COVID-19 and the Gendered Impacts on Paid and Domestic Work: Evidence from an Exploratory Loglinear Analysis of Young Lives Data

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Abstract

The outbreak of the COVID-19 pandemic in early 2020 resulted in a global economic crisis, with severe consequences for the lives and livelihoods of people worldwide. While hundreds of millions of people were unable to work as usual due to lockdowns and restrictions, simultaneously, the burden of care work increased drastically as a result of school closures, work-from-home orders, and overwhelmed healthcare systems. The purpose of this study was to explore the gendered impacts of the crisis, by examining how young men and women's time spent on paid and domestic work in four global south countries was affected during the lockdown of the first wave of the pandemic. Drawing on data from the Young Lives project, this study used chi-square tests and loglinear analysis to explore the associations between sex, economic sector, paid work during lockdown, and domestic work during lockdown. The results revealed that all the bivariate association tests reached statistical significance, and further revealed two significant three-way associations. Women had slightly higher odds of reducing work hours than men, which can, at least partly, be attributed to their overrepresentation in certain economic sectors. Moreover, women had higher odds than men of increasing the time spent on domestic work during lockdown, and the association between domestic work and paid work was found to be stronger for women than for men. These results imply that the time spent on paid work by women was more sensitive to increases in domestic work, than it was for men. In addition, the results indicate that women had a higher vulnerability to shouldering a double work burden during lockdown. The results presented in this study carry important implications for COVID-19 recovery policies and future research on the gendered impacts of economic crises.

Introduction

Background

The COVID-19 Pandemic

On March 11th of 2020, the World Health Organization (WHO) classified the infectious coronavirus disease, also known as COVID-19, as a pandemic (WHO, 2020). As of early December 2021, the global confirmed death toll from COVID-19 since the outbreak of the virus in late 2019 exceeded 5.2 million (WHO, 2021). Efforts to curb the spread of the disease have included lockdowns and unprecedented restrictions on social interaction and movement, with the severity of measures varying across countries and localities. As a result, the world has seen the deepest economic downturn in almost a century, with the IMF in April 2021 estimating that the global economy had contracted by 3.3 per cent in 2020 (IMF, 2021). According to the International Labor Organization, 2020 saw an 8.8 per cent loss of global working hours, corresponding to 255 million full-time jobs (ILO, 2021). The available evidence suggests that the severity of the impact has varied considerably across economic sectors and countries (ILO, 2021). Moreover, emerging evidence suggests that young adults are among those most affected by the economic downturn (Churchill, 2020; Moen et al., 2020). Simultaneously, the amount of care work has substantially increased as a result of school closures, stay-at-home orders and overwhelmed health services in many countries, a burden which has been argued to fall disproportionately on women (UN Women, 2020a).

As the above suggests, there is a dual nature to the COVID-19 crisis that sets it apart from previous economic crises (Tejani & Fukuda-Parr, 2021). Therefore, Tejani and Fukuda-Parr (2021) argue, it is helpful to make an analytical distinction between the "health effects" and "lockdown effects" of the COVID-19 pandemic. The present study follows this recommendation and focuses solely on the early lockdown effects of the crisis on paid and domestic work.[1] Moreover, it seeks to uncover whether there was a gendered nature to these

[1] Throughout this study, the term "lockdown" is used to refer to the period during the first wave of the COVID-19 pandemic, in the spring of 2020, when most countries introduced different measures restricting social interaction and movement. The specific time period and the strictness of measures varied between countries. Notably, among the four countries studied here, three (India, Vietnam and Peru) introduced formal lockdowns while Ethiopia opted for somewhat softer measures.

effects, and if so, how men and women were differentially impacted. In order to do so, a general understanding of the gendered division of labor is needed, which is the topic of the following section.

