives (grandson/granddaughter, parents-in-law, among others).[47]

There probably exist gender differences among single-person households as well as multi-person households. Thus, larger households demand more household production. To capture this kind of information, household size is used as a control variable. The average Guatemalan household consisted of 5.36 people in 2000, while in comprised about 5.21 people in 2014.[48]

Generally, adults face responsibilities for caring for both young children and elderly parents. The presence of children also increases the time spent on housework. In this regards, two continuous variables are added: the number of children under 5, and the number of persons aged 60 and over--when they typically become economically inactive.

Market work is the most important source of income for most households, but labor income has not been considered because the model may suffer endogeneity problems. Nonetheless, it is possible to use a proxy for the economic situation of the household.[49] Because the time devoted to domestic chores is usually positively correlated with the poverty level of the household (see BARNETT; WHITESIDE, 2002), a dichotomous variable is constructed to identify whether the household is poor or not.[50]

[47] On average, 28 percent of the Guatemalan population lives in multigenerational family households. Meanwhile, the population living in couples with children aged 15 or older reaches 25 percent.

[48] Fertility remains higher in Guatemala than in neighboring Central American countries like El Salvador, Nicaragua, and Honduras. It also remains higher than most other South American countries (DE BROE; HINDE; FALKINGHAM, 2004). In Guatemala, the total fertility rate (TFR) recorded was 3.19 for the 2010-2015 period (see the report of this indicator in UNFPA).

[49] This study also tried to control the non-labor income, but the results were not robust, so this variable was not included in the final estimation.

[50] Poverty status is a variable that indicates if the household is poor or non-poor and is reported directly by the ENCOVI. Poverty is measured using household consumption. For more details about calculations, see INE (2000, p. 3-7). The incidence of poverty in Guatemala is still high. According to the World Bank, the incidence of poverty

Finally, some families tend to understand domestic labor in terms of a hierarchy based on relations of class, rather than those of gender, employing others to take care of their children or work at home. However, this study does not control this possible effect because the survey reported only domestic workers who live in their employer's household.

The variables mentioned above were grouped into two categories, namely individual and household characteristics. See the detailed description and descriptive statistics of these variables in Table 3.3 and Table 3.4 respectively in the appendix.

3.4.Methodology

This section presents the empirical strategy to investigate the determinants of time allocated in unpaid and paid work by gender in Guatemala. Thus, large discrepancies in the gender division of labor may be observed using individual and household characteristics as control variables. Another important issue is knowing whether these differences have been reduced or whether they have remained stable over time. This study explores such questions using two points in time, 2000 and 2014. To answer it, a multivariate Tobit model is built, allowing the analysis of time uses simultaneously. This econometric approach is presented in the next section.

The model

The decision to allocate time by men and women on paid and unpaid work is modeled distinguishing three types of activities: housework, childcare, and paid work. The main problem that one faces when dealing with data is the presence of zero observations on dependent variables. Such excess weight of extreme values causes biases when the usual linear regression models are used. In order to resolve this, the literature proposes the use of the Tobit Model (TOBIT, 1958). The structural equation in this model is the following:

$$y_i^* = X_i\beta + \varepsilon_i \qquad (3.1)$$

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was 56.19 percent in 2000 and 59.3 percent in 2014 (see the report of these indicators in the Socioeconomic Database for Latin America and the Caribbean, SEDLAC, at Universidad de La Plata and World Bank, 2014).

where; $\varepsilon_i \sim N\ (0, \sigma^2)$, the model expresses the observed level of the dependent variable (y) in terms of an underlying latent variable (y^*).

$$y_i = \begin{cases} y^* if\ \ y^* > 0 \\ 0\ \ \ if\ y^* \leq 0 \end{cases} \quad (3.2)$$

According to Amemiya (1985), the likelihood function for this model takes the form:

$$L = \prod_0 [1 - \phi(X_i')]\ \prod_1 \sigma^{-1}\, \phi\left[\frac{y_i}{\sigma} X_i' \alpha\right] \quad (3.3)$$

An important distinction of this study is that non-market work time is divided between housework (house cleaning, cooking, laundry washing, ironing, dishwashing, water collecting, and wood collecting), and childcare. Household members decide what resources to devote to household production at the same time as they decide whether participating in the labor market. In this sense, a system of equations with multiple censored variables is presented. Here, it is necessary to consider both censoring and simultaneity. Extensions to the original Tobit model have been proposed to analyze multivariate censored data in the literature (NELSON; OLSON, 1978; MADDALA, 1983).

These variables are functions of a set of exogenous variables and are simultaneously determined. The equation for each activity can be represented by:

$$Y_{hw}^* = f(X_{hw}) + \varepsilon_{hw} \quad (3.4)$$

$$Y_{ch}^* = f(X_{ch}) + \varepsilon_{ch} \quad (3.5)$$

$$Y_{pw}^* = f(X_{pw}) + \varepsilon_{pw} \quad (3.6)$$

where; $[\varepsilon_{hw}, \varepsilon_{ch}, \varepsilon_{pw}\ ] \sim N\ (0, \sum)$, Y_{hw}^*, Y_{ch}^*, Y_{pw}^* are latent variables associated with time use, and X_{hw}, X_{ch}, and X_{pw} represent the common attributes that influence the dependent variables.

The likelihood function of the system of equations in the case in which all activities are censored is given by:

$$L = f(\varepsilon_{hw}, \varepsilon_{ch}, \varepsilon_{pw}) \quad (3.7)$$

where, f is the probability density function of a multivariate normal function with mean zero and variance $\sum$.

In this next section, this work examines how time is distributed among the three dependent variables of interest.

3.5.Results

First, this work explores the data by reporting time use in the three activities: housework, childcare, and paid work for women and men by individuals and household characteristics, as well as changes in the time devoted to these tasks over time. Then, the multivariate analyses are presented.

3.5.1. Time use and gender differentials over 2000-2014

Time allocation in the three activities analyzed differs by gender in Guatemala. Looking at different groups, various patterns in gender gap are observed, which seem to be stable over time. As expected, for both periods, on average, women devoted more time to housework and childcare and continued to spend less time in paid work, which leads to women accumulating both types of work while men show specialization in the market work. For instance, spouses and daughters-in-law allocate more time in housework and childcare than the rest of the family members. It is also remarkable that the gender gap in the three activities exists at all stages of the life course, but important differentials are observed at the extreme phases of the life cycle (among the very young and the older individuals): while very young individuals devote less than 22 hours per week to housework, individuals over sixty spend less than 24 hours. As expected, a decrease in working time for older household members is reported (see Table 3.5 in the appendix).[51]

Differences between educational attainment and the time devoted to unpaid and paid work are also reported (see Figure 3.2, Figure 3.3, and Figure 3.4 in the appendix). For both men and women, the time devoted to housework is associated negatively with the level of education,

[51] Generally, time use surveys report a relatively large number of individuals with zero values in each time category. In Guatemala, the share of respondents with zero values varies according to the activity, the largest being for childcare time in both years (an average of 70 percent). For housework, it is around 50 percent, and for paid work, it is 40 percent.

while childcare time tends to increase with educational level. For instance, in 2000, educated women spent, on average, 4 hours more per week on childcare than women with less education. However, highly educated women decreased their childcare time supply in 2014. Moreover, men with higher education spent, on average, more time in childcare compared to those less educated (2.56 hours in 2000 and 0.6 hours in 2014).

3.5.2. Multivariate Tobit Model

The multivariate Tobit model allows the simultaneous analysis of the effect of individuals and household characteristics on time allocation for housework, childcare, and paid work. Thus, the model is a system of three equations. In general terms, the findings show that women's time allocation is more responsive to individuals and household characteristics than men's for both periods analyzed.

Table 3.2 reports the results concerning observable individual characteristics. The relationship to the head of the household is only relevant to the time devoted by women. Spouses tend to spend more time on housework and childcare than the rest of the family members. As expected, the time allocated on unpaid and paid work varies across the life cycle. Age has a strong effect on hours allocated to childcare and paid work for both women and men at all stages of life for both periods. However, this is not relevant for the time devoted to housework, except for women aged 40-59.

Consistent with the literature, this study finds that educational attainment plays an important role in how individuals allocate their time between market and non-market activities (see, KALENKOSKI et al., 2006; GURYAN et al., 2008; SULLIVAN, 2010; MANCININI; PASQUA, 2012; BIANCHI et al., 2015). For instance, housework time tends to decrease with education level. Higher-educated individuals spend less time in this activity than their lower-educated counterparts. However, the difference becomes more significant for women at the university level (5 hours in 2000 and 10 hours in 2014) when compared to men at the same level (between 1-4 hours), which becomes notable only in 2014.

Important differences in childcare time across educational groups are also observed among men. Higher-educated men spend significantly more time in childcare in relation to those who completed primary school for both periods. Women's education has a positive impact on their working hours, although this varies according to their education level. Female educated tend to devote more hours to market work compared to those who studied up to primary level.

Guatemala comprised an important proportion of the indigenous population. Nevertheless, this variable is only statically significant for women in childcare. For men, it is only relevant for housework. In both periods, indigenous women significantly decreased their time devoted to childcare while men tended to spend more time on housework.

Household characteristics also affect time allocation across individuals, as is shown in Table 3.2. The size household is only statically significant for women in childcare. An additional member in the household decreases the time allocated to childcare by 1.4 hours per week in 2000, and 1.12 hours per week in 2014. The effect of the size household is strongly significant and negative on time devoted to household chores by men. An additional member in the household decreases the time allocated to these chores by 1.6 hours per week in 2000, and almost one hour per week in 2014. Household size has a positive impact on paid work by men, although it is only highly significant in 2000.

In terms of household composition, the number and the age of children in the household affect significantly the time devoted to childcare and paid work by women in both years, which is consistent with previous findings (YEUNG et al., 2001; MANCININI; PASQUA, 2012). Women's time allocation on childcare is associated positively with the number of children under 5. Meanwhile, an additional child (under 5) in the household decreases women's hours of market work by 6 in 2000 and by 3 in 2014. The number of adults aged sixty or over also seems to affect negatively the time allocated by women on childcare in 2014. Given the age structure of the Guatemalan population, childcare supply may be compensated by the demand for adult care in multi-family households, where women and girls are usually the predominant providers of informal care for family members (WORLD BANK, 1999; CHAPPELL et al., 2015; ILO, 2018).

Table 3.2 Results of Multivariate Tobit model

Dependent variable	Housework				Childcare				Paid Work			
	Female		Male		Female		Male		Female		Male	
	2000	2014	2000	2014	2000	2014	2000	2014	2000	2014	2000	2014
Individual Characteristics												
Relation to household												
Spouse/Partner	6.81***	10.95***	3.88	11.83***	11.08***	3.95**	2.77	3.16	-22.64***	-28.14***	-12.36**	-5.46*
Son/Daughter	-12.41***	-4.37***	1.17	2.56*	-16.90***	-11.0***	-24.18***	-16.34***	-6.26*	-16.12***	-21.68***	-17.15***
Son/Daughter in law	-1.27	9.23***	-4.74	2.49	13.07**	5.60*	-9.08	6.88**	-24.39***	-37.55***	0.90	-1.52
Other relatives	-10.76***	-5.01***	4.12	0.86	-11.74**	-1.59	-22.08***	-10.12***	-16.30***	-20.94***	-19.65***	-16.59***
Age Group												
25-39	4.90***	-0.6	-2.69	-0.33	8.46***	2.68**	4.11	1.02	14.00***	26.41***	7.34***	12.62***
40-59	5.19***	1.87*	3.07	-0.33	-14.17***	-14.84***	-8.33	-7.81***	10.04***	19.59***	1.06	6.04***
60 and older	1.16	0.7	6.64	4.7**	-23.08***	-18.96***	-23.07***	-8.37**	-17.15***	-18.51**	-17.04***	-18.22***
Educational attainment												
Primary	3.57***	1.41	0.40	4.1 **	-6.45*	0.33	2.01	1.08	6.63**	5.90**	1.26	3.84**
Secondary	3.28**	-1.81*	3.27	-2.73	-2.44	2.89*	11.69**	6.08**	1.23	6.08**	-4.91**	-0.47
Tertiary	-4.90**	-10.06***	-0.92	-3.63	1.79	-1.39	14.05***	5.07**	11.79***	15.90**	-3.30*	-2.72
Ethnicity	5.72***	0.02	9.57***	2.00*	-10.43***	-2.25*	-2.58	-0.27	-1.00	2.52*	1.83	1.15
Household Characteristics												
Household size	0.20	0.21	-1.60**	-0.91***	-1.43***	-1.12***	-1.17*	-8.46**	0.53**	-0.17	1.06***	0.10
Number of children aged under 5 years	0.57	1.42**	1.42	-0.77	27.08***	20.94***	15.84***	12.79***	-5.88***	-3.00**	1.30	1.82**
Number of persons aged 60 and older	1.64*	-1.1*	0.71	-0.21	-1.12	-3.2***	6.92***	-2.87*	-4.69**	5.22***	-2.52**	-0.001
Poor	1.62*	1.87**	-3.51	1.56	-8.55***	4.8***	-11.78***	1.06	-0.67	-4.34**	1.53	-1.32
Constant	10.44***	17.51***	-20.57***	-17.02***	-7.55*	-12.89***	-39.00***	-27.48***	7.27*	-4.96	40.48***	36.4***

* p<0.10; **p<0.05; ***p<0.01

Note: The reference categories are: head, aged 15-24, no education, and non-poor.

Source: Authors' calculation based on ENCOVI 2000 and 2014.

Finally, in both years, poverty status is only statistically significant for the time devoted to housework and childcare by women. Women living in poor families spend more hours on domestic activities as compared to non-poor females. Results are mixed for their childcare time. In 2000, this variable had a negative effect on the time devoted to childcare. In contrast, this effect becomes positive in 2014. Poverty status only seems to affect negatively the time devoted to childcare by men in 2000.

3.6.Conclusions

This work contributes to the existing empirical literature by examining the effects of individual and household characteristics on the time allocation decision for both women and men, and how they have evolved over time in Urban Guatemala. For that, a multivariate Tobit model is built, which models simultaneously the decision of individuals to allocate time between unpaid and paid work. An important distinction of this study is that unpaid work time is divided between housework and childcare, distinguishing three time uses: housework, childcare, and paid work. The National Survey (ENCOVI) from 2000 and 2014 is used for the estimations. It is important to note that this is not a Time-Use Survey, but it is a representative survey of the Guatemalan population and includes a module of time use.

The findings provide evidence that time allocation is largely determined by gender. For both periods, on average, women devoted more time to housework and childcare while men spent more hours on paid work than their counterparts, which leads women to accumulate both unpaid and paid work and men to show specialization in the market work. These results are in line with previous studies that have analyzed the intrahousehold time allocation across developed and developing countries.

This study also shows that women's time allocation is more responsive to individuals and household characteristics for both periods. For instance, spouses tend to spend more time on housework and childcare than the rest of the family members. Gender differences also emerged over the life cycle of women and men. Age has a strong effect on hours allocated to child care

and paid work for both women and men at all stages of life for both periods, but this is not relevant for the time devoted to housework, except for women aged 40-59.

The results also show that educational attainment plays an important role in the time allocation of individuals between market and non-market activities. Generally, housework time tends to decrease with education level. Higher-educated individuals spend less time in this activity than their lower-educated counterparts. However, the difference becomes higher for women at the university level (5 hours in 2000 and 10 hours in 2014) when compared to men at the same level (between 1-4 hours), which becomes significant only in 2014. Another interesting result is that higher-educated men spend significantly more time on childcare in relation to those who completed primary school in both years. Previous studies have found similar results (GRACIA; GHYSELSH; VERCAMMEN, 2011; SULLIVAN; BILLARI; ALTINTAS, 2014). Educational attainment is strongly more significant for women on paid work for both years. Women's education has a positive impact on their working hours, although this varies according to the education level. Female educated tend to devote more hours to market work compared to those who studied up to primary level.

Some relevant indications also emerge from the analysis of the household variables in the model. The number of children under 5 in the household affects positively the time devoted to childcare. Meanwhile, an additional child (under 5) in the household decreases women's hours of market work in both years. Besides, the number of adults over sixty seems to affect negatively the time allocated by women on childcare in both periods. Other factors explaining the gender gap are household size and poverty status. An additional member in the household decreases the time allocated to housework by men. Meanwhile, women living in poor families spend more hours on domestic activities as compared to non-poor females.

The results highlight the persistent gender gap in time allocation over time. Despite the female participation in labor markets has risen steadily in recent decades, women continue being primarily responsible for housework and childcare in Guatemala.[52] Similar results have been

[52] The pattern of employment among men and women has changed over the past decades. The ratio of women's labor force participation grew from 29 percent in 1990 to 41.02 percent in 2014 (RAMÍREZ, 2012; INE, 2014).

reported for both developed and developing countries (see, e.g., SULLIVAN, 2011; SAYER, 2016; RUBIANO-MATULEVICH; VIOLLAZ, 2019). Thus, the research focused on time use can contribute to recognizing the invisibility of the unpaid work of women.

In summary, the findings indicate that gender differences in time allocation to housework, childcare, and paid work are substantial. Consequently, these gender differences limit access to productive activities and affect negatively the well-being, especially of women, who spend most of their time on unpaid work. These findings may have a large implication on economic policies if time use is incorporated into labor market analysis and the design of employment policies.

The results suggest new research on other unpaid care activities, especially, caring for elderly members of family according to family and work patterns. Generally, women face care responsibilities for both young children and elderly members of households (ILO, 2018). Moreover, unpaid care activities demand time, and these are potentially costly, which may lead to a rearrangement of employment schedules (BIANCHI et al., 2006) or a reduction in working hours (CRAING, 2006; VOSKO, 2006; MOLINA, 2015).