The Gendered Division of Labor

The gendered division of paid and domestic labor is a topic that came into being during the second wave of feminism in the late 1960s and 1970s (important works include e.g. Hartmann, 1976; Oakley, 1974; Siltanen & Stanworth, 1984). Until then, household and care work had been virtually absent from the conscience of the social sciences, partly as a result of it being considered to belong to the private (female) sphere, which was ruled by personal choice and could be distinctly separated from the public (male) sphere (Gardiner, 1997). According to Gardiner (1997) domestic labor is thus "a concept that has been used by feminists and social scientists since the 1970s to refer to unpaid work that is done by and for members of households" (p. 1). Inspired by socialist and Marxist ideologies, contemporary feminists argued that occupational sex segregation in combination with a gendered division of domestic work was responsible for women's continued subordination to men. A quote from Hartmann (1976) is included here to exemplify this line of reasoning:

> Job segregation by sex, I will argue, is the primary mechanism in capitalist society that maintains the superiority of men over women, because it enforces lower wages for women in the labor market. Low wages keep women dependent on men because they encourage women to marry. Married women must perform domestic chores for their husbands. Men benefit, then, from both higher wages and the domestic division of labor. This domestic division of labor, in turn, acts to weaken women's position in the labor market. Thus, the hierarchical domestic division of labor is perpetuated by the labor market, and vice versa. (p. 139)

This quote illustrates how feminists considered the gendered division of domestic work and sex segregation on the labor market to interact to produce unequal outcomes for men and women.

Theories of the gendered division of labor have also been influential within the field of development studies, where scholarly attention was initially focused on making visible the amount of work (for instance in the reproductive sphere and the informal economy) carried out by women that had previously largely gone unnoticed, and thereby highlight the role of women as development agents (see e.g. Boserup, 1970). Since then, however, women in the global

south have in increasing numbers joined the paid labor force, partly as a result of structural adjustment and economic downturn in many countries (Chant, 2011; Elson, 1995). Simultaneously, women's responsibility for domestic labor tasks remains pervasive, with for instance OECD reporting in 2014 that globally, women spend between two and ten times more time on domestic work than men (OECD, 2014). On the one hand, it has been argued that the gender gap in unpaid work is part of the cause of persistent gender inequality in the labor market, both in terms of female labor force participation, quality of employment, and gender wage gaps (OECD, 2014; World Bank, 2012). At the same time, development scholars have also called attention to the double burden women across the global south are shouldering as they in increasing numbers take up paid work outside the home, while continuing to perform the bulk of domestic work tasks (Chant, 2011).

Finally, a note on terminology is warranted here. The terms domestic work, reproductive work, unpaid household work and related concepts are often used interchangeably in academic and policy literature. Domestic work, which is the term preferred in this study, is sometimes taken to include caring activities such as childcare, and sometimes other terms such as "care and domestic work" or "domestic labor and care" are used (see e.g. Craig, 2020; UN Women, 2020b). Importantly, the term domestic work can include both paid and unpaid work, as underscored by the International Labor Organization, which defines domestic work as "work performed in or for a household or households" (ILO, 2011, Article 1). The term "unpaid domestic work" thus is more exact in referring to unpaid household and caring activities. However, the data used in this study are based on survey questions on time spent on household chores and childcare that do not specify whether this work was paid or unpaid. Therefore, the less exact term "domestic work" is used throughout this study. This term is taken to include both household chores and childcare, and it is assumed that for the majority of survey respondents, such work was unpaid. A fuller discussion of the domestic work variable is offered in the section on study variables.

Research Objective and Organization of the Study

Based on the above background, the overarching objective of this study is to explore the gendered effects on paid and domestic labor among young adults in the global south during the lockdown in the first wave of the COVID-19 pandemic. In so doing, this study aspires to add to the growing literature on the early impacts of the pandemic, and more specifically, its gendered impacts on the time spent on paid and domestic work by men and

women. The goal thus is to deepen the understanding of how men and women's labor was differentially impacted by lockdown, and thereby generate implications for policy responses, and future research. The remainder of this study is organized in the following way: in the second chapter, the central tenets of a theoretical framework for a gendered analysis of economic crises are presented. The third chapter discusses main themes as well as inconsistencies in the previous literature on this topic and concludes by presenting the two research questions to be addressed in this study. In the fourth chapter, the data and methods used for exploring the research questions are presented and justified, and in the fifth chapter, results of these analyses are presented. The sixth chapter offers a discussion of the results on the basis of the previous literature and the theoretical framework for this study and highlights the strengths and contributions of the study, as well as some important limitations. Finally, the seventh chapter concludes by summarizing the central findings of the study and briefly discussing their implications for policy and future research.

Theoretical Framework: A Gendered Analysis of Economic Crises

The COVID-19 pandemic and its origins and effects represents an entirely novel research area spanning across diverse fields including medicine, psychology, and economics, to name only a few. Due to the novelty of this research area, there is a lack of existing theoretical frameworks that are specifically adapted to analyzing the present crisis. However, feminist economists have since the 1980s been using a gender lens to analyze the causes and consequences of previous economic crisis and downturns (Rubery, 2021). Key theoretical contributions in this area include Elson (2010), Pearson and Sweetman (2011), Fukuda-Parr et al. (2013), and Rubery (2021), among others. This study draws on the theoretical arguments put forth by these scholars and applies them to analysis of the economic crisis caused by the COVID-19 pandemic. Importantly, this allows not only for a structured analysis grounded in existing theoretical research, but also for identifying aspects of the present crisis that differ from previous ones, with a view to contributing to theoretical advancement. It is worth bearing in mind that feminist economists have argued that a gendered lens can be used in analyzing the origins and impacts of, and responses to, economic crises (Elson, 2010; Rubery, 2021). The scope of this chapter, however, is limited to the theoretical arguments that are relevant for the purpose of the present study, the focus of which lies on the gendered impacts of the COVID-19 crisis (and not on its origins or policy responses). Within this limited scope, the remainder of

this chapter is devoted to discussing three central tenets of a gendered analytical framework of economic crises.

Firstly, a key aspect of feminist critiques of traditional economic approaches has been that they overlook the vast amounts of unpaid care and household work that is central to the healthy functioning of the economy (Fukuda-Parr et al., 2013). In analyzing the impacts of previous economic downturns, feminist scholars have found that cuts in public spending tend to lead to an increase in the amount of unpaid care work performed within households, duties which fall disproportionately on women as a result of social norms regarding the gendered division of labor (Elson, 2010; Tejani & Fukuda-Parr, 2021). Thus, Fukuda-Parr et al. (2013) argue that "by recasting the effects of economic crises to include outcomes that are excluded from most analyses (that is, nonmarket processes and shifts in the burden of care work), feminist insights enrich the theoretical framework for understanding the nature of crises" (p. 15). A gendered economic analysis, then, must be based on a view of the economy as including both the productive and reproductive spheres (Pearson & Sweetman, 2011; Tejani & Fukuda-Parr, 2021).

Secondly, the gendered effect on paid work is a central topic of a feminist analysis of economic crises. According to Rubery (2021), early feminist theories on this topic proposed that women constitute a "flexible labor force", which is drawn in to offset labor shortages when needed and dismissed during economic downturns (p. 363). While there may be some truth to this claim, critics have argued that the level of gender segregation on the labor market restricts women's opportunities to act as a cyclical labor reserve (Rubery, 2021, p. 363). Rather, they argue, the gendered consequences of crisis for employment depend on whether the occupational sectors that are most affected by the crisis are dominated by male or female workers (Elson, 2010; Pearson & Sweetman, 2011; Rubery, 2021). From this follows that gendered outcomes on the labor market depend on the nature of the crisis, where women's employment can be either protected or exposed as a result of gender segregation on the labor market (Rubery, 2021, p. 365).

Finally, a gendered analysis of economic crises includes inquiry into the effects of crises on gender relations. According to Elson (2010), social norms regarding what constitutes men's and women's work are likely to influence the division of labor during crisis, which could be considered to reinforce existing gender norms. However, she also contends that gender norms can start to decompose as a result of crisis, for instance when men shoulder responsibilities that traditionally have fallen on women, and vice versa (Elson, 2010, p. 204). In this view, economic

crises could lead either to a reversal to a more traditional (inequal) gendered division of labor, or it could lead to a transformation of gender relations in a more gender equal direction (Elson, 2010).