3.7.References

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3.8.Appendix

Table 3.3 Description of independent variables

Variable	Description
Individual Variables	
Relation to household	An ordinal variable that indicate the relation with head households, 1- Head Household 2- Spouse/Partner 3- Son/Daughter 4- Son/Daughter in law 5- Other relatives (Grandson/Granddaughter, Parents/Parents in law and Other relatives)
Age Group	An ordinal variable that indicate age groups, 1- 15-24 years old 2- 25-39 years old 3- 40-59 years old 4- 60 or over
Educational Attainment	An ordinal variable that indicate education groups, 1- No Education 2- Primary 3- Secondary 4- Tertiary
Indigenous	It is a dummy that takes on the value 1 if the individual is indigenous
Household Variables	
Household size	A continuous variable that indicate the household size
Number of children aged under 5	A continuous variable to indicate the number of children under 5 years old
Number of persons aged 60 or over	A continuous variable to indicate the number of persons aged 60 and over
Poor	A dummy variable to indicate the poverty status of household (takes on value 1 if the household is poor)

Table 3.4 Summary statistics of the independent variables by gender

Women				
	2000, N=5,233		**2014, N=8,219**	
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**
Individual Variables				
Relation to household				
Spouse/Partner	0.46	0.50	0.42	0.49
Son/Daughter	0.27	0.44	0.30	0.46
Son/Daughter in law	0.03	0.16	0.03	0.16
Other relatives	0.09	0.29	0.09	0.28
Age Group				
25-39	0.31	0.46	0.31	0.46
40-59	0.27	0.44	0.26	0.47
60 or over	0.11	0.31	0.13	0.33
Educational attainment				
Primary	0.37	0.48	0.34	0.47
Secondary	0.31	0.46	0.40	0.49
Tertiary	0.09	0.29	0.08	0.27
Indigenous	0.24	0.43	0.28	0.45
Household Variables				
Household size	5.36	2.44	5.16	2.48
Number of children aged under 5	0.68	0.87	0.48	0.72
Number of persons aged 60 or over	0.66	0.87	0.44	0.71
Poor	0.27	0.44	0.41	0.49
Men				
	2000, N=4,466		**2014, N=7,226**	
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**
Individual Variables				
Relation to household				
Spouse/Partner	0.01	0.10	0.02	0.14
Son/Daughter	0.30	0.46	0.36	0.48
Son/Daughter in law	0.02	0.13	0.03	0.16
Other relatives	0.08	0.27	0.06	0.24
Age Group				
25-39	0.31	0.47	0.31	0.46
40-59	0.26	0.44	0.25	0.44
60 or over	0.11	0.31	0.13	0.33

Table 3.4 (Continued)

Educational attainment				
Primary	0.39	0.49	0.35	0.48
Secondary	0.33	0.47	0.45	0.50
Tertiary	0.14	0.35	0.09	0.28
Indigenous	0.24	0.43	0.28	0.45
Household Variables				
Household size	5.52	2.56	5.26	2.54
Number of children aged under 5	0.66	0.87	0.45	0.71
Number of persons aged 60 or over	0.37	0.67	0.41	0.70

Source: Authors' calculation based on ENCOVI 2000 and 2014.

Table 3.5 Hours per week spent on housework, childcare, and paid work by gender, and various sub groups (2000-2004)

Mean hours per week spent on	Women					
	2000			2014		
	Housework	Childcare	Paid work	Housework	Childcare	Paid work
Whole	22.84	16.00	19.01	25.37	7.51	16.82
Indigenous population	26.47	16.08	17.04	26.15	7.64	16.17
Relation to head household						
Head	22.88	12.69	25.34	23.32	4.83	24.51
Spouse/Partner	28.72	21.3	17.17	31.72	10.05	13.96
Son/daughter	14.95	9.81	21.04	18.67	4.91	18.44
Son/Daughter in law	27.58	30.19	10.18	29.66	17.65	11.88
Other relatives	15.39	8.86	14.82	18.27	4.64	13.26
Age group						
15-24	17.72	15.76	16.46	21.84	9.12	12.64
25-39	25.81	25.03	22	26.49	11.57	21.65
40-59	26.44	9.6	22.2	28.47	3.39	20.05
60 or older	20.66	5.87	10.48	24.62	2.29	8.34
Household Characteristics						
Poor	26.15	17.7	15.7	24.04	6.12	18.46
Non-poor	21.61	15.36	20.24	27.33	9.54	14.4
Mean hours spent on	**Men**					
	2000			2014		
	Housework	Childcare	Paid work	Housework	Childcare	Paid work
Whole	2.67	3.08	40.14	3.1	2.1	38.4
Indigenous population	3.55	2.64	42.26	2.97	1.88	40.44
Relation to head household						
Head	2.84	3.88	46.33	2.83	2.45	44.02
Spouse/Partner	4.86	4.28	35.92	5.07	1.75	42.01
Son/daughter	2.38	1.70	30.06	3.07	0.93	30.83
Son/Daughter in law	1.71	5.45	49.84	2.29	5.51	48.21
Other relatives	2.55	1.81	31.00	3.32	0.94	27.41
Age group						
15-24	2.45	2.21	31.39	3.05	1.48	30.13
25-39	2.13	5.31	48.15	2.46	3.17	47.21
40-59	3.00	2.29	46.38	2.82	1.31	45.01
60 or older	4.05	1.46	30.18	4.33	0.78	25.70

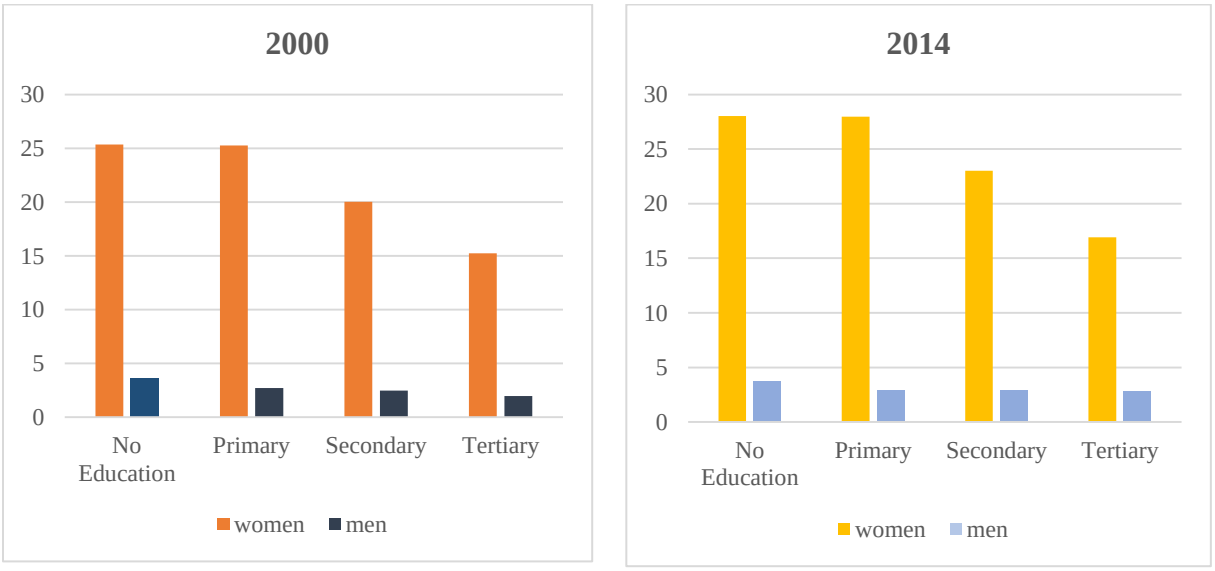
Table 3.5 (Continued)

Household Characteristics						
Poor	2.96	2.56	43.27	2.92	1.77	37.97
Non-poor	2.56	3.28	38.95	3.04	2.04	39.06

Note: The table reports the unconditional mean. the ratio of individuals with non-zero values in each time category and the means conditioned on declaring a positive value (percentage of zeros)

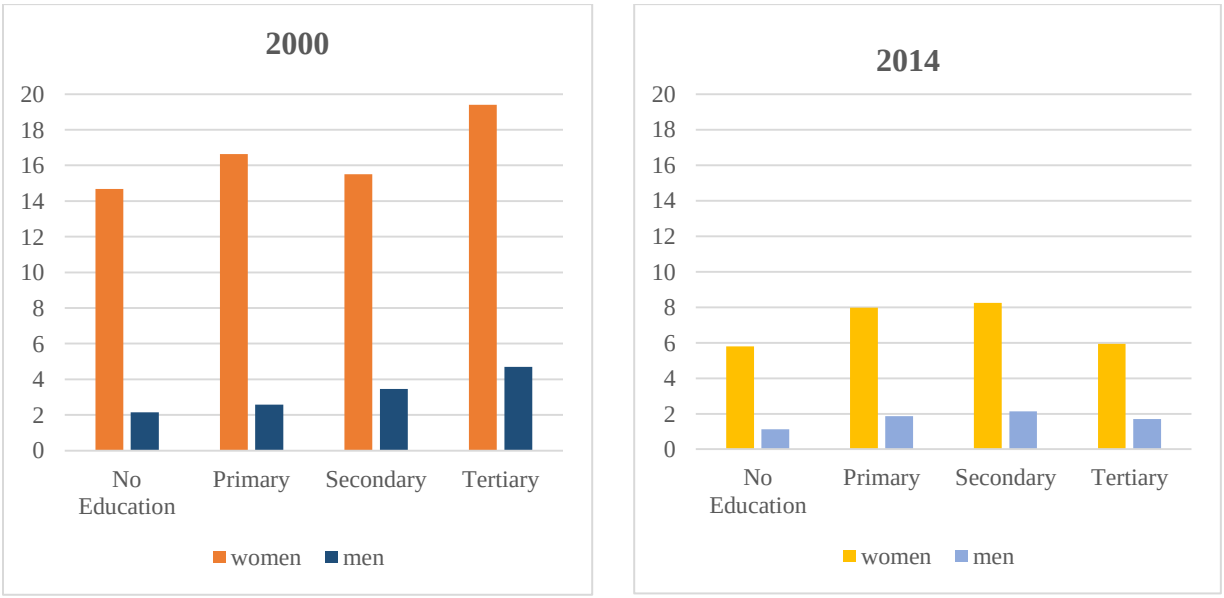
Source: Authors' calculation based on ENCOVI 2000 and 2014.

Figure 3.2 Time spent on housework per week (2000-2014)



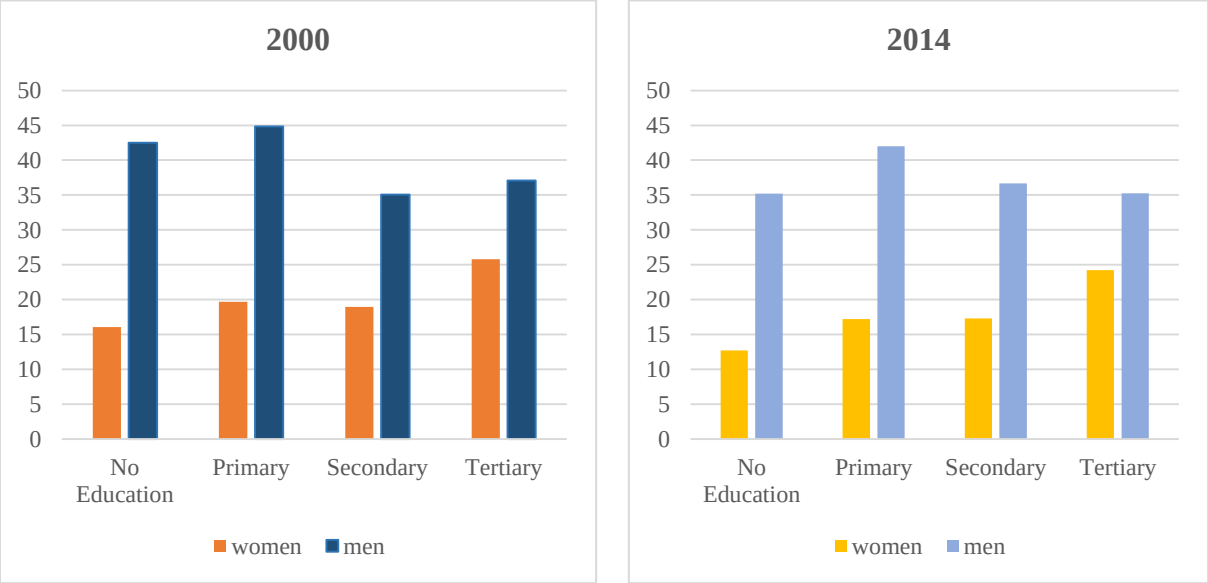
Source: Authors' calculation based on ENCOVI 2000 and 2014.

Figure 3.3 Time spent on childcare per week (2000-2014)



Source: Authors' calculation based on ENCOVI 2000 and 2014.

Figure 3.4 Time spent on paid work per week (2000-2014)



Source: Authors' calculation based on ENCOVI 2000 and 2014.

4. STUDY 3 GENDER OCCUPATIONAL INTENSITY AND GENDER DIFFERENCES IN PAY IN THE NORTHERN TRIANGLE OF CENTRAL AMERICA (2014)

ABSTRACT

This paper examines the relationship between gender occupational intensity and gender differences in pay in the Northern Triangle of Central America using national surveys carried out in 2014. For this task, a harmonized occupational classification at the 2-digit-level is built with the objective of analyzing the occupational distribution across countries. Then, quantile regressions are estimated to explore in detail which factors are affecting wages; in particular, this paper pays special attention to female occupational intensity (MACPHERSON; HIRSCH, 1995; BAKER; FORTIN, 2003). The comparative analysis suggests that women are always at a disadvantage when compared to men in the labor market. Females are overrepresented in certain occupations, and they are much more likely to be working in part-time jobs than men in all countries. The results also show that women earn less than men in the region, but the largest differences are observed at the lower part of the distribution. Educational attainment plays an important role in wage differentials, and the patterns are stable for all countries. For instance, individuals with tertiary education have the highest wage rates along the wage distribution in all countries. Besides that, the returns to education are higher for women than for men at the lower quantile and at the mean of the distribution. On the other hand, at the upper quantile of the distribution men tend to have a higher return to education than women. Another important factor is worked hours: it is observed a wage penalty for part-time workers; however, it is higher for women at the lower quantile of the wage distribution across countries. Finally, the findings show wage penalties for working in female-dominated occupations along the distribution. However, gender differences across female occupational intensity quantiles are noted, the effect of this variable is higher at the lower quantile of the distribution for women, especially in El Salvador and Honduras.

Keywords: gender occupational intensity, pay gap, quantile regression, Northern Triangle of Central America

RESUMO

Este trabalho examina a relação entre intensidade ocupacional de gênero e diferenças salariais por gênero no Triângulo Norte da América Central usando pesquisas nacionais conduzidas em 2014. Para essa tarefa, uma classificação harmonizada ocupacional de nível de dois dígitos é construída com o objetivo de analisar a distribuição ocupacional nos países. Então, regressões quantílicas são estimadas de modo a explorar em detalhe quais fatores estão afetando a remuneração, em particular, este trabalho fornece atenção especial à intensidade ocupacional feminina (MACPHERSON; HIRSCH, 1995; BAKER; FORTIN, 2003). A análise comparativa sugere que mulheres estão sempre em desvantagem quando comparadas aos homens no mercado de trabalho. Mulheres estão excessivamente presentes em certas profissões e tem muito mais probabilidade de estarem trabalhando em empregos de meio período do que os homens em todos os países. Os resultados demonstram que mulheres ganham menos do que homens na região, mas a maior diferença é observada na parte inferior da distribuição. O nível educacional exerce um papel importante nos diferenciais de renda e os padrões são estáveis para todos os países. Além disso, o retorno da educação é maior para mulheres do que para homens na parte inferior dos quantis e na média da distribuição. Por outro lado, no topo da distribuição, homens tendem a ter um maior retorno da educação do que mulheres. Um outro importante fator são horas trabalhadas: observa-se uma penalidade salarial para trabalhadores de meio-período, porém isso é maior para mulheres na parte inferior dos quantis nos países. Finalmente, os resultados demonstram penalidades salariais ao se trabalhar em profissões dominadas por mulheres ao longo da distribuição. Entretanto, diferenças de gênero ao longo dos quantis da intensidade ocupacional feminina é notada, o efeito dessa variável é maior na parte inferior dos quantis da distribuição para mulheres, especialmente em El Salvador e Honduras.

Palavras-chave: Intensidade ocupacional de gênero; diferença salarial; regressão quantílica; Triângulo Norte da América Central.

4.1.Introduction

Patterns of employment among men and women have changed over the past decades: women's labor force participation has been growing across countries. Besides, women have experienced high educational levels, and more often they are better educated than men (DURYEA et al., 2007; CHIODA, 2011; BLAU; FERBER; WINKLER, 2014). Despite women's progress, gender differences persist in the labor market, particularly, in earnings and occupations. Gender differences in pay are generally attributed to a variety of factors: differences in work experience and family responsibilities, employer discrimination, and occupational segregation (see, MINCER, 1974; ANKER, 1997; BECKER, 1981, BLAU; KHAN, 2006). In this line, most cross-country studies confirm the prevalence of occupational segregation by gender is very extensive in both industrialized and developing countries, although these are particularly high in Latin America (BORROWMAN; KLASEN, 2019). For instance, women tend to be concentrated in occupations such as clerks, service and retail sales workers, numerical clerks, textile workers, housekeeping workers, restaurant services, and education and health professionals; whereas, men's employment is dominant in agriculture, crafts, trades, plant and machine operations, and managerial occupations (ENGLAND; BOYER, 2009; ILO, 2012; WEEDEN et al., 2018; ILO, 2019). Consequently, women continue to be disadvantaged in the labor market, as a result, they remain concentrated in low-paid jobs (ENGLAND; FOLBRE, 2005; BETTIO; VERASCHAGINA, 2009; LINDLELY, 2015). With respect to these gender differences, scholars have investigated the role of "feminization" (the share of females within each occupation) on gender differences in pay incorporating this variable into earnings equations (see, e.g., MACPHERSON; HIRSCH, 1995; COTTER, HERMSEN; VANNEMAN, 2003; BAKER; FORTIN, 2003). In fact, empirical evidence has shown that female-dominated occupations have lower wages than male-dominated occupations in both developed and developing countries (see, e.g., OLIVEIRA, 2001; BAYARD et al., 2003; ESPINO, 2013; SALARDI, 2013; ADDISON et al., 2018).

In addition, scholars suggest that working time patterns are an important feature in explaining a portion of the gender differences in pay (GOLDIN, 2014; MEURS; PONTHIEUX, 2015). Part-time workers tend to receive lower pay rates in relation to full-time workers (JAIN et al., 2010),

particularly, it is observed wage penalty among female workers (MANNING; PETRONGOLO, 2008; FERNÁNDEZ-KRANZ; RODRÍGUEZ-PLANAS, 2011; BOLL et al., 2017). For instance, the comparative study by Boll et al (2017) finds that women's higher presence at part-time work contributes to a widening of the cross-country gender pay gap by 1.6 points. Meanwhile, Cha and Weeden (2014) suggest wage premium for overworking, nevertheless, wage returns to overwork differ modestly by gender. They find that overworking men earn 10 percent more and overworking women earn 8 percent more than their full-time counterparts in the United States.