Literature Review and Research Questions

Literature Review

The purpose of the literature review was to review the existing literature on the early gendered effects of the COVID-19 pandemic and ensuing measures to restrict the spread of infection. Specifically, the focus for the literature review was to identify studies on the effects of the pandemic measures on the gendered division of paid and domestic work. This chapter first presents the search strategy used in identifying relevant literature. Thereafter, some of the recurring themes in the literature that are relevant for the purpose of this study are summarized, and ambiguities and inconsistencies identified in this growing body of literature are highlighted. On the basis of the literature review, the chapter concludes by presenting the research questions guiding the present study.

Search Strategy

The focus for the database search was on the gendered consequences of the COVID-19 pandemic on paid and domestic work. This general research area includes three central elements: COVID-19, gender, and work. These elements, related search terms, and subject headings were used for searches in two relevant databases: Web of Sciences and Psycinfo. The search was limited to material published in 2020 or later. After completing the searches and reviewing titles and abstracts to filter out irrelevant material, a total of 36 published academic articles remained that were included in the review. Out of the 36 selected articles, 24 employed a quantitative methodology, 11 employed qualitative methodology, and one was an editorial. In terms of geography, 27 of the studies were conducted in "global north" countries, 8 were conducted in "global south" countries, and one study covered countries from both categories.[2] This overview shows that out of the studies published on this topic, quantitative methodologies

[2] The division of countries into "global north" and "global south" is based on the OECD list of countries which were eligible for official development assistance (ODA) in 2020, where ODA-eligible countries are considered as belonging to the "global south". The full list of ODA-eligible countries for 2020 is available on the OECD website: https://www.oecd.org/dac/financing-sustainable-development/development-finance-standards/DAC-List-of-ODA-Recipients-for-reporting-2020-flows.pdf.

are more common than qualitative, and that most of the studies published so far focus on countries in the global north.

Gendered Patterns in Employment Loss

One central question which many of the studies reviewed address, is whether there are gendered patterns to the loss of employment as a result of the COVID-19 pandemic. The findings in many of the articles indicate that on average, women seem to have been more vulnerable to job loss than men (see e.g. Adams-Prassl et al., 2020; Dang & Viet Nguyen, 2021; Kristal & Yaish, 2020; Moen et al., 2020). However, the evidence is not entirely conclusive in this regard; for instance, in a study of the effects of the pandemic in Colombia, Cuesta and Pico (2020) find that while lockdown has had severe negative effects on the incidence of poverty, women and men have been affected relatively equally. Moreover, findings from a study in the UK suggest that men were in fact more likely to have lost employment as a result of the pandemic than women (Witteveen, 2020). How should these seemingly conflicting findings be understood? To the extent that women are more vulnerable to employment loss, it does seem as though this is largely due to structural gender inequalities on the labor market before the onset of the pandemic. As formulated by Reichelt et al (2020):

> In particular, the differences in unemployment probabilities are largely due to women's pre-COVID employment situation (e.g., their higher likelihood of working part-time). After taking individual and employment characteristics into account, men's and women's unemployment risks do not substantially differ anymore, pointing toward potential mechanisms of the arising gender inequalities in the labor market (p. 240).

Another factor that seems to play a role in determining gendered outcomes on the labor market is which sectors of the economy that are dominated by men and women, respectively. For instance, Witteveen (2020) argues that women may have been less vulnerable to job dismissal than men because women are more likely to work in "essential occupations", such as healthcare (p. 4). Similarly, other authors have found men and women to be equally vulnerable to job loss, and women to be less vulnerable than men to work reduction (Hupkau & Petrongolo, 2020). On the other hand, other studies point to women's concentration in the informal economy and in professions which have been hit heavily by the pandemic (such as tourism, hospitality and retail) as a reason for women's greater vulnerability to job loss (see e.g. Churchill, 2020; Cook & Grimshaw, 2021; Mohapatra, 2020). Therefore, it could be argued that local differences in terms of the occupations where women and men are concentrated may account for some of

the variation in vulnerability to job loss. It does seem clear however, that gender inequalities which existed in the labor market prior to the outbreak of the pandemic have been exacerbated by the crisis (Blundell et al., 2020; Moen et al., 2020).