In this respect, the main contribution of this study is twofold. First, a harmonized data is built with the objective of proposing a new harmonized occupational classification at the 2-digit-level, which permits a consistent and comparable analysis of the occupational structure and occupational distribution across countries. Second, this research analyzes the role of gender occupational intensity on gender differences in pay in three countries of Central America: Guatemala, El Salvador, and Honduras, the region is known as the *Northern Triangle of Central America* this term is used with respect to economic integration, and their challenges. Finally, a comparative analysis is provided, which may be useful in terms of public policies in the region.

The underlying reasons for the interest in this topic are three. First, Latin American countries have experienced an increase in female labor participation during the last two decades. However, women appear to be concentrated in low-paying jobs. They are also overrepresented among unpaid family workers and in the informal sector, and rarely rise to positions of power in the labor market (WORLD BANK, 2012a, chapter 5). Particularly, in Central American countries, working women are underrepresented in managerial positions and overrepresented in other occupations like service workers, labourers, administrative personnel, and professionals (ÑOPO; ATAL; WINDER, 2010; ILO, 2019). Regarding that, these gender differences in the occupational distribution are relevant since they have negative impacts on women's life, shaping women's opportunities in the labor market, earnings and work experiences as well. Therefore, these findings can become an opportunity of promoting public policies that protect women's employment.

Second, the growing participation of Central American women in the economy requires a more exhaustive exploration of the way in which they are inserted in the labor market since some differentiated behaviors are noted with respect to men as wage differentials. The characteristics of the labor market and differences in trends across these countries suggest that this topic is a challenging research for the region. Therefore, this could also draw a picture to address gender occupational intensity its links with gender differences in pay. Third, the existing literature focuses on this topic in Central America is very scarce. Moreover, most of the studies have involved cross-international comparisons using only indices to examine gender differences on the occupational distribution (see, e.g., DEUTSCH et al., 2004; TENJO et al., 2005; ILO, 2019).

By considering these contributions, this dissertation aims to answer two questions. First, what factors affect gender differences in pay along the wage distribution? Second, does female occupational intensity into the labor market of the Northern Triangle impact wages at different points of the distribution? In order to answer these questions, the methodological approach is presented in two ways. First, a new typology of occupations allows exploring the occupational distribution in the urban areas of the region. Second, with the purpose of examining what factors affect gender differences in pay along the wage distribution, and how these are displayed among countries, quantiles regressions are estimated. In particular, the quantile method focuses on the effects of gender and other covariates on different quantiles along the distribution and not only on the average of variables. This paper pays special attention to female occupational intensity, which captures the proportion of female workers in each occupation (MACPHERSON; HIRSCH, 1995; BAKER; FORTIN, 2003). For these tasks, the comparative study uses data from the national surveys carried out in 2014.

After this introduction, section 2 provides a literature review, starting with the theories behind occupational segregation, and previous empirical studies that analyzed the role of occupational gender segregation on gender differences in pay in developed countries and Latin America with special attention to Central American countries, particularly the Northern Triangle region. Section 3 provides the context of the research. Section 4 presents a description of the data sources and variables used in the model. Section 5 explains the empirical methodology. Section 6 discusses the main results. Section 6 concludes.

4.2.Literature Review

The literature suggests that one of sources of the gender pay gap is differences in individual characteristics and human capital endowments. These differences have been analyzed within the capital theory which argues a positive relationship between educational attainment, experience and earnings (SCHULTZ, 1960; BECKER, 1962; MINCER, 1974).[53] However, gender differences in earnings have also been addressed through the phenomenon of occupational segregation ("the tendency for men and women to work in different occupations", ANKER (1998, p. 403) since occupations with a higher concentration of male labor tend to be better paid. In this respect, most of the relevant theories of occupational segregation, neoclassical theories, institutional and labor market segmentation theories, and gender theories have contributed to the understanding of occupational gender segregation.

Despite the criticism, neoclassical theories have influenced the economic literature, focusing on both labor supply and labor demand factors. Becker (1957) developed the idea that employers, employees and/ or customers may have prejudices against members of minority groups, which they identified as discriminatory tastes. Thus, these tastes may influence earning differentials.[54] Later, Baldwin, Butler, and Johnson (2001) have extended the Becker's model, which allow them to integrate an occupational sorting function into the traditional earnings equation. On the demand side, discrimination theory argues that occupational segregation occurs when workers face barriers entering into occupations, once employers "prefer" to hire women or men for certain occupations (see, ANKER, 1998). Women with equal education and productive potential are generally assigned to lower-paying occupations, while employers reserve the higher-paying occupation for men (EHRENBEG; SMITH, 2012, chapter 12).[55] On the other hand, labor market segmentation theory refers to the division of labor market into "primary" and "secondary" sector; jobs in the primary sector are relatively good in terms of pay, security, opportunities for

[53] The model argues that one's incentive to invest in human capital is directly proportional to the time one expects to work throughout life (POLACHECK, 2004).

[54] Becker (1957) explored the economic effects of discrimination in the marketplace due to race, religion, sex, color, social class, personality, or other non-pecuniary factors.

[55] In the past decades, economists have developed econometric methods to treat the effect of discrimination on the gender wage gap. For more details, see, Oaxaca (1973) and Blinder (1973); Machado and Mata (2005); Firpo, Fortin, and Lemieux (2009).

advancement and working conditions, while "secondary" sector jobs tend to be relatively poorer with respect to pay, and these also tend to provide little protection or job security. Thus, the primary sector tends to hire male workers, while women tend to be concentrated in the secondary sector (ANKER, 1997). Other assumptions of institutional theories, such as, minimum wages, unions, and large enterprises, and laws that protect women also play an important role in the labor market (LEMIEUX, 2006).

The theories described above have contributed to the understanding of gender differences in occupational distribution. Nonetheless, they do not offer a conclusive explanation/argument of the occupational gender segregation, its causes, and its persistence. In this sense, another theory supported mainly by feminist economists and sociologists has pointed out the importance of gender roles on occupational segregation. Additionally, feminist analysis is highly critical of mainstream male economists for taking gender division of labor for granted (see, ENGLAND, 1982; ENGLAND; FOLBRE, 2005).

The gender perspective argues there exist other factors that limit the equal participation of women and men in certain occupations that are not related to the labor market. For instance, gender stereotyping of occupations is an important source of occupational segregation (ANKER, 1997; BLACKBURN et al., 2002); lower levels of human capital accumulation for women in relation to men may be linked to the division of responsibilities within households and the reflection of patriarchy and women's subordinate position in society and family (see, BIANCHI et al., 2000). Women contribute more to routine housework and childcare than men, who tend to be specialized in the labor market (BIANCHI et al., 2000; FERRANT et al., 2014; BENERÍA; BERIK; FLORO, 2015).[56]

In this regard, another aspect that has also been discussed is occupational flexibility, women may "choose" conducive working hours because of their household responsibilities (ANKER, 1997). Females dedicate a significant amount of time complying with their family roles which do not fit particularly well with the quite strict time schedule of paid employment (VOSKO, 2006).

[56] The gender inequalities in paid and unpaid work have decreased in recent decades, however, the gender gap remains prevalent over time (AGUIAR; HURST, 2007; SULLIVAN, 2011; SAYER, 2016).

Particularly, women enter motherhood trying to look for occupations that allow them a job and a working-life balance, even though these types of jobs may offer advantages in terms of schedules or labor flexibility, generally they offer lower salaries (MANNING; SWAFFIELD, 2008; GICHEVA, 2013; GOLDIN, 2014). Therefore, women are more likely to take some time out of the labor market or quit, or be unable to work in occupations that involve long-hour shifts (GOLDIN, 2014).

The existing literature reports large and persistent gender differences in the distribution of occupations. Most empirical studies have relied on single indices of segregation to capture changes in the distribution of occupations. The most popular measure of horizontal occupational segregation[57] in the literature is the "index of dissimilarity (ID)" (ANKER; MELKAS, 1997; ANKER et al., 2003; BLACKBURN; JARMAN, 2006) or its modifications (e.g. KARMEL; MACLACHLAN, 1988).[58] Nonetheless, the ID is sensitive to the number of categories used in its computation (BLACKBURN et al., 2001).[59] Changes in indices can be decomposed in order to make distinctions within different effects (e.g. composition and mixture effects, see DOLADO et al., 2002). Another additional measure of segregation was proposed by Charles and Grusky (1995).[60]

Occupational gender segregation has been used as one of the determinants of the pay gap into earnings equations. For instance, Brown, Moon, and Zoloth (1980) modeled the male occupational distribution using a multinomial logit to produce a counterfactual female occupational distribution based on the set of female average characteristics and the estimated coefficients from the male subsample. Later, other scholars have investigated the role of *feminization* (the share of females within each occupation) in the labor market on the gender

[57] Occupational segregation makes distinctions within/between two main dimensions: vertical and horizontal. Horizontal segregation describes the fact that at the same occupational level, men and women have different job tasks, while vertical segregation refers to the distribution of men and women considering the hierarchical positions occupied by each one of them (BLACKBURN et al., 2000).

[58] ID index was originally proposed by Duncan and Duncan (1955). The index is usually expressed as the sum of a set of terms with one for every occupation (see, BLACKBURN et al., 2001).

[59] Anker (1997) argues that the level of segregation can be underestimated when the ID is calculated at one-digit occupational categories. Another problem with this conventional measure of segregation is that it is influenced by changes in the number of men and women entering the labor force and by the extent of female labor force participation (BLACKBURN; JARMAN, 2006).

[60] The ratio index overcomes limitations associated with previous indices. The ratio index, which is derived from the log-linear model (CHARLES; GRUSKY, 1995).

wage gap (e.g., MACPHERSON; HIRSCH; COTTER; HERMSEN; VANNEMAN, 2003; BAYARD et al., 2003 for the United States (U.S); for Sweden, HANSEN; WAHLBERG, 2000). For Canada, Baker, and Fortin (2003) who have incorporated the "femaleness" of occupations into wage equations, this variable is then defined as the proportion of female employment in its corresponding four-digit level.[61]

Occupational segregation and gender differences in pay

Education may be an important factor in the evolution of women's employment (GOLDIN, 2008). Women have reported higher levels of education than men in the overall population (BLAU; FERBER; WINKLER, 2014). Despite women's progress in educational attainment, the gender wage gap remains an important feature in the labor market across countries (BLAU; KHAN, 2003; ÑOPO; DAZA; RAMOS, 2011; WORLD BANK, 2012a; ILO, 2016b; BLAU; KHAN, 2017). For example, Boll et al (2017) estimate that the pay gap amounts to 15.3 percent in European countries.[62] Therefore, education is a necessary but not sufficient condition for changes in gender inequality to take place (BLAU; FERBER; WINKLER, 2014). In this regard, England (2010) highlights that women's educational attainment has risen, and this might have enabled women to move to professional jobs previously dominated by men in the U.S. However, she also argues that these revolutionary changes that have occurred since the 1960s have slowed down. The reasons beyond this deceleration can be numerous, including the continued devaluation of women paid and unpaid work, the stalled movement of women into male-dominated occupations, and continued inequality in heterosexual relationships.

In this line, Goldin (2014) argues that increases in the earning gap by age, and the increases in the earnings gaps and hours worked within and across occupations and sectors can explain large parts of the persistence of the gender wage gap. The empirical literature suggests that access to occupations tends to be highly differentiated by gender (e.g., ANKER, 1998; CHARLES; GRUSKY, 2004; BLACKBURN; JARMAN, 2006; BORROWMAN; KLASEN, 2019). For example, in the United Kingdom (UK), men tend to be concentrated in managers and senior

[61] Blackburn (2009) provides a rigorous measurement of the differences in cross-national occupational gender segregation. He also explores the reasons to these differences.

[62] The comparative study by Boll et al. (2017) examines the drivers of the gender wage gap in 21 European countries plus Norway.

officials' occupations or employed in skilled trades or processes, plants, and machine jobs, while women are more likely than men to be in administrative and secretarial, personal services, and sales and customer service job (LINDLEY, 2016). Weeden et al. (2018) report that women constitute 73 percent of workers in clerical occupations, but less than 4 percent of workers in craft occupations from 2015 to 2016 in the U.S.

Several studies have observed that women are generally found overrepresented in low-paying occupations and underrepresented in high-paying ones in the U.S (see, e.g., ALTONJI; BLANK, 1999; BLAU; KHAN, 2003; BLAU; KHAN, 2006; LEVANNON; ENGLAND; ALLISON, 2009; EHRENBEG; SMITH, 2012). Consistent with this evidence are European countries (see, e.g., DOLADO et al., 2002; GUPTA; ROTHSTEIN, 2005; BETTIO; VERASCHAGINA, 2009; LINDLEY, 2016). For instance, Lindley (2016) finds that men are more likely than women to be employed in jobs associated with higher pay, and gender difference arises entirely because of such occupations being overrepresented in male-dominated industrial sectors, while women still remain over-represented in the lousiest jobs in the UK. These gender differences in the distribution of occupations are also key to understand the gender differences in pay in many countries, including all industrialized countries (ALTONJI; BLANK, 1999; O' NEILL, 2003; BLACKBURN; JARMAN, 2006; BLACKBURN et al., 2009). In this regard, Blau and Khan (2017) suggest that occupational differences can explain one third of the gender wage gap in the U.S. Besides, the gender wage gap is not homogeneous across the entire wage distribution, which leads to the presence of "glass ceilings". The glass ceiling effect is a larger wage gap in the upper part of the distribution, while "sticky floors" effect might suggest the opposite (see, ALBRENCHT; BJ¨ORKLUND; VROMAN, 2003; KEE, 2006; ARULAMPALAM et al., 2007). In this line, De la Rica, Dolado, and Llorens (2008) estimate wage regressions using quantile regression and panel data techniques. They observe the presence of a sticky floor effect, especially for less educated workers, the gap decreases as we move up the distribution in Spain.

Gender differences in the occupational distribution are likely to be related to any differences in the work intensity. Part-time jobs are more common among women, for example; Vosko (2006) finds that retail trade is ranked amongst the highest for its use of part-time unskilled labor with most of these job positions available to women in Canada. In this line, Golden (2008) argues that

part-time jobs are more likely to offer flexible schedules than those with the traditional 40 hours per week. Consequently, part-time jobs among mothers remains most prevalent in many Western economies (BERGHAMMER, 2014). Several scholars also suggest this "flexibility" may raise female occupational concentration into ghettos (STEINMETZ; HANDL, 2003; BARDASI; GORNICK, 2008; MATTEAZZI, PAILHÉ; SOLAZ, 2014).[63] Occupational flexibility is likely to be related to the household gender division of labor. Regarding gender, researches continue to find women performing more household chores and care activities than men (BIANCHI et al., 2000; FERRANT et al., 2014; BENERÍA; BERIK; FLORO, 2015);[64] men are therefore more readily available for long hours of employment. (GOLDIN, 2014). Thus, most of the mothers engaged in paid work can face difficulties finding affordable childcare, and, consequently, often choose part-time jobs to balance their domestic and paid work responsibilities (CRANFORD; VOSKO, 2006; JACKSON, 2010).

On the other hand, high-level jobs often demand long hours. Generally, more men report working long hours (WEEDEN; CHA; BUCCA, 2016), while women remain underrepresented among "overworkers" (i.e., 50 hours or more per week) due to their greater responsibility for family caregiving (BLAIR-LOY, 2003; CHA, 2013). Moreover, trends in overwork have been especially pronounced among highly skilled men (DRAGO et. al., 2005; KHUN; LOZANO, 2008; CHA; WEEDEN, 2014). For example, Khun and Lozano (2008) find that the share of employed 25-64 years old men who usually work more than 50 or more hours per week on their main job reached 18.5 percent, while the share of long hours was 30.5 percent among college-educated men employed full-time (30 hours or more) in the U.S. The correlation between long-hours and high pay have been explored by the labor economics literature (see, e.g., CHARNESS, 2004; CHARNESS; KUHN, 2007; FEHR; GOETTE, 2007). Gicheva (2013) uses a promotion model to show that there exists a positive relationship between long hours and wage growth.[65] For American workers who put in over 47 hours per week, 5 extra hours are associated with a 1

[63] Women's part-time work is highly segregated and can be seen, to a certain extent, to form a female special job called "ghetto" (BLACKWELL, 2001; ENGLAND, 2010).

[64] The shift of women from the household to the labor market during the 20th century has fundamentally transformed both the market and non-market work (BIANCHI et al., 2012; GOLDSCHEIDER; BERNHARDT; LAPPEGARD, 2015).

[65] The promotion model was developed by Gibbons and Waldman (1999).

percent increase in annual wage growth. Moreover, this relationship is especially strong for young professionals.

In addition, research suggests that working time patterns are an important aspect of the explanation concerning a portion of the gender differences in pay (GOLDIN, 2014; MEURS; PONTHIEUX, 2015). Part-time workers tend to receive lower pay rates in relation to full-time workers (JAIN et al., 2010), particularly, part-time wage penalty affects mainly female workers (MANNING; PETRONGOLO, 2008; FERNÁNDEZ-KRANZ; RODRÍGUEZ-PLANAS, 2011; BOLL et al., 2017). For instance, the comparative study by Boll et al (2017) finds that women's higher frequency of part-time work contributes to a widening of the cross-country gender pay gap by 1.6 percent.[66] Meanwhile, Cha and Weeden (2014) suggest that wage premium for overwork, even though the wage returns to overwork differ modestly by gender. They find that overworking men earn 10 percent more and overworking women earn 8 percent more than their full-time counterparts in the U.S.

Focusing on studies that have examined the role of occupational structure on the gender differences in pay using earnings equations, Amuedo-Dorantes and De la Rica (2006) estimate a joint log wage regression for men and women, in which the gender wage gap can be explained as a function of individual human capital, job characteristics, and idiosyncrasies of the pay structure, and gender segregation.[67] Their results suggest that gender segregation and pay structure explain a portion of gender wage differentials of full-time salaried workers, the adjusted gender wage gap within job cells is around 14 percent and the gap in the base wage is 5 percent in Spain. Meanwhile, Baker and Fortin (2003) estimate log wage equations using human capital variables and job characteristics as control variables applying the Canadian four-digit occupation codes to measure the "femaleness" of jobs.[68] Their findings show that the contribution of occupational gender segregation is quite modest, however, another interesting result is shown, the gender composition of employment is not strongly relevant to female dominated low-paid

[66] Hours of work are also only available as a categorical measure, distinguishing between full-time workers, those who work 60-99 percent and those who work less than 60 percent of a full-time worker's normal workload. (Boll et al., 2017).

[67] Amuedo-Dorantes and De la Rica (2008) display the results using 2-digit occupational classifications.

[68] Female jobs are defined as those with a femaleness rate of 60 percent (clerical and care jobs are found predominately female jobs), while male-dominated jobs are considered with a femaleness rate of 30 percent (BAKER; FORTIN, 2003).

jobs; for instance, women are equally lower paid in mixed and male jobs (clerks and food preparations), however, some of them might also hold female jobs which are highly paid such as nurses and teachers. Later, Addison et al. (2018) have investigated the contribution of feminization (FEM) to the explained and unexplained gaps between 1993-2010 in the U.S.[69] They conclude that feminization plays an important role in explaining the gender wage gap, FEM coefficients remain significant and negative for both genders, although in the presence of the human capital and occupational controls they are significantly reduced to females (For example, by 2010 the FEM coefficient was -0.151 for females in the standard model and -0.075 in the expanded model; the corresponding values for males were -0.181 and -0.125).[70]

In Latin America, the empirical literature has shown that gender differences in pay tend to be associated with observable productivity characteristics such as education and potential labor experience. Most of the studies have paid attention to wage discrimination (see, e.g., TENJO et al., 2005; ENAMORANDO; IZAGUIRRE; ÑOPO, 2009; GALVIS, 2011; ÑOPO, 2012; POPLI, 2013; CANELAS; SALAZAR, 2014), nonetheless, research with a focus on occupational segregation is still limited.[71] Most research on occupational segregation has concluded that although women's labor force participation has increased in the past decades, nevertheless, there exists a large concentration of women in certain jobs and fields across countries (ANKER, 1998; TZANNATOS, 1999; BLAU et al., 2003; ORRACA; CABRERA; IRIARTE, 2016; ILO, 2019). More often women are concentrated in occupations such as medical, dental and related workers, teachers, numerical clerks, textile workers, salespersons, housekeeping workers, and restaurant services. While the most male-dominated occupations are generally: employees in the control of transportation and communications, agricultural workers, drivers, electric and electronic workers, and mechanics (see, e.g., DEUTSCH et al., 2005; ILO, 2019).

[69] Addison et al. (2018) use decomposition methods. Further, the female intensity of an occupation is measured as the share of female workers in the 3-digit occupation.

[70] The standard specification includes controls for years of schooling, potential experience and its square, and dummies for union coverage, public sector employment, large metropolitan area, full-time employment, Hispanic heritage, race, marital status, region, industry, and occupation. While, the "expanded" model includes all controls used in "standard" specification and 10 additional occupational and industry controls to include controls for working conditions (see, ADDISON et al., 2018).

[71] Empirical researches have shown that women and gender minorities experienced greater discrimination in the labor market. Most of them have followed the 'taste for discrimination' approach proposed by Becker (1971).

In this line, previous studies have reported high levels of occupational segregation across Latin American countries. Occupational segregation is a persistent phenomenon in Uruguay (AMARANTE; ESPINO, 2001; AMARANTE; ESPINO, 2004; ESPINO, 2013).[72] For instance, Espino (2013) uses segregation indices computed at the 3-digit level, the ID was 0.608 in 2010. For Colombia, Isaza-Castro (2013) finds an unequal distribution of women and men in the occupational structure, especially in the informal sector in which nearly 50 percent of those women work in housekeeping occupations. While Kuri Alonso (2014) finds that women's participation in historically feminized occupations remains stable in the Mexican labor market, particularly the most female-dominated occupations are education and preschool teachers and domestic workers, in these occupations male participation barely represents between 5 and 10 per percent of the total participation.

Isaza-Castro (2013) also includes a full set of occupations as equation intercepts to examine the level of wage inequality between occupational groups, the results then showed that wholesale and retail trade workers followed by engineers and technicians are the two occupation categories with the highest returns for both men and women.[73] Calónico and Ñopo (2009) use a matching comparison technique to explore the role of individual and family characteristics in determining gender segregation and wage gaps in the Mexican labor market. Their findings revealed that the complete elimination of hierarchical segregation would reduce the observed gender wage gaps by 5 percentage points, while the elimination of occupational segregation would have increased gender wage gaps by approximately 6 percentage points.

Scholars have found a strong link between occupational segregation and gender differences in pay in Brazil (OLIVEIRA, 2001; GIUBERTI; MENEZES-FILHO, 2005; MADALOZZO, 2010; SALARDI, 2013). For instance, Salardi (2013) has analyzed the gender wage gap throughout the wage distribution. She uses decomposition methods to show that effects are driven by the wage structure, especially at the bottom of the distribution, although it has declined over time. Salardi (2013) also observes the presence of both effects (sticky and glass ceiling) for Brazil during 1987-2006. The study documented by Arceo-Gómez and Campos-Vasquez (2014) has also

[72] Amarante and Espino (2001) computed ID at the 2-digit level; it was 0.568 in 1999.
[73] The classification of occupations is at the 2-digit level, and data contains 23 occupations in the case of formal workers and 16 in the case of informal workers (ISAZA-CASTRO, 2013).

observed the gender wage gap in different parts of the wage distribution. The results reveal a consistent pattern of "sticky floors" and a decreasing pattern of "glass ceilings" over the period 1990-2010 in Mexico.

In addition, differences in human capital and demographic characteristics among male and female employees across occupations have been observed. The study documented by Oliveira (2001) estimates earnings equations and shows that marital status plays an important role in occupational gender segregation, single workers report a lower level of occupational segregation than married workers do in Urban Brazil. Moreover, single part-time workers present the lowest gender segregation level.[74] Deustch et al. (2005) use segregation index to show that less educated women are significantly less likely to be more mobile across occupational categories than women in higher educational levels. It seems that gender differences in employment opportunities are exacerbated by the educational level in three Latin American countries.[75] Later, López and Lasso (2015), and Sepulveda (2017) have observed a strong relationship between education and women's progress in employment in Colombia. In that regard, Lopez and Lasso (2015) suggest that less educated women tend to be concentrated in low-paid jobs.

The role of feminization on the gender wage gap has been little explored in Latin America (see, OLIVEIRA, 2001; SALARDI, 2013; ESPINO, 2013). For instance, Salardi (2013) investigates the impact of female occupational intensity (the variable is computed at the 3-digit level of occupational categories) on the gender wage gap using quantile regression. Her results show that female-dominated occupations reduce female wages, mainly in the highest paid jobs, whereas, it has a positive impact on wages for male workers, but it is only on low-paid jobs.[76] Likewise, Espino (2013) incorporates control variables of occupational segregation into earnings equations. Her results show that the feminization of occupations (the variable is computed at the 3-digit level of occupational categories) contributes relatively 50 percent to gender differences in pay in Uruguay.

[74] The econometric specification uses the individual and job characteristics, in this case, the occupations are at the one-digit code (OLIVEIRA, 2001).
[75] Deutsch et al (2005) construct comparable data sets for Costa Rica, Ecuador, and Uruguay over the 1989-1997 period. For example, the ID was 0.7347 for less educated workers in Ecuador, while it was 0.3917 for college-workers.
[76] Using data from the national survey (PNAD) the author generates 83 occupational codes.

Several studies across Latin American countries show that occupational segregation has decreased over time (see, e.g., DEUTSCH et al., 2005; ISAZA; REILLY, 2009; MADALOZZO, 2010; SALARDI, 2013; SALAMANCA, 2016). Madalozzo (2010) highlights that Brazilian women have penetrated traditionally male occupations to a certain extent, but that traditionally female occupations have maintained their gender composition over the period 1978-2007. Meanwhile, Salamanca (2016) observes that the ID declined by 2 percent in Colombia and metropolitan areas during the period 2007-2015. Nonetheless, these results are not consistent over time across countries, for instance, Kuri Alonso (2014) finds that although female participation in the labor market increased in Mexico during the period from 2000 to 2010, occupational segregation increased, the KM index grew by 0.69 percent.

Recently, Borrowman and Klasen (2019) have examined the effect of gendered occupational segregation on the gender wage gap in developing countries (the sample included 20 countries from Latin America and the Caribbean) using data from 1980 to 2011.[77] In general terms, they find that within the majority of the countries in the sample gender occupational segregation has increased. Nonetheless, the segregation indices show significant differences across regions, with Latin America and the Caribbean and Middle East and North Africa at the higher end for occupational segregation.[78]

For Central American countries the existing literature related to this research topic is very scarce. Furthermore, the trend of researches has involved cross-international comparisons of occupational segregation indices. Nonetheless, the common previous finding of these studies is that Central American countries report high levels of occupational segregation by gender (e.g., PSACHAROPOULOS; TZANNATOS, 1992; ANKER, 1998; TENJO et al., 2005). The study documented by Tenjo et al. (2005) uses national surveys from six Latin American countries (including Costa Rica and Honduras) to analyze the distribution of male and female labor force by occupations and sectors. These study results suggest that there is an important segregation problem, and the highest level of occupational segregation tends to be displayed/ to be noticed in

[77] Data come from the International Income Distribution Database (I2D2), a World Bank data set that harmonizes over 600 household surveys.

[78] One-digit occupational categories found Duncan Indices of 0.32 (Latin America and the Caribbean), 0.46 (Middle East and North Africa), 0.20 (East Asia and the Pacific), and 0.20 (Sub-Saharan Africa). These two last regions are found at the lower end of occupations (BORROWMAN; KLASEN, 2019).

Honduras (the ID was 0.6471 in 1998).[79] Deutsch et al. (2005) also find high and persistent levels of occupational segregation during the 90s in urban areas in three Latin American countries, including Costa Rica. However, using method decompositions they show that these levels explain only a small portion of earnings differentials.[80]

The level of occupational segregation tends to decline in the case of more educated workers in Nicaragua (MONRROY, 2008), and Costa Rica (DEUSTCH et al., 2005). For instance, for Nicaraguan workers at the primary level, the ID calculated at three-digit occupational categories was 0.71, while this index was 0.39 for those at the university level (MONRROY, 2008). More recently, a study documented by the ILO (2019) has observed an increase in the level of occupational segregation by gender in some Centro American countries over time. For instance, the ID (calculated at 2 digit-occupational categories) increased from 0.48 to 0.55 in Guatemala, while ID slowly decreased from 0.62 to 0.59 in El Salvador during the period from 2000 to 2015.

In summary, most cross-country studies confirm the prevalence of occupational segregation by gender. This segregation is very extensive in both industrialized and developing countries.

The next section offers the context of the labor market in the Northern Triangle of Central America.

4.3.The context

Guatemala, El Salvador, and Honduras form a region known as "The Northern Triangle of Central America", this term is used with respect to economic integration, and their challenges. The region has experienced overwhelming economic, political, and security challenges in recent years. A combination of domestic challenges, including anemic economic growth, high rates of violence, and few jobs in the formal economy and migration have been observed (RUNDE;

[79] The ID calculated at one-digit occupational categories for Argentina (0.4903), Brazil (0.5625), Uruguay (0.5888), Colombia (0.5412), and Costa Rica (0.5620).
[80] The ID reports for 1989, 1992/3, and 1997 respectively state: Costa Rica (0.32, 0.35, and 0.37); Ecuador (0.38, 0.38, and 0.38); and Uruguay (0.37, 0.39, and 0.42) according to Deutsch et al. (2005).

SCHNEIDER, 2019).[81] After the global financial crisis, on average, the economy (region) has been slowly growing in recent years.[82] However, Guatemala and Honduras have maintained its position as the most unequal countries in Latin America, and they also have a high incidence of poverty (WORLD BANK, 2017).[83] The region has experienced important progress in education, but it still reports low levels of educational attainment in relation to other Latin American countries. The average years of schooling for an individual in El Salvador was 6.5 years; in Guatemala, 5.6 years; and Honduras, 5.5 years in 2014 (UNDP, 2015).

One of the most important sectors of the economy is still agriculture. However, during the period from 2000 to 2015, the most important sectors that have shown the highest economic growth in El Salvador were commerce and manufacturing industries, while in Guatemala it was the commerce sector (ILO, 2019). In Honduras, finance, communication and economic sectors showed the highest growth during the period 2010-2014 (SEFIN, 2014).[84] The countries of the Northern Triangle also share similar employment conditions characterized by a low unemployment rate, but with a rapid extension of the informal sector, the persistence of precarious employment in the agricultural sector, and the massive incorporation of women into the labor market in precarious conditions (ILO, 2003; OLACD, 2013; ILO, 2015).

The labor market is characterized by unequal relations between men and women in the region. For example, the female labor force participation rate is lower than men, and women are more commonly employed in the informal market than men across countries. The following table summarizes that some labor market indicators generally score relatively similar results in urban areas across countries during the period analyzed; nevertheless, major deterioration of labor-market performance is observed in Honduras.

[81] The migration phenomenon has been reported since the1980s in the region. Approximately 96,813 individuals emigrated from Central America's Northern Triangle in 2013 (OROZCO; YANASURA, 2015). In the summer of 2014, record numbers of migrants, most of them unaccompanied minors from the Northern Triangle nations attempted to cross the U.S.-Mexican border (LORENZEN, 2017).

[82] In 2014, the economy of Guatemala experienced the highest growth in the region, it grew by 3.4 percent, while El Salvador and Honduras grew by 1.7 and 3 percent respectively (IMF, 2014).

[83] According to the World Bank in 2014, the Gini coefficient was 0.486, and the incidence of poverty 59.29 percent in Guatemala. In Honduras, the Gini coefficient was 0.504 and the incidence of poverty 62.8 percent. Whereas, El Salvador reported the lowest Gini coefficient (0.418) and the incidence of poverty 31.8 percent (see the report of these indicators in SEDLAC (Socioeconomic Database for Latin America and the Caribbean, CEDLAS at Universidad de La Plata and World Bank, 2014).

[84] The finance sector and Communications grew by 8.3 and 5.2 percent, respectively (SEFIN, 2014).

Table 4.1 Some indicators of labor market by gender and country, 2014

Ratio (mean)	Guatemala		El Salvador		Honduras	
	Women	Men	Women	Men	Women	Men
Unemployment	4.2	3.9	4.6	8.5	8.3	6.9
Participation in the labor force	48.5	79.0	54.1	77.8	45.2	68.5
Informal employment	52.3	47.7	57.1	46.8	59.6	56.4

Note: Participation rate based on the working-age population.

Source: INE (2014a) and ILO (2015).

Gender inequality in the labor market requires special interest once, women have historically faced greater obstacles to access the labor market and lower returns to their work in the Northern Triangle of Central America (see, e.g., ALEJOS, 2003; TENJO et al., 2005; ENAMORANDO; IZAGUIRRE; ÑOPO, 2009; ÑOPO; ATAL; WINDER, 2010), even though Central American countries show lower gender gaps in relation to the rest of the countries in Latin America (ÑOPO; ATAL; WINDER, 2010).[85] Besides, working women are underrepresented in managerial positions and overrepresented in other occupations like service workers, clerks, and administrative personnel. For instance, Lopez-Lepe (2016) finds that women are primarily employed as salespersons and services workers (43.7 percent), while men are more frequently employed in agriculture and as laborers (26.4 percent) in Guatemala. Gender differences are significantly present at the sector level; construction and agriculture are clearly male-dominated sectors while community, social and personal services are female-dominated (ÑOPO; ATAL; WINDER, 2010). These countries have also reported a highly feminized demand for employment in the maquila industry (ILO, 2003; OLACD, 2009), other jobs are increasingly available to women such as food processing, domestic services, and other export industries (WORLD BANK, 2001; ILO, 2015).[86]

[85] The cross-study by Ñopo, Atal, and Winder (2010) includes 18 Latin American countries within all Central American countries. This study analyzes the evolution of the gender wage gap (1992-2007) using national surveys.

[86] "Maquiladora" or Maquila industry have been changing the level of activity and composition of female occupation in the region. For instance, in Honduras, the rise of female employment was driven by the great dynamics of the maquila industry in the 90s (FERNÁNDEZ-PACHECO, 2002).

4.4.Data

This section introduces data sources, and key variables used in the empirical analysis. This work uses micro data sets from three national surveys carried out in 2014.[87] The surveys are representative at the national, departmental, urban, and rural levels. Besides, the sample design of these surveys allows using expansion factors.[88] In general terms, the questionnaire of three surveys contains sociodemographic information about the household respondents: education, migration and social programs, expenditure, access to technology, type sources of incomes, both in cash and in kind, employment, and unemployment.[89] Particularly, data on labor market characteristics includes information on the number of hours worked, labor income, payment of social contributions, participation in union activity, individual's occupation, occupational tenure, economic sector and occupational classes. Despite some minor divergence in the questionnaires, the three surveys include a compatible employment section, therefore comparisons for the purposes of this research are possible through the use of a set of harmonized variables.

For each country, several sample restrictions are applied, for instance, the sample is composed by individuals aged between 16 to 60 years, in order to avoid the influence of retirement decisions in the labor market participation.[90] The analysis is restricted to the urban areas because the labor market characteristics in rural areas may differ from the urban in terms of occupations, productivity, and remuneration, for example, agriculture is the predominant sector in rural areas.

[87] The year of 2014 was chosen because this is the last survey available for Guatemala. The ENCOVI is carried out by the National Institute of Statistics (Instituto Nacional de Estadísticas-INE). The EHPM is conducted by the General Directorate for Statistics and Censuses (DIGESTYC, for its Spanish acronym) of the Ministry of Economic Affairs of El Salvador. Finally, the EPHPM is carried out by the National Institute of Statistics (Instituto Nacional de Estadísticas-INE).

[88] The design of these surveys is based on the methodology developed by the World Bank under the project Living Standards Measurement Study (LSMS).

[89] Guatemala's and El Salvador's surveys also report information about the household respondents: health and health expenditure, expenditure and auto consumption, and credits. The ENCOVI collects a time module as well.

[90] The minimum age for employment is established by the Ministry of Labor in each country. In Guatemala, it is 15, according to international conventions and selected laws on child labor and education as well (Ministry of Labor and Social Security (MTPS), 2015, p. 44). In El Salvador, it is 14 (Labor code 28, 29), but The Law for the Protection of Children and Adolescents (LEPINA) establishes the minimum age for domestic service at 16 (El Salvador, 2009). In Honduras it is 14, according to Article 120 of the Code on Childhood and Adolescence; Article 15 of the Executive Agreement STSS-211-01; Article 32 of the Labor Code (Honduras, 2001). The ages for retirement vary across countries. In El Salvador and Guatemala, the minimum male worker retires at 60, in Honduras he does at 65. While the age in which women qualify for retirement rises from 55 (El Salvador) to 60 (Honduras and Guatemala).

Box 4.1 Original Data Sources

Country	Survey	Original sample size	Final sample size
Guatemala	National Survey of Living Conditions (Encuesta Nacional de Condiciones de Vida, ENCOVI)	54,822 individuals	4,427 men and 2,676 women
El Salvador	Multi-Purpose Household Survey (Encuesta de Hogares de Propósitos Múltiples, EHPM)	80,164 individuals	7,486 men and 6,674 women
Honduras	Multi-Purpose Household Survey (Encuesta Permanente de Hogares de Propósitos Múltiples, EPHPM)	24,023 individuals	2,311 men and 1,785 women

Note: The original sample size refers to the total sample at national level.

Source: ENCOVI (2014), EHPM (2014), and EPHPM (2014).

In this regard, the urban population in each sample is 49, 42, and 53 percent for Guatemala, El Salvador and Honduras respectively. Further, individuals from which there is any missing value in the used variables in the analysis are excluded. Boarders and domestic servants are also excluded (see Box 4.1).[91]

Equivalent variables were selected among the three surveys, although minimum differences were unavoidable. Working individuals are classified as those who reported positive hours and earnings. The dependent variable is *wages*, which are computed using the labor income; this variable is in nominal terms expressed in local currency obtained from the main job (Guatemalan quetzals, Honduran Lempiras, American dollar in El Salvador). Earnings are reported in several frequencies (daily, weekly, monthly, and annually). Therefore, the data are standardized to a monthly frequency, and then the natural logarithm of the variable is used.

Then, human capital variables are used as control variables: age, age squared, and educational attainment. Educational attainment is built based on the highest level of education that a person

[91] Dropped observations with missing values represent 13, 17, and 28 percent of samples for Guatemala, El Salvador, and Honduras respectively.

has successfully completed. Thus, four dummy variables are generated for each level of education; no education; primary, secondary, and tertiary (including master or doctoral degree). Given that the distributions for educational attainment vary significantly by gender, it is interesting to observe this variable across the wage distribution. The variable work experience is commonly employed in the specification of earnings equations; however, it is not reported in the three samples. Besides, occupational tenure is only reported by Guatemalan sample. Marital status and the number of children under 14 years old in the household are also included in order to capture the effect of the division of household labor.[92]

Hours worked within and across occupations is a factor relevant to gender differences in pay. The literature highlights the importance of flexibility occupational for women (GOLDEN, 2008; GOLDIN, 2014), and another case it finds a persistent gender gap in part time (FERNÁNDEZ-KRANZ; RODRÍGUEZ-PLANAS, 2011; BOLL et al., 2017) and overwork (CHA; WEEDEN, 2014). In fact, this work also controls by the variation in working hours. Thus, a set of dummy variables is constructed, which adopt standard cut points according to the labor economics literature (see, CHA; WEEDEN, 2014): less than 35 hours (part-time), 35 hours or more but less than 50 hours (full-time), and 50 hours or more (overwork). In addition, several variables to capture job characteristics are included; self-employment is included in the model as a single dummy variable and a dummy variable for each economic sector.[93]

Finally, the main objective of this study is examining the role of the gender intensity occupational and the gender wage gap in the Triangle Northern. Then, the main control variable named *female occupational intensity* is included, which is an indicator of the proportion of female workers in each occupation (MACPHERSON; HIRSCH, 1995; BAKER; FORTIN, 2003). Then, this variable may capture gender differences in the occupational structure across

[92] Further, Guatemala and Honduras are multiethnic countries, nonetheless, this work does not distinguish the indigenous population because this information is only reported by the Guatemalan sample. In 2014, the indigenous population represented around 39 percent for Guatemala (INE, 2014b). Despite the labor market being characterized by the larger size of the non-formal sectors, formal and informal patterns are not included because indicators made to indicate formality, such as having a writing contract, as well as payment of direct taxes have a low response rate across samples (EL SAVADOR, 2014; INE, 2014b; INE, 2014).

[93] The normal day shift in the region is 8 hours a day, and 45 hours a week for Guatemala (Labor code, Guatemala). While, for El Salvador and Honduras is 8 hours a day, and 44 hours a week (Labor code, El Salvador, Honduras).

countries. The relevant variable is built using the harmonized classification of occupational categories described in the next section.

Harmonized Classification of Occupational Codes

The classification used in the three national surveys is directly comparable to the International Standard Classification of Occupations (ISCO-08) released by the International Labor Organization (ILO). ISCO-08 is a hierarchical structure of classification of occupations obtained by means of statistical censuses and surveys, as well as from administrative records. Nevertheless, for Guatemala, the survey reports a classification at the 2-digit level, for El Salvador at the 4-digit level. While Honduras survey uses the National Occupational Classification (CNOH), which is also based on ISCO-08, the occupations are described by a 7-digit level.

In this context, a new harmonized occupational classification at the 2-digit-level is built in order to have enough observations in each category. This represents a contribution to the literature that permits a consistent and comparable analysis of the occupational structure and occupational distribution across countries. Thereby, the variable *female occupational intensity* allows to know the degree of the feminization (or femaleness) of each 2-digit occupational group across countries. Check the detailed description of the harmonized data and variables in the appendix.

4.5.Methodology

This work seeks to explore the role of the gender occupational intensity and gender differences in pay in the Northern Triangle. For this purpose, this section presents the methodological approach, which is displayed in two ways. First, a quantile regression (QR) analyzes what factors may affect gender differences along the wage distribution, considering individuals and household variables and occupation patterns.

The QR estimates conditional quantile functions (among them the conditional median function) and obtains statistical inference about the parameters estimated. The method “may be viewed as a natural extension of classical least squares (OLS) estimation of conditional mean models to the

estimation of an ensemble of models for conditional quantile functions" (KOENKER; HALLOCK, 2001). In this sense, the purpose of the classical OLS estimation is to determine the conditional mean of the distribution of the regression dependent variable, a random Y. This method assumes that possible differences in terms of the impact of the exogenous variables along the conditional distribution are unimportant. However, exogenous variables may influence parameters of the conditional distribution of the dependent variable other than the mean. The QR poses this question at any quantile of the conditional distribution of Y (KOENKER; BASSETT, 1978).

First, this study estimates an earning equation using QR applying all of the samples for each country. Second, an equation for female (*f*) and male (*m*) workers is separately estimated at different quantiles, namely $\theta = \{0.1, 0.5, 0.9\}$. Then, these findings provide a complete view of how gender differences vary along the wage distribution. Furthermore, it is possible to include comparisons across not only gender but also across countries.[94] For a more detailed description of the QR and decomposition method, see the appendix.

4.6.Results

This section highlights the most important results. First, this work presents a descriptive analysis of the workforce by gender in the urban areas of the Northern Triangle. Then, quantile regressions are estimated to analyze what factors may affect wages along the distribution using two specifications, the first using all sample, and the second, wage equations for female and male workers are estimated separately.

4.6.1. Descriptive Analysis

The female proportion in each sample is 38, 52, and 56 percent for Guatemala, El Salvador, and Honduras respectively. The workforce in the region remains young, the largest population is

[94] This paper does not address selectivity in participation due to the following consideration; the most widely used method of calculating sample selectivity when estimating wage equations is Heckman's correction (1979), nonetheless, this traditional method cannot be used for QR according to Buchinsky (2001), therefore any selection correction within quantile framework could become more complex. Further, few studies have addressed this issue. These studies rely on the validity of instruments and the correct identification of the intercept of the wage equation (see ALBRETCH et al., 2009; CHZHEN et al., 2012).

aged 16 and 24 years for both women and men. But the proportion of working women in this group is considerably lower than men when compared to the rest of the groups. As it is expected, it is observed a decrease in participation of older people in the samples. There are differentials in schooling levels between men and women, but differences in education levels among countries are also important. On average Salvadorian workers are more educated (22.84 percent for women and 13.3 percent for men), and Guatemalan workers are less educated (8.66 percent for women and 20.15 percent for men), this last feature is consistent with the literature (see, SAHN; YOUNGER, 2006; ILO, 2019). The proportion of women with tertiary education level is higher than men in El Salvador and Honduras. On the contrary, the share of men with primary and secondary education level is lower than women in Guatemala. Meanwhile, household characteristics are very similar across countries (see Table 4.2).

Table 4.2 Composition of the workforce by gender and country - demographic and educational characteristics (2014)

	Guatemala		El Salvador		Honduras	
Variable	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**
Age groups (%)						
16-24	20.77	26.94	13.59	18.44	16.87	25.70
25-29	17.46	16.19	12.91	14.96	16.16	14.48
30-34	15.20	13.90	14.97	14.68	16.20	13.26
35-39	12.60	12.53	17.03	14.27	13.21	12.73
40-44	11.64	10.23	12.69	11.33	12.29	10.69
45-49	8.47	7.01	11.51	10.12	9.52	9.53
50-54	8.39	6.76	9.73	9.19	8.91	7.61
55-60	5.48	6.44	7.58	7.01	6.85	6.00
Total	100	100	100	100	100	100
Educational attainment (%)						
No Education	8.86	13.33	6.15	3.69	4.55	4.32
Primary	37.11	32.28	40.30	42.33	32.86	41.94
Secondary	45.31	41.78	30.71	33.82	39.58	38.96
Tertiary	8.72	12.61	22.84	20.15	23.00	14.78
Total	100	100	100	100	100	100

Table 4.2 (Continued)

Household composition						
Married (%)	46.46	65.32	46.48	64.57	45.53	63.27
Number of children under 14 years old (mean)	1.37	1.42	0.99	0.96	1.30	1.29
Observations	2,031	3,874	6,674	7,486	1,785	2,311

Source: Authors' calculation based on ENCOVI (2014), EHPM (2014), and EPHPM (2014).

Table 4.3 reports job-related characteristics, which present similarities among countries. For instance, the share of women employed in self-employment is higher than men. Even though, Honduras workers report the largest share in self-employment, gender differences in self-employment rate are quite modest in this country. Important gender differences in working hours are also revealed: women allocate more hours to paid work than men. In particular, women are more likely than men to be working part-time, between 23-27 percent of employed women work part-time, far higher than the share of employed men (9-17 percent). While the proportion of men engaged in overwork is higher than women in Guatemala and Honduras, in El Salvador, gender differences among overworkers are quite modest. In the Northern Triangle as well as the rest of the countries in Central America, the largest concentrations of female employment are found in commerce and services. Further, there are substantial differences in the main covariate, the rate of female occupational intensity is approximately 60 percent for women compared to 25-30 percent for men.

Table 4.3 Composition of workforce by gender and country - job related characteristics (2014)

	Guatemala		**El Salvador**		**Honduras**	
Variable	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**
Self-employment (%)	27.86	15.09	32.35	16.90	38.24	31.98
Working hours (%)						
Part-time	27.04	9.79	23.80	12.94	27.23	17.02
Full-time	42.01	45.15	45.85	56.30	42.04	41.14
Overwork	30.95	45.06	30.35	30.76	30.72	41.84

Table 4.3 (Continued)

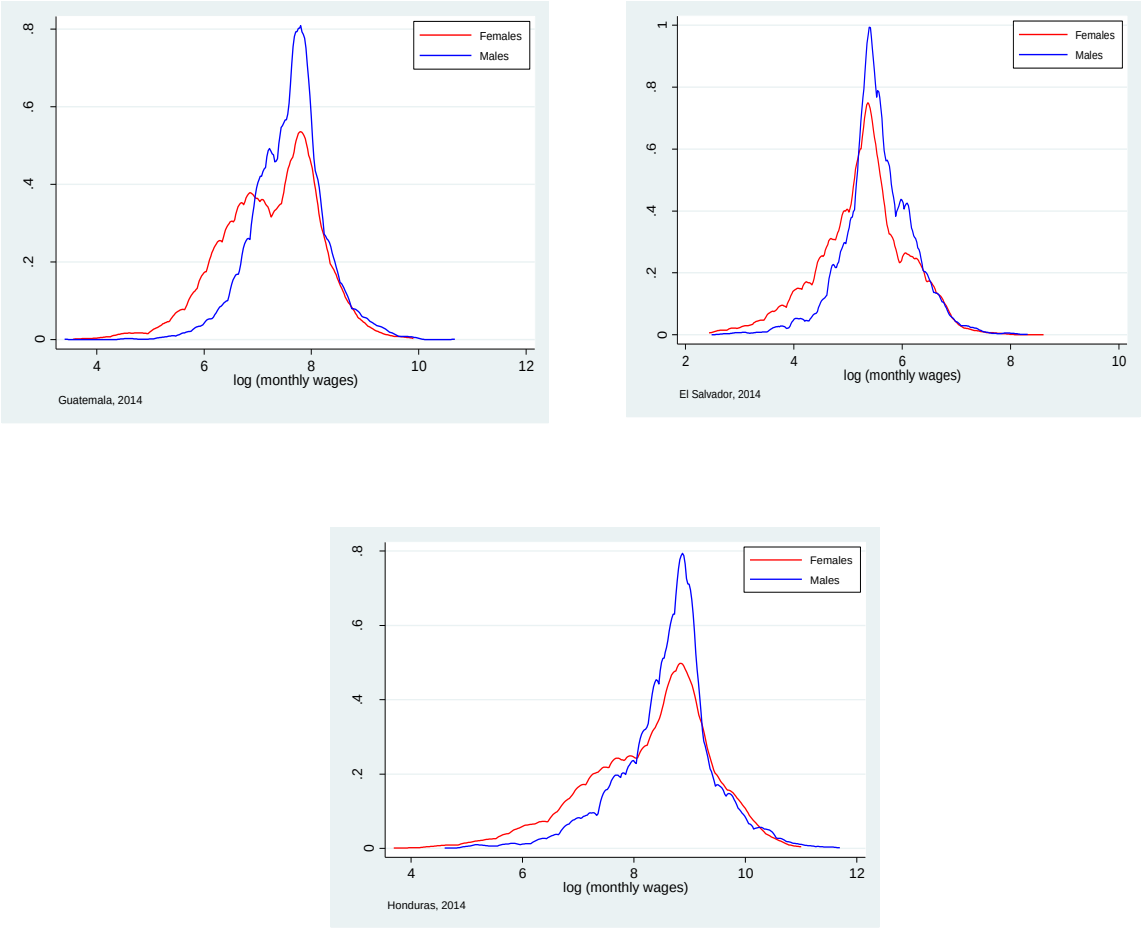
Economic sector (%)						
Agriculture, Forestry, Hunting and Fishing	2.27	13.61	0.87	6.22	1.18	7.25
Mining and Manufacturing	16.76	18.86	17.26	17.36	21.73	19.20
Construction	0.19	13.01	0.34	10.51	0.89	12.47
Commerce	35.91	31.76	27.81	22.94	34.40	29.87
Transport and Communication	0.52	1.60	1.75	9.10	0.95	9.00
Finance and Insurance Services	3.38	2.25	2.32	1.57	5.83	6.68
Other Services	40.96	18.92	49.65	32.30	35.03	15.52
Female occupational intensity (mean)	0.61	0.25	0.66	0.32	0.60	0.30
Observations	2,031	3,874	6,674	7,486	1,785	2,311

Note: Other services sector includes community, social and personal services, and others.

Source: Authors' calculation based on ENCOVI (2014), EHPM (2014), and EPHPM (2014).

The following plots show the distribution of the logarithm of wages per month by gender in the three samples. This is a preliminary view of gender differentials along the wage distribution across countries, men's wage density is skewed to the right, especially for Guatemala, which is consistent with men receiving higher average wages. These plots also support the idea of exploring the determinants of these gender differences across the distribution rather than exclusively at the mean.

Figure 4.1 Kernel density of log monthly wages by gender and country (2014)

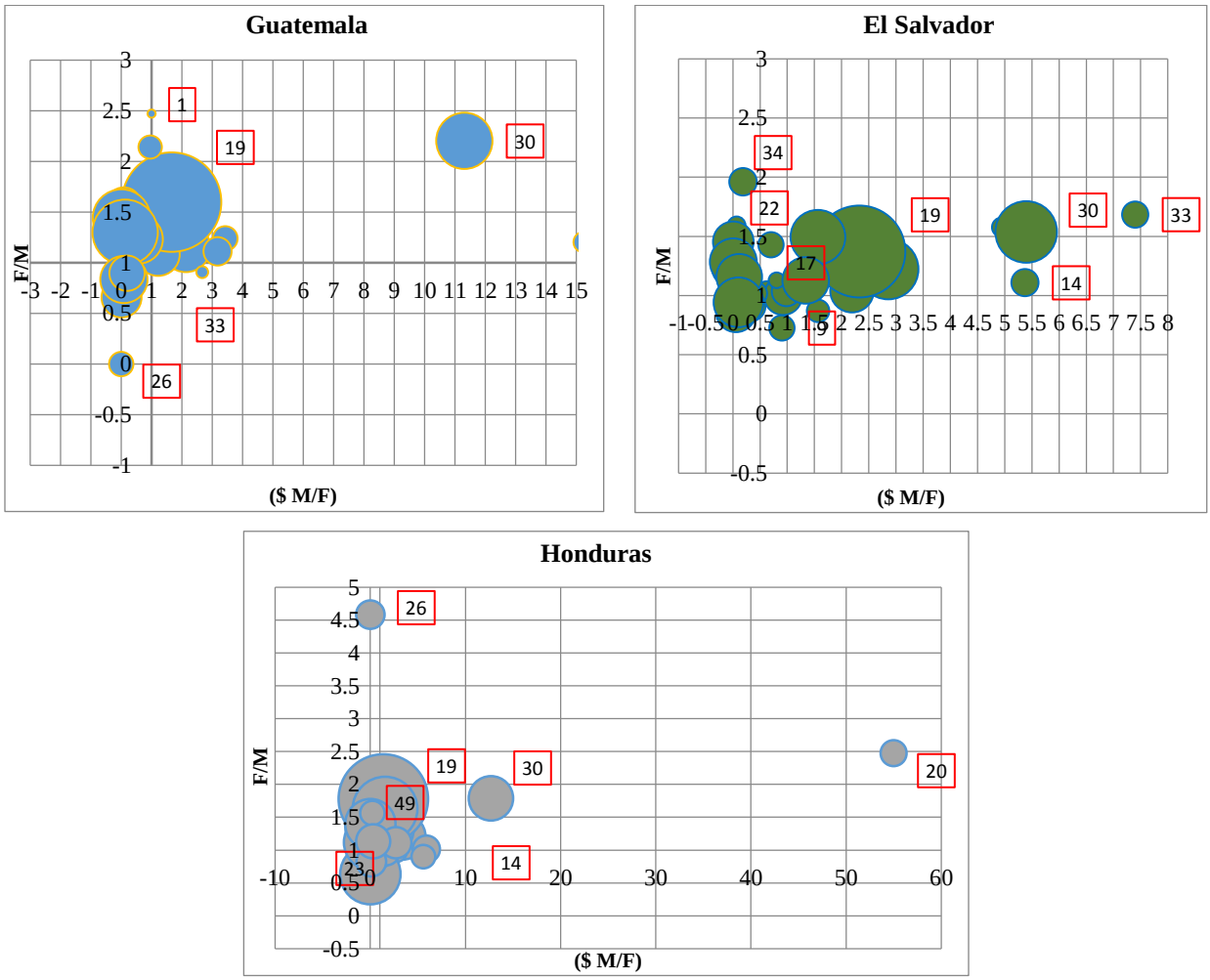


Source: Authors' calculation based on ENCOVI (2014), EHPM (2014), and EPHPM (2014).

Moving to occupational structure, the harmonized data provides 34 groups of occupations described by a 2-digit level. Later, occupations are classified according to the female occupational intensity rate for each country. As a result, women and men tend to work in different occupations, the most female-dominated occupations that are common in the three countries: elementary occupations with low qualifications such as personal care workers, cleaners and helpers, personal services workers, and food preparation assistants. Professionals and associate professionals (including health and teaching), sales workers, general and keyboard clerks. In Honduras the distribution varies only modestly in relation to Guatemala and El Salvador, in the top ten of female-dominated jobs is reported stationary plant and machine operators, this occupation is likely concentrated in the Maquila industry, which has been highly

feminized in Central America (OLACD, 2009). Table 4.12, Table 4.13, and Table 4.14 in the appendix provide complete descriptive information.

Figure 4.2 Male-Female earnings (M/F) by occupation and country (2014)



Note: Each category is identified by a code, which is provided by Table 4.12, Table 4.13, and Table 4.14 in the appendix (see, first column).

Source: Authors' calculation based on ENCOVI (2014), EHPM (2014), and EPHPM (2014).

In addition, Table 4.12, Table 4.13, and Table 4.14 in the appendix contain a raking of occupational categories based on monthly wages (mean). As a result, high-skilled occupations have the highest wage rates across countries, i.e. business administration and communication professionals, administrative and commercial managers, and chief executives, senior officials

and legislators. Regarding male-female earnings (M/F), which is computed as male mean earnings over female mean earnings, on average, male' wages represent around 1.22, 1.19, and 1.16 points of female wage rate in urban areas for Guatemala, El Salvador, and Honduras respectively. Moreover, the male-female wage differential is substantial for most categories, including certain professional occupations (including health and engineering). Next plots display additional descriptive information, particularly, plotting M/F earnings ratios versus female to male share ratios. The x-axis represents (M/F) earnings ratio, and the y-axis represents the ratio of female proportion over male proportion within each occupational category, the plots then shape occupational distributional and its link with earnings differentials. As shown in Figure 4.2, women are overrepresented in certain categories. Moreover, they are at a disadvantage in pay compared to men in most of the categories.

4.6.2. Quantile regression results

Quantile regressions show a complete insight of gender differentials in pay along the wage distribution. Two different specifications for wage equations are explored, in the first specification a quantile regression is estimated using all sample data for each country, the control variables previously described are included, plus a binary variable that identifies the individual's gender (it takes on the value of 1 for female and 0 for male) due to the interest of capturing the effect of this binary variable on wages along the distribution.

As it is noted in Table 4.4, the control of female occupational intensity (foccup2), the "gender" dummy is always negative and significant. It has a large impact on wages at the bottom of the wage distribution in all countries, which would suggest the existence of the sticky floor effect. Although this effect is larger in Guatemala. By observing gender profile across countries, gender differences in pay are slightly decreasing from the 10^{th} to 50^{th} quantile in the three countries, but it is then increasing at the 90th quantile, especially in El Salvador and Honduras. While gender differentials decrease considerably as one moves up to the upper distribution in Guatemala.

In addition, the effect of age, education, and sectors remains positive and significant across samples. Meanwhile, part-time and self-employment have a negative impact on wages, although

the magnitude of this effect varies for most the covariates along the distribution in the three samples. For example, the effect of part-time is larger in the lower part of the wage distribution (Table 4.4).

Focusing on the coefficient of the relevant variable *foccup2* it is negative and statistically significant along the wage distribution in the three countries. But the effect of foccoup2 varies for different quantiles, in particular, at the lower quantile individuals have lower returns (see Table 4.4). Nonetheless, the main objective of this work is to observe the effect of female occupational intensity on the gender differentials in pay, for that, the second specification is estimated. Here, quantile regressions are estimated for male and female workers separately at different quantiles.

Table 4.4 Quantile regression of wages by country, 2014 (using all sample)

Log Monthly Wages	**Guatemala**			**El Salvador**			**Honduras**		
	q10	**q50**	**q90**	**q10**	**q50**	**q90**	**q10**	**q50**	**q90**
Gender	-0.40***	-0.18***	-0.08**	-0.15***	-0.11***	-0.13***	-0.29***	-0.16***	-0.20***
Age	0.10***	0.07***	0.08***	0.04***	0.03***	0.03***	0.07***	0.05***	-0.03**
Age squared	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***	-0.00
Primary	0.23***	0.22***	0.15**	0.23***	0.19***	0.19***	0.48***	0.28***	0.30***
Secondary	0.59***	0.61***	0.58***	0.47***	0.40***	0.45***	0.83***	0.59***	0.64***
Tertiary	1.19***	1.09***	1.25***	0.80***	0.95***	1.09***	1.53***	1.19***	1.38***
Married	0.10**	0.07**	0.08**	0.08**	0.07***	0.08***	0.20***	0.12***	0.08**
Number of children under 14 years old	-0.03**	-0.04***	-0.04***	0.01	0.01	0.00	-0.03**	-0.04***	-0.03**
Part-time	-0.60**	-0.35***	-0.19***	-0.63***	-0.38***	-0.26***	-1.1***	-0.66***	-0.3***
Overwork	0.05	0.05**	0.11***	0.01	0.01	0.03	-0.17***	0.25	0.28
Self- employment	-0.32***	-0.03	0.21***	-0.68***	-0.23***	0.06***	-0.79	-0.45***	-0.08**
Mining and Manufacturing	0.41***	0.46***	0.08	0.36***	0.34***	0.13***	0.62***	0.33***	0.08
Construction	0.37***	0.40***	0.06	0.31***	0.37***	0.23***	-0.25**	0.12*	-0.01
Commerce	0.45***	0.58***	0.18**	0.35***	0.35***	0.21***	0.64***	0.38***	0.18
Transport and Communication	0.62***	0.58***	0.19*	0.43***	0.49***	0.35***	0.81***	0.52***	0.37**
Finance and Insurance Services	0.88***	0.65***	0.30**	0.54***	0.50***	0.50***	0.74***	0.46***	0.18
Other Services	0.54***	0.54***	0.18**	0.38***	0.44***	0.27***	0.57***	0.42***	0.24**
Female occupational intensity	**-0.33*** **	**-0.27*** **	**-0.18** **	**-0.29*** **	**-0.20*** **	**-0.12** **	**-0.47*** **	**-0.28*** **	**-0.28*** **
Constant	4.48***	5.54***	6.17***	3.62***	4.20***	4.66***	5.61***	7.00***	7.84***
Observations	7,103	7,103	7,103	14,160	14,160	14,160	4,096	4,096	4,096

Notes: Dependent variable is the natural logarithm of monthly wages.
The reference categories are: male, no education, unmarried, full-time, and agriculture, forestry, hunting and fishery sector.
Source: Authors' calculation based on ENCOVI (2014), EHPM (2014), and EPHPM (2014).

In this sense, Table 4.5, Table 4.6, and Table 4.7 present the results for 10^{th}, 50^{th}, and 90^{th} quantiles separately for women and men. These results show that the magnitude of wage differentials does not remain constant along the distribution in the three countries. Furthermore, it reaffirms as the previous researches conducted in Central America countries have pointed out, the strong relationship between educational attainment and wages rates (see, ALEJOS, 2003; TENJO et al., 2005; ÑOPO; ATAL; WINDER, 2010). This paper finds that the effect of educational attainment is positive and statistically significant at the one percent level along the wage distribution in all countries (e.g. secondary and tertiary levels). In general, the returns to education are higher for women than for men at the bottom quantile and at the mean of the wage distribution. Meanwhile, in the top part of the distribution men tend to have a higher return to education than women. Furthermore, wage rates increase for individuals with tertiary education along the wage distribution in all countries.

Considerable empirical evidence indicates a negative relationship between children and women's wages, commonly known as the motherhood wage penalty (see, e.g., ENGLAND, 2005; ABENDROTH et al., 2014; BUDIG; MISRA; BOECKMAN, 2015; BLAU; KHAN, 2017). In this sense, the findings are heterogeneous across samples, each additional child under 14 years old reduces women's earnings, but the effect is lower at the upper quantile of the distribution in Guatemala and Honduras. Meanwhile, this does not have an effect on Salvadorian women. Marital status plays an important role on wages, but it is not significant at the lower quantile of the distribution for women in the three countries.

There are large gender differences in self-employment along wage distribution, the effect is negative and statistically significant at 10^{th} quantile for both men and women across countries. Whereas it becomes positive for males at the upper quantile of the wage distribution. Scholars have observed that there exists a strong relationship between the gender gap in earnings and hours worked (GOLDIN, 2014; CHA; WEEDEN, 2014). With respect to this issue, this work included three dummy variables (part-time, full time, and overwork). Then, the findings reveal that the variation of working hours partially explains the gender wage gap. Working part-time reduces individual wages, but it is higher for women at 10^{th} quantile across countries. Furthermore, the overwork effect is positive and statistically significant only for men at the top

of the distribution in Guatemala and Honduras. Similar trends have been reported in some other countries, men are much more likely to work long hours (see, KHUN; LOZANO, 2008; CHA; WEEDEN, 2014). Meanwhile, women must be more frequently available to comply with their family responsibilities; for example, Cha (2013) suggests that women are underrepresented among overworkers. Hence, women may be concentrated in jobs with flexible schedules (GOLDIN, 2014). Working long hours does not have any impact on wages along the distribution for both men and women in the El Salvador sample.

In addition, one of the most cited factors which affect wage inequality is occupation patterns (see, e.g., BAKER; FORTIN, 2003; SALARDI, 2013; ADDISON et al., 2018). Research has shown that predominantly female occupations pay less than jobs with a higher proportion of men (BLAU; KHAN, 2003; ENGLAND; ALISSON, 2009; EHRENBEG; SMITH, 2012). Consistent with this evidence, this study finds that the female occupational intensity has a negative impact on wages along the distribution for women in the region. Moreover, women at the lower quantile experience greater negative penalties. However, in the case of men, the results are heterogeneous across countries. For Guatemala and Honduras, female occupational intensity has a negative impact on male wages at the lower quantile, although this impact is quite modest and statistically insignificant. In spite of that, the effect of female occupational intensity becomes negative and statistically significant at the bottom and at the mean of the wage distribution in El Salvador, revealing a penalty for working in predominantly female jobs.

In sum, the coefficients of the main variable suggest a strong relationship between *female occupational intensity* and women's wages, and a weaker one between *female occupational intensity* and male wages in the Northern Triangle of Central America. Figures 4.3, Figure 4.4, and Figure 4.5 in the appendix provide a graphical summary of estimation results by gender in the three samples.

Table 4.5 Quantile regression of wage, Guatemala (2014)

	q10		q50		q90	
	Female	**Male**	**Female**	**Male**	**Female**	**Male**
Age	0.11***	0.09***	0.09***	0.05***	0.07***	0.07***
Age squared	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***
Primary	0.20	0.12	0.28*	0.14**	0.13**	0.18**
Secondary	0.65***	0.40***	0.93***	0.38***	0.64***	0.52***
Tertiary	1.24***	0.85***	1.28***	0.89***	1.12***	1.23***
Married	-0.01	0.18***	0.02	0.11***	0.10**	0.11**
Number of children under 14 years old	-0.05**	-0.04*	-0.04***	-0.03***	-0.04**	-0.02
Part-time	-0.52***	-0.78***	-0.34***	-0.29***	-0.11**	-0.20**
Overwork	0.04	0.07	0.00	0.08**	0.04	0.11**
Self- employment	-0.44***	-0.30*	-0.08**	0.02	0.16**	0.22***
Mining and Manufacturing	0.53**	0.44***	0.46***	0.47***	0.00	0.15**
Construction	0.61**	0.39*	0.38***	0.44***	-0.27	0.13*
Commerce	0.72***	0.42***	0.60***	0.48***	0.24**	0.13*
Transport and Communication	1.34***	0.63***	0.79***	0.56***	0.30**	0.09
Finance and Insurance Services	1.02***	0.85***	0.53***	0.77***	-0.01	0.40**
Other Services	0.68***	0.60***	0.59***	0.62***	0.04	0.27***
Female occupational intensity	-0.55**	-0.12	-0.74***	0.01	-0.52***	0.11
Constant	3.95***	4.82***	5.01	5.86***	6.41***	6.09***
Observations	2,676	4,427	4,427	2,676	2,676	4,427

* p<0.10; **p<0.05; ***p<0.01

Notes: The dependent variable is the natural logarithm of monthly wages.
The reference categories are: no education, unmarried, full-time, and agriculture, forestry, hunting and fishery sector.
Source: Authors' calculation based on ENCOVI (2014).

Table 4.6 Quantile Regression of wage, El Salvador (2014)

	q10		q50		q90	
	Female	**Male**	**Female**	**Male**	**Female**	**Male**
Age	0.04***	0.04***	0.02***	0.04***	0.03***	0.05***
Age squared	-0.00***	-0.00***	-0.00	-0.00***	-0.00	-0.00***
Primary	0.22**	0.23***	0.22***	0.16***	0.15**	0.21***
Secondary	0.60***	0.37***	0.46***	0.34***	0.43***	0.41***
Tertiary	0.94***	0.59***	1.02***	0.83***	1.09***	1.02***
Married	0.03	0.15***	0.04**	0.13***	0.05**	0.11***
Number of children under 14 years old	0.03*	0.00	0.01	-0.00	0.00	0.01
Part-time	-0.63***	-0.66***	-0.50***	-0.22***	-0.34***	-0.16***
Overwork	0.01	0.01	0.01	0.02	0.02	0.00
Self- employment	-0.70**	-0.63***	-0.29***	-0.14***	0.05	0.13***
Mining and Manufacturing	0.35***	0.39***	0.44***	0.32***	0.46***	0.17***
Construction	0.31	0.36***	0.66***	0.38***	1.15***	0.21***
Commerce	0.40**	0.39***	0.50***	0.32***	0.63***	0.19***
Transport and Communication	0.45***	0.44***	0.51***	0.51***	0.66***	0.38***
Finance and Insurance Services	0.55**	0.48***	0.66***	0.38***	0.81***	0.70***
Other Services	0.40**	0.47***	0.57***	0.46***	0.70***	0.29***
Female occupational intensity	-0.61***	-0.16***	-0.44***	-0.09**	-0.55***	0.01
Constant	3.50***	3.64***	4.24***	4.09***	4.52***	4.37***
Observations	6,674	7,486	7,486	6,674	6,674	7,486

* p<0.10; **p<0.05; ***p<0.01

Notes: The dependent variable is the natural logarithm of monthly wages.

The reference categories are: no education, unmarried, full-time, and agriculture, forestry, hunting and fishery sector.

Source: Authors' calculation based on EHPM (2014).

Table 4.7 Quantile Regression of wage, Honduras (2014)

	q10		q50		q90	
	Female	**Male**	**Female**	**Male**	**Female**	**Male**
Age	0.05**	0.08***	0.05***	0.05***	0.03***	0.04***
Age squared	-0.00*	-0.00***	-0.00**	-0.00***	-0.00	-0.00*
Primary	0.21	0.68***	0.28***	0.21***	0.24**	0.17*
Secondary	0.71***	0.84***	0.75***	0.45***	0.60***	0.49***
Tertiary	1.41***	1.41***	1.35***	0.95***	1.15***	1.29***
Married	0.06	0.29***	0.09*	0.15***	0.08*	0.10*
Number of children under 14 years old	-0.04	-0.02	-0.04*	-0.03**	-0.02***	-0.01***
Part-time	-1.02***	-1.06***	-0.64***	-0.47***	-0.43***	-0.20***
Overwork	-0.29***	-0.05	-0.05	0.03	-0.04	0.10***
Self- employment	-1.05***	-0.58***	-0.79***	-0.24***	-0.26***	0.13**
Mining and Manufacturing	1.09	0.65	0.26	0.42***	-0.59***	0.25*
Construction	0.40***	-0.12***	0.10	0.22***	-0.73***	0.15
Commerce	1.25***	0.58***	0.47*	0.45***	-0.40***	0.26*
Transport and Communication	1.45***	0.84***	0.69*	0.61***	-0.17	0.36**
Finance and retail trade	1.39***	0.89***	0.39	0.53***	-0.27*	0.14
Other Services	1.30***	0.80***	0.39	0.53***	-0.17	0.29**
Female occupational intensity	-1.13***	-0.08	-0.69***	-0.04	-0.85***	-0.01
Constant	5.70***	5.05***	6.84***	6.90***	8.62***	7.54***
Observations	2,311	1,785	2,311	1,785	2,311	1,785

* p<0.10; **p<0.05; ***p<0.01

Notes: The dependent variable is the natural logarithm of monthly wages.

The reference categories are: no education, unmarried, full-time, and agriculture, forestry, hunting and fishery sector.

Source: Authors' calculation based on EPHPM (2014).

Considering the results described above, additional equations are estimated. For that, an interaction variable is included, which expands the understanding of the relationships among the variables in the model, particularly the interaction of two variables: working hours and female occupational intensity (see Box 4.2). Hence, this study explores in detail the links between working hours and gender differences in the occupational distribution.

Box 4.2 Description of interaction variables

Variable name	Description
Foccup2-working hours	An ordinal variable that captures the interaction of working hours and female occupational intensity; 1-foccup2 & full-time (nhours >=35 & nhours<=49) 2-foccup2 & part-time (nhours >0 & nhours <=34) 3-foccup2 & overwork (nhours >= 50)

Table 4.8, Table 4.9, and Table 4.10 report the results of estimations for 10^{th}, 50^{th}, and 90^{th} quantiles. It is important to note that for reasons of space are only presented in the tables the results for coefficient of the interaction.

Table 4.8 Quantile Regression of wage using interaction variables, Guatemala (2014)

	q10		q50		q90	
	Female	**Male**	**Female**	**Male**	**Female**	**Male**
Part-time	-1.030***	-0.947***	-0.327***	-0.480***	-0.019	-0.233**
Overwork	0.289	0.130***	0.234***	0.135***	0.212	0.104*
Foccup2 part-time	0.721**	0.963***	-0.048	0.417***	-0.194	0.163
Foccup2 overwork	-0.404	-0.416***	-0.419***	-0.239***	-0.311	0.033
Foccup2	-0.444**	0.048	-0.616***	0.091*	-0.371***	0.072
Observations	2,676	4,427	4,427	2,676	2,676	4,427

* p<0.10; **p<0.05; ***p<0.01
Notes: The dependent variable is the natural logarithm of monthly wages.
The reference categories are: no education, unmarried, full-time, ffcoup2 full-time, and agriculture, forestry, hunting and fishery sector.
Source: Authors' calculation based on ENCOVI (2014).

Table 4.9 Quantile Regression of wage using interaction variables, El Salvador (2014)

	q10		q50		q90	
	Female	**Male**	**Female**	**Male**	**Female**	**Male**
Part-time	-1.237***	-0.544***	-0.747***	-0.174***	-0.550***	-0.081**
Overwork	0.324***	-0.013	0.309***	0.032	0.189**	0.030
Foccup2 part-time	0.893***	-0.338***	0.352**	-0.125	0.333**	-0.297**
Foccup2 overwork	-0.458***	0.069	-0.463***	-0.055	-0.238**	-0.101
Foccup2	-0.535***	-0.135*	-0.385***	-0.064	-0.546***	0.033
Observations	6,674	7,486	7,486	6,674	6,674	7,486

* p<0.10; **p<0.05; ***p<0.01
Notes: The dependent variable is the natural logarithm of monthly wages.
The reference categories are: no education, unmarried, full-time, ffcoup2 full-time, and agriculture, forestry, hunting and fishery sector.
Source: Authors' calculation based on EHPM (2014).

Table 4.10 Quantile Regression of wage using interaction variables, Honduras (2014)

	q10		q50		q90	
	Female	**Male**	**Female**	**Male**	**Female**	**Male**
Part-time	-1.234***	-1.144*	-0.420*	-0.504***	-0.666***	-0.227**
Overwork	0.194	-0.135	0.392**	0.082*	0.191*	0.153**
Foccup2 part-time	0.312	0.295	-0.373	0.123	0.355	0.232
Foccup2 overwork	-0.732*	0.215	-0.731*	-0.149	-0.364*	-0.219
Foccup2	-0.891***	-0.190	-0.457***	0.019	-0.862***	0.004
Observations	2,311	1,785	2,311	1,785	2,311	1,785

* p<0.10; **p<0.05; ***p<0.Notes: Dependent variable is the natural logarithm of monthly wages.
Notes: The dependent variable is the natural logarithm of monthly wages.
The reference categories are: no education, unmarried, full-time, ffcoup2 full-time, and agriculture, forestry, hunting and fishery sector.
Source: Authors' calculation based on EPHPM (2014).

On analyzing the results, the part-time coefficient is more deteriorated at the lower part of the distribution for both women and men in relation to the estimations presented before. The coefficient of "foccup2 part-time" is not significant across the samples. Nonetheless, the coefficient of interaction "foccup2 overwork" shows that working women are more responsive to this interaction variable than men in the three samples. Furthermore, the effect of "foccup2-overwork" varies along the wage distribution. This effect is negative at each quantile for women,

but it is only significant at the lower quantile of the distribution for women in El Salvador and Honduras, therefore, these results suggest a wage penalty for female-dominated occupations even when working long hours.

4.7.Conclusions

This paper contributes to the discussion on gender differences in the labor market of the Northern Triangle of Central America by examining the role of occupational intensity by gender on gender differences in pay. It also makes several methodological and empirical contributions to the existing literature. Firstly, a new harmonized occupational classification at the 2-digit-level was built with the objective of proposing a new typology of occupations across countries, which allowed a consistent and comparable analysis of the occupational structure in the urban areas of the region. Secondly, this paper analyzes the link between gender occupational intensity and gender differences in pay along the wage distribution, and how it displayed among countries. In doing so, it provided a novel contribution by focusing on women of the Northern Triangle. For that, using national surveys carried out in 2014, this study estimated quantile regressions to analyze what factors affect wages at different points of the distribution, considering individuals and household variables, and job-related characteristics using two specifications for each country. The first one used all sample, and the second, wage equations for female and male workers were estimated separately.

The descriptive analysis attempts to draw a picture of the occupational structure of the urban labor market in the region. Women's employment follows a similar pattern across countries. For instance, analyzing self-employment performance, the share of women employed in self-employment is higher than men across countries. Women are more commonly employed in part-time jobs than men, they account for 27 percent of part-time workers in Guatemala and Honduras, and in El Salvador 23 percent. The region also reports the largest concentrations of female employment found in commerce and services.

In addition, gender differences are significantly present at the occupational distribution; working women are underrepresented in managerial positions and overrepresented in other occupations

like personal care workers, cleaners and helpers, personal services workers, food preparation assistants, and professionals and associate professionals (including health and teaching). In Honduras the distribution varies only modestly in relation to Guatemala and El Salvador, in the top ten of female-dominated jobs is reported stationary plant and machine operators, this occupation is likely concentrated in the Maquila industry, which has been highly feminized in Central America (OLACD, 2009). A preliminary descriptive analysis shapes occupational distributional and its link with earnings differentials; as a result, it is observed that women are overrepresented in low-paid jobs. Furthermore, on average, male' wages (M/F) represent around 1.22, 1.19, and 1.16 points of the female wage rate in urban areas for Guatemala, El Salvador, and Honduras respectively.

Quantile earnings equations are estimated using as control variables; demographic characteristics, education, and job-related characteristics plus a binary variable that identifies the gender of individuals. When the results of quantile regressions are analyzed, it is observed that the coefficient of gender is of specific interest once it suggests gender differences in earnings. In fact, women earn less than men along the wage distribution, but the largest differences are observed at the lower quantile in all countries. It would indicate the existence of a sticky floor effect; although this effect is greater in Guatemala. The comparative case study also shows that the gender profile varies across countries. Gender differences in pay are decreasing from the 10^{th} to 50^{th} quantile in the three countries, but it is then slightly increasing at the 90^{th} especially in El Salvador and Honduras. While these differences decrease considerably as one moves up to the upper part of the distribution in Guatemala. Special attention is reserved for the relevant variable; the female occupational intensity coefficient is negative and statistically significant along the wage distribution across countries. Nonetheless, it varies across quantiles, particularly, female occupational intensity has a larger negative effect at the lower part of the wage distribution in El Salvador and Honduras.

The analysis then explores the relationship between the set of covariates and wage differentials by gender at different points of the wage distribution. From these results, gender differences along the wage distribution are observed. The effect of control variables varies among 10^{th} and 90^{th} as well as from the mean, as other country-case studies have shown (see, e.g., MARTINS;

PEREIRA, 2004; GALVIS, 2011; SALARDI, 2013; ARCEO-GÓMEZ; CAMPOS VASQUEZ, 2014; ADDISON et al., 2018). With respect to the effect of the control variables, it is observed that educational attainment plays an important role in wage differentials. Individuals with tertiary education have the highest wage rates along the wage distribution in all countries. Besides, the results show that there are differences in the returns to education by gender across quantiles, although the patterns are stable for all countries. In general, the returns to education are higher for women than for men at the lower quantile and at the mean of the distribution. On the contrary, at the upper quantile of the distribution men tend to have a higher return to education than women.

Another important factor affecting wage differentials is worked hours, it is noted a wage penalty for part-time workers, but it is higher for women at the lower part of the distribution across countries. Meanwhile, the overwork effect is positive and statistically significant only for men at the top of the distribution in Guatemala and Honduras. Similar trends have been reported by several scholars, women are concentrated in part-time jobs, and men are much more likely to work long hours (see, e.g., VOSKO, 2006; KHUN; LOZANO, 2008; CHA; WEEDEN, 2014; GOLDIN, 2014).

The results thus are consistent with previous studies about gender differences in pay conducted in Central American countries (see, TENJO et al., 2005; ENAMORANDO; IZAGUIRRE; ÑOPO, 2009; ÑOPO; ATAL; WINDER, 2010). Nonetheless, this paper also reveals gender differences in the occupational structure and its importance on wage differentials. Generally, women are disproportionately represented in certain occupations, and this translates into lower pay. In this respect, this study goes much further when addressing the question: how does female occupational intensity (foccup2) affect the distribution of wages? The coefficients remain significant and negative for women in all countries. Consequently, these findings confirm the hypothesis of the wage penalty for working in female-dominated occupations in the region. Similar results have been discussed in other Latin American countries (SALARDI, 2013; ESPINO, 2013) as well as in developed countries (HANSEN; WAHLBERG, 2000; BAKER; FORTIN, 2003; COTTER; HERMSEN; VANNEMAN, 2003; ADDISON et al., 2018). Moreover, there are differences across female occupational intensity quantiles. The effect of this

variable is larger at the lower quantile, but this effect tends to decrease as one moves up to the mean of the distribution in El Salvador and Honduras.

In sum, the findings suggest that women are always at a disadvantage if compared to men in the labor market. The comparative study leads to two main remarks; the first point, there are similarities in the occupational distribution, particularly, females are overrepresented in certain occupations, and they are much more likely to be working in part-time jobs than men in all countries. The second point is related to heterogeneity along the wage distribution, although gender differences in pay are observed along the distribution in all countries, these differences are larger at the lower part of the distribution for Guatemalan women. Finally, being employed at female-dominated occupations reduce wages for working women, it is remarkable to notice the larger effect at the lower quantile are present in El Salvador and Honduras.

Later, these results can contribute to understanding gender differences in the labor market, which becomes an issue with strong policy making implications. In this sense, the results highlight the importance of promoting a more equal pay structure both for men and women, as well as family policies that facilitate the reconciliation between work and family (e.g. provision of quality daycare services for young children, parental leave, and promotion of caring responsibilities within the family, see OLIVELLI; PETRONGOLO, 2017). These family policies could help to combat occupational segregation by gender since this phenomenon is usually linked to the household division of labor (see, e.g., ANKER, 1997; MANNING; SWAFFIELD, 2008; GOLDIN, 2014); generally, women devote more time than men to unpaid activities (FERRANT et al., 2014; RUBIANO-MATULEVICH; VIOLLAZ, 2019).

Finally, studies along this line may be of particular interest to policymakers as women's employment and their earnings have been cited as an important factor in the improvement in poverty and inequality reduction in Latin American countries (WORLD BANK, 2012b). This is especially relevant for Honduras and Guatemala, countries characterized by high levels of poverty and inequality. Therefore, activist policies with a regional vision should be oriented to combat gender inequalities in the labor market in the Northern Triangle.

Future research ought to engage with the analysis of the dynamic of gender inequalities in the labor market in the region. The comparative analysis shows that women face similar disadvantages in the labor market across countries; further, the wage penalty for working in female-dominated occupations is larger along the distribution for women. In that regard, all over the region, female labor force participation has increased substantially in the past decades, although it continues to be low in relation to the rest of the Latin American countries. Thus, it will be interesting, first, to explore trends in employment and earnings, and then to investigate how the gender wage gap has evolved throughout time. This analysis can then offer a more accurate and complete understanding of the female occupational intensity and its importance to the evolution of gender differences in pay in the Northern Triangle region.

4.8.References

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4.9.Appendix

Re classification

ISCO-08 divides jobs into 10 major groups. Major Group 1: Legislators, senior officials, and managers; Major Group 2: Professionals; Major Group 3: Technicians and associate professionals; Major Group 4: Clerks; Major Group 5: Service workers and shop and market sales workers; Major Group 6: Skilled agricultural and fishery workers; Major Group 7: Craft and related trades workers; Major Group 8: Plant and machine operators and assemblers; Major Group 9: Elementary occupations, and Major Group 0: Armed forces.

Some categories have been re-label to have enough observations by each occupational category. For this purpose, variables such as education, age, average earnings, and sector of economic activity have been considered to observe the distribution within subgroups. Thus, the number of occupations is reduced to a minimum of 34 categories.

The first group to analyze is the Major 1 "Legislators, senior officials, and managers", which distinguish three categories that are comparable across the three countries:

- Chief executives, senior officials and legislators
- Administrative and commercial managers
- Production and specialized services managers;

The Major group 2 "Professionals" distinguishes the following categories:

- Science and engineering professionals
- Health professionals
- Teaching professionals
- Business and administration professionals
- Information and communications technology professionals
- Legal, social and cultural professionals;

The category "Information and communications technology professionals" reports a few observations in the three samples. Indeed, "Business and administration professionals" and

“Information and communications technology professionals” have been included within the same category named “Business administration and communication professionals” because these presented a similar distribution across sectors; particularly these categories are concentrated in sales, finance, and retail trade.

The Major group 3 “Technicians and associate professionals”:

- Science and engineering associate professionals
- Health associate professionals
- Business and administration associate professionals
- Legal, social and cultural associate professionals
- Information and communications technicians;

The category “Information and communications technicians” contains a few observations for Guatemala and Honduras. Indeed, “Business and administration associate professionals” and “Information and communications technicians” haven been included within the same category named “Business administration and communication professionals” because these presented a similar distribution across sectors; particularly these categories are concentrated in sales, finance and retail trade.

The Major group 4 “Clerks”:

- General and keyboard clerks
- Customer services clerks
- Numerical and material recording clerks
- Other clerical support clerks;
- The Major group 5 “Services and Sales workers”:
- Personal services workers
- Sales workers
- Personal care workers
- Protective services workers;

Moving to the Major group 6 “Skilled agricultural, forestry and fishery workers”:

- Market oriented skilled to agricultural workers (CIU-61)
- Market oriented skilled forestry, fishery, and hunting workers (CIU-62)
- Subsistence farmers, fishers, hunters and gatherers (CIU-63);

Honduras sample does not report the last category, and data from Guatemala reports a few observations. Then, this category has been re-label as “Agricultural workers”, because there exist similarities among forestry and fishery workers.

The Major group 7 “Craft and related trades workers”:

- Building and related trades workers, excluding electricians
- Metal, machinery and related trades workers
- Handicraft and printing workers
- Electronical and electronic trades workers
- Food processing, wood working, garment and other craft and related trades workers;

The Major group 8 “Plant and machine operators and assemblers” is composed by:

- Stationary plant and machine operators
- Assemblers
- Drivers and mobile plant operators;

In this case, data for Guatemala does not report the “Assemblers” category, and for Honduras, it reports a few observations on this category, while the last category “Drivers and mobile plant operators” contains more 200 observations for each country. Thus, other characteristics such as education, age, average earnings, and sector of activity have been considered to observe the distribution within subgroups. For example, “Stationary plant and machine operators” and “Assemblers” are concentrated in Manufacturing, while “Drivers and mobile plant operators” are distributed in three different economics activities: transport, sales, services, and manufacturing. Thus, the first and the second category are re-label as “Stationary plant and machine operators and Assemblers”.

The Major group 9 is for “labourers” or “elementary occupations” distinguishes the following categories:

- Cleaners and helpers
- Agricultural, forestry and fishery labourers
- Labourers in mining, construction, manufacturing and transport
- Food preparations assistants
- Street and related sales and services workers
- Refuse workers and other elementary workers;

The category “Street and related sales and services workers” computes few observations for Guatemala. Indeed, this has been included in “Personal sales workers”.

Finally, members of the armed forces (Major 0) are omitted from the sample. As a result, 34 groups of occupations are generated.

Table 4.11. Description of independent variables

Variable	Description
Individual characteristics	
Age	An continue variable that indicate the age of household members
Age squared (age2)	Age squared
Educational attainment (edu_level)	An ordinal variable that indicate the education level 1- No Education 2- Primary 3- Secondary 4- Tertiary
Household characteristics	
Married	It is a dummy that takes on the value 1 if the individual is married
Number of children under 14 years old (nch014)	A continuous variable to indicate the number of children under 14 years old by household
Job related characteristics	
Number of working hours (nhours)	1-full-time; nhours >=35 & nhours<=49 2-part-time; nhours >0 & nhours <=34 3-overwork; nhours >= 50
Self-employment (self_empl)	It is a dummy that takes on the value 1 for being self-employed
Sector employment (sector)	An ordinal variable that indicate the economic sector, 1-Agriculture, Forestry, Hunting and Fishing 2-Mining and Manufacturing 3-Construction 4-Commerce 5-Transport and Communication 6-Finance and retail trade 7-Other Services
Female occupational intensity(foccup2)	A continuous variable built using the harmonized classification of occupational categories, which captures the proportion of female workers in each occupation

Table 4.12 Distribution of female workforce by occupational category, Guatemala (2014)

Code	Occupational category	N(total workers)	Female occupational intensity (%)	Ranking Monthly wages (mean)	F/M	M/F
	All	*7,103*	*61.20*		*0.80*	*1.22*
20	Personal care workers	65	93.85	33	0.83	1.20
30	Cleaners and helpers	480	91.88	34	0.45	2.20
11	Health associate professionals	93	77.42	17	0.81	1.24
14	General and keyboard clerks	121	76.03	18	0.90	1.11
33	Food preparations assistants	22	72.73	27	1.10	0.91
7	Teaching professionals	366	68.03	13	0.87	1.15
3	Production and specialized services managers	19	63.16	7	0.75	1.33
19	Sales workers	1,504	62.37	24	0.63	1.60
6	Health professionals	24	58.33	5	0.79	1.27
18	Personal services workers	283	54.77	23	0.92	1.08
1	Chief executives, senior officials and legislators	10	50.00	2	0.40	2.47
25	Handicraft and printing workers	82	48.78	31	0.47	2.14
15	Customer services clerks	211	45.02	15	0.86	1.16
27	Food processing, wood working, garment and other craft and related trades workers	366	36.07	28	0.81	1.23
13	Legal, social and cultural associate professionals	46	34.78	16	0.96	1.04
17	Other clerical support clerks	32	34.38	11	1.23	0.81
28	Stationary plant and machine operators and Assemblers	144	32.64	22	0.75	1.34
9	Legal, social and cultural professionals	68	30.88	8	1.03	0.97
2	Administrative and commercial managers	17	29.41	3	0.97	1.03

Table 4.12 (Continued)

4	Hospitality, retail and other services	24	25.00	6	0.89	1.12
16	Numerical and material recording clerks	189	24.87	12	0.92	1.09
12	Business administration and Communication associate professionals	69	23.19	10	0.97	1.03
8	Business administration and Communication professionals	46	19.57	1	0.72	1.40
34	Refuse workers and other elementary workers	191	15.71	26	1.12	0.90
5	Science and engineering professionals	13	15.38	4	0.83	1.20
31	Agricultural, forestry and fishery labourers	648	11.42	32	0.77	1.30
10	Science and engineering associate professionals	52	9.62	9	0.96	1.04
32	Labourers in mining, construction, manufacturing and transport	341	7.92	29	1.20	0.83
22	Agricultural workers	193	7.77	30	0.64	1.57
21	Protective services workers	209	5.74	14	1.25	0.80
29	Drivers and mobile plant operators	339	1.47	19	0.72	1.38
24	Metal, machinery and related trades workers	245	0.82	21	1.52	0.66
23	Building and related trades workers, excluding electricians	502	0.80	25	0.69	1.44
26	Electronical and electronic trades workers	89	0.00	20	-	-

Notes: The wage gap in each category is computed as the ratio of females mean wage over males mean wage (F/M).

The wage gap in each category is computed as the ratio of males mean wage over females mean wage (M/F).

Source: Authors' calculation based on ENCOVI (2014).

Table 4.13 Distribution of female workforce by occupational category, El Salvador (2014)

Code	Occupational category	N(total workers)	Female occupational intensity (%)	Monthly wages (mean)	F/M	M/F
	All	*14,160*	*65.67*		*0.84*	*1.19*
33	Food preparations assistants	210	88.10	33	0.59	1.68
30	Cleaners and helpers	1,151	84.36	30	0.65	1.54
14	General and keyboard clerks	223	84.30	14	0.90	1.11
20	Personal care workers	119	83.19	20	0.63	1.58
18	Personal services workers	1,096	74.09	18	0.82	1.22
6	Health professionals	144	70.83	6	0.76	1.32
19	Sales workers	2,544	69.93	19	0.73	1.37
7	Teaching professionals	565	68.67	7	0.96	1.04
11	Health associate professionals	154	61.04	11	1.15	0.87
27	Food processing, wood working, garment and other craft and related trades workers	900	61.00	27	0.67	1.49
28	Stationary plant and machine operators and Assemblers	653	57.27	28	0.89	1.13
15	Customer services clerks	264	49.62	15	0.97	1.04
2	Administrative and commercial managers	69	49.28	2	0.92	1.08
12	Business administration and Communication associate professionals	440	47.95	12	1.00	1.00
9	Legal, social and cultural professionals	194	47.42	9	1.38	0.73
8	Business administration and Communication professionals	195	45.64	8	0.99	1.01
17	Other clerical support clerks	74	44.59	17	0.89	1.13
1	Chief executives, senior officials and legislators	37	43.24	1	1.04	0.96
4	Hospitality, retail and other services	42	42.86	4	0.93	1.08
25	Handicraft and printing workers	194	41.24	25	0.70	1.43
3	Production and specialized services managers	102	38.24	3	0.96	1.04
13	Legal, social and cultural associate professionals	147	29.93	13	0.98	1.02
5	Science and engineering professionals	113	24.78	5	0.87	1.14
16	Numerical and material recording clerks	292	23.97	16	1.10	0.91
10	Science and engineering associate professionals	145	23.45	10	1.02	0.98

Table 4.13 (Continued)

34	Refuse workers and other elementary workers	228	15.79	34	0.51	1.96
31	Agricultural, forestry and fishery labourers	626	10.38	31	0.86	1.16
32	Labourers in mining, construction, manufacturing and transport	745	9.53	32	1.06	0.94
22	Agricultural workers	94	6.38	22	0.63	1.59
21	Protective services workers	476	5.46	21	1.16	0.86
23	Building and related trades workers, excluding electricians	500	0.80	23	0.69	1.45
29	Drivers and mobile plant operators	663	0.60	29	0.78	1.29
26	Electronical and electronic trades workers	215	0.47	26	1.17	0.85
24	Metal, machinery and related trades workers	546	0.18	24	0.80	1.24

Notes: The wage gap in each category is computed as the ratio of females mean wage over males mean wage (F/M).
The wage gap in each category is computed as the ratio of males mean wage over females mean wage (M/F).
Source: Authors' calculation based on EPHM (2014).

Table 4.14 Distribution of female workforce by occupational category, Honduras (2014)

Code	Occupational category	N(total workers)	Female occupational intensity (%)	Ranking Monthly wages (mean)	F/M	M/F
	All	*4,096*	*60.35*		*0.86*	*1.16*
33	Personal care workers	56	98.21	33	0.40	2.47
34	Cleaners and helpers	164	92.68	34	0.56	1.79
12	Health associate professionals	62	85.48	12	0.98	1.02
15	General and keyboard clerks	46	84.78	15	1.11	0.90
7	Teaching professionals	175	77.14	7	0.83	1.20
16	Other clerical support clerks	34	73.53	16	1.02	0.98
26	Food preparations assistants	81	72.84	26	0.90	1.11
29	Stationary plant and machine operators and Assemblers	57	63.16	29	1.03	0.97
31	Food processing, wood working, garment and other craft and related trades workers	346	60.69	32	0.62	1.63
13	Numerical and material recording clerks	61	59.02	13	0.88	1.14
25	Sales workers	662	57.55	25	0.56	1.78
1	Health professionals	25	56.00	1	0.82	1.22
17	Customer services clerks	55	54.55	17	0.98	0.99
9	Administrative and commercial managers	102	52.94	9	1.02	0.98
27	Personal services workers	390	49.74	27	0.74	1.35
5	Business administration and Communication professionals	53	43.40	5	0.91	1.09
4	Legal, social and cultural professionals	77	42.86	4	1.11	0.90
10	Business administration and Communication associate professionals	161	39.75	10	1.21	0.82
14	Legal, social and cultural associate professionals	41	39.02	14	0.65	1.55
8	Science and engineering associate professionals	50	38.00	8	0.79	1.27
11	Hospitality, retail and other services	28	35.71	11	0.49	2.05
2	Chief executives, senior officials and legislators	91	34.07	2	0.80	1.26
6	Production and specialized services managers	42	33.33	6	0.97	1.03
3	Science and engineering professionals	30	26.67	3	1.13	0.88
22	Refuse workers and other elementary workers	96	23.96	22	0.88	1.13
23	Labourers in mining, construction, manufacturing and transport	49	18.37	23	0.64	1.56

Table 4.14 (Continued)

24	Metal, machinery and related trades workers	254	13.39	24	0.90	1.12
28	Agricultural workers	70	11.43	28	1.03	0.97
32	Agricultural, forestry and fishery labourers	73	9.59	32	1.21	0.82
20	Handicraft and printing workers	24	8.33	20	0.88	1.14
19	Protective services workers	64	4.69	19	0.68	1.48
30	Building and related trades workers, excluding electricians	301	1.66	30	1.58	0.63
21	Electronical and electronic trades workers	67	1.49	21	0.22	4.58
18	Drivers and mobile plant operators	209	0.96	18	0.72	1.40

Notes: The wage gap in each category is computed as the ratio of females mean wage over males mean wage (F/M).
The wage gap in each category is computed as the ratio of males mean wage over females mean wage (M/F).
Source: Authors' calculation based on EPHPM (2014).

The Quantile Regression Approach

The Ordinary Least Squares (OLS) has been traditionally used to estimate the Mincerian equation. However, this method characterizes the wage distribution only at the mean of the distribution. Thus, in recent years scholars have used Quantile Regression (QR) to estimate wage equations, this method looks at the effects of gender and other covariates on different quantiles of the wage distribution and not only at the average of variables. Another motivation to use QR is that this method is more robust to non-normal errors and outliers while OLS can be inefficient if the errors are highly non-normal. The QR framework was provided by Koenker and Basset (1978), the method was initially applied in the context of wage equations, by Chamberlain (1994), Poterba and Rueben (1994), Buchinsky (1994, 1998), Fitzenberger and Krutz (1999), and Machado and Mata (2001).

Given that, the earnings equation may be calculated as follows (see Pereira and Martins, 2000);

$$lnw_i = x_i\beta_\theta + u_{\theta i} \text{ with } Quant_\theta(lnw_i/x_i) = x_i\beta_\theta \quad (4.1)$$

where; x_i is the vector of exogeneous variables, β_θ corresponds to the parameters vector, and $Quant_\theta(lnw_i/x_i)$ is the θ-th conditional quantile of lnw_i given *x*. The θ-th quantile regression, $0 <\theta <1$ is defined as the solution to the problem:

$$min_{\beta \in \mathbb{R}^k}\left\{\sum_{i:y\geq x_i\beta} \theta|lnw_i - x_i\beta_\theta| + \sum_{i:y\geq x_i\beta}(1-\theta)|lnw_i - x_i\beta_\theta|\right\} \quad (4.2)$$

Then, it can express (4.2) as:

$$min_{\beta \in \mathbb{R}^k}\left(\sum \rho_{\theta^{(lnw_i - x_i\beta_\theta}}\right) \quad (4.3)$$

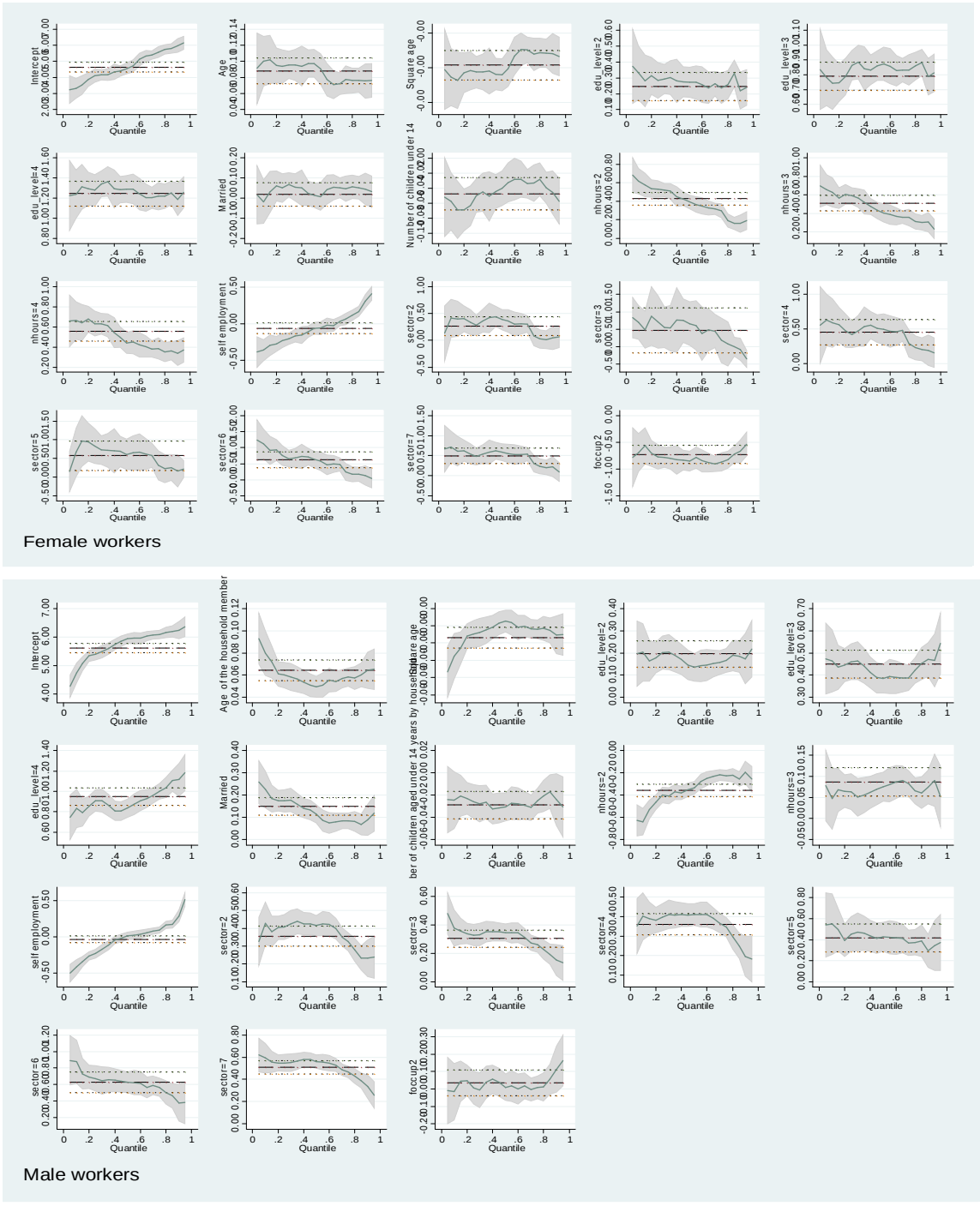
where, ρ_θ is a function defined as follows: $\rho_\theta(\varepsilon) = \theta\varepsilon$ if $\varepsilon \geq 0$ and $\rho_\theta(\varepsilon) = (1-\theta)\varepsilon$ if $\varepsilon < 0$

The quantile regression estimator is asymptotically normally distributed. The first quantile is obtained by setting (θ=0.10) and so on, it is continuously increasing from 0 to 1, one traces the entire distribution of *y*, conditional on *x*. Therefore, the QR can generate different solutions (i.e.

distinct β‘s) at different quantiles, which is very useful because it permits to compute several regression curves corresponding to different conditional quantiles in the wage distribution.[95]

[95] Stata provides commands that estimate QR using bootstrap standard errors, but these do not allow the use of weights.

Figure 4. 1. Covariates effect from quantile regressions by gender, Guatemala (2014)

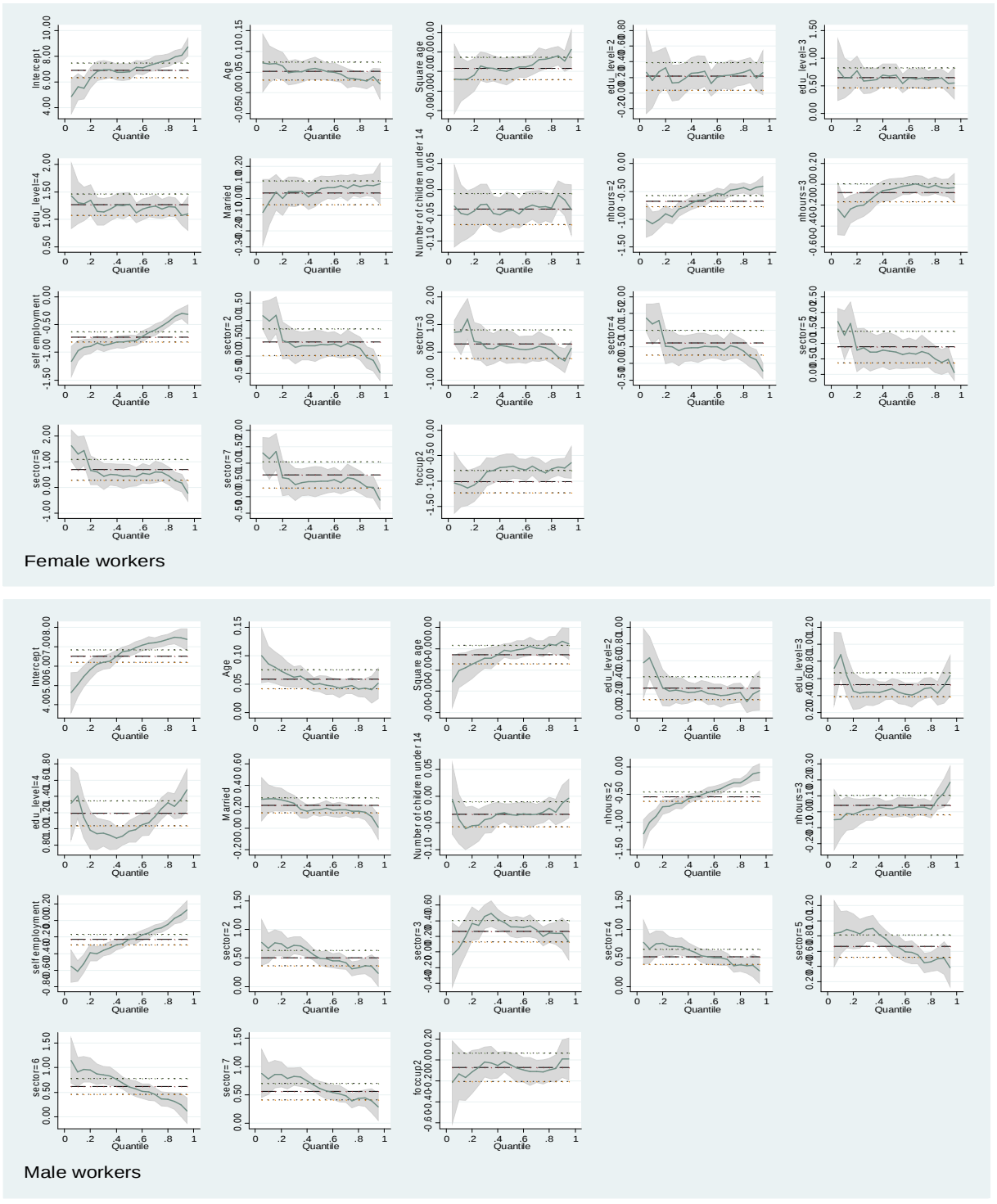


Source: Authors' calculation based on ENCOVI (2014

Figure 4. 2. Covariates effect from quantile regressions by gender, El Salvador (2014)

Source: Authors' calculation based on EHPM (2014).

Figure 4. 3. Covariates effect from quantile regressions by gender, Honduras (2014)



Source: Authors' calculation based on EPHPM (2014).