Gendered Division of Domestic Work and Childcare

As the previous section shows, the pandemic and ensuing lockdowns have resulted in a sharp decrease in the demand for labor in certain sectors, which has arguably impacted men and women differently. However, while the demand for productive labor has decreased as a result of lockdowns, the burden of household work has dramatically increased as a result of schools closing and adults having to work from home (UN Women, 2020b). Another central theme in the literature is thus the gendered division of the increased load of domestic work and childcare (see e.g. Craig & Churchill, 2020; Hazarika & Das, 2020; Petts et al., 2020). A number of interesting findings are worth mentioning in this regard. Firstly, many studies (e.g. Hupkau & Petrongolo, 2020; Yamamura & Tsustsui, 2020; Zamarro & Prados, 2020) find that the increased burden of household work falls disproportionately on women. The increased burden of unpaid work in the home also seems to impact the number of hours women spend on paid work outside the home. For instance, in a study using data from the U.S., Collins et al (2020) find that "mothers with young children have reduced their work hours four to five times more than fathers. Consequently, the gender gap in work hours has grown by 20–50 per cent" (p. 101). Moreover, this effect seems to be largely mediated through parental status, whereby mothers are most vulnerable to detachment from the labor market (Heggeness, 2020), while interestingly, fathers have been found to be less affected than mothers, non-mothers and non-fathers (Dias et al., 2020). The finding that the burden of unpaid care work appears to fall disproportionately on women has caused some scholars, specifically those focusing on the global south, to argue that the pandemic has increased the "time poverty" of women (e.g. Chauhan, 2021; Sarker, 2020).

While most of the studies reviewed indicate that the increased burden of domestic work and childcare falls disproportionately on women, there is a non-negligible number of studies suggesting a slightly more nuanced picture. These articles indicate that while women on average continue to do more unpaid work than men, the crisis has resulted in small steps toward a more equal division of household work (Seiz, 2020; Sevilla & Smith, 2020; Shafer et al., 2020). For instance, Schafer et al (2020) note that:

> In general, the gendered division of household labor appears to have inched toward greater equality during this early period of quarantine, remote work, remote schooling, and social distancing. Our analyses suggest that, at least initially, a regression toward less domestic equality among parents was not the case in Canada. In fact, it appears that many Canadian fathers increased their involvement in domestic labor and comparatively few decreased their share (p. 543).

Findings such as this one have caused some scholars to be carefully optimistic about the prospects for a more equal division of labor in the post-pandemic future (Lim et al., 2020; Sevilla & Smith, 2020).

Research Questions

Admittedly, there are themes that are recurrent in the literature reviewed that have not been covered here. These include for instance the intersectional effects of the pandemic by gender, race and age (Moen et al., 2020), and its differential mental health impacts on men and women (Hjalmsdottir & Bjarnadottir, 2020). Nevertheless, the review does point to certain questions and elements which should be further explored within this emerging research area. Notably, there is a shortage of published academic literature studying the gendered effects of the pandemic in countries in the global south. Therefore, this study draws on data on young adults from four countries in the global south to explore how the time spent on paid and domestic work by men and women has been impacted differently during the first wave of the pandemic. It also explores the relationships between sex, the economic sector in which one works, and time spent on paid and domestic work. The specific research questions to be addressed are:

> *RQ1: How has the time spent on paid and domestic work by men and women been affected during the lockdown of the first wave of the COVID-19 pandemic?*
>
> *RQ2: What are the associations between sex, economic sector of occupation, time spent on paid work and time spent on domestic work during the lockdown of the first wave of the COVID-19 pandemic?*

Data and Methods

In order to answer the research questions presented above, this study was based on secondary data analysis and drew on quantitative, cross-sectional[3] survey data collected from four countries in the global south to perform statistical analyses. The main statistical method employed to seek answers to the research questions was loglinear analysis, a technique which is suitable for exploring relationships between more than two categorical variables (Agresti, 2013; Howell, 2010; Tabachnick & Fidell, 2014). It is worth noting that the analysis method followed an exploratory approach, inspired by Tabachnick and Fidell (2014, p. 947), and thus was not based on any a-priori hypotheses regarding the associations between variables. This chapter begins by discussing the philosophical foundation on which the study is based, before presenting the data source and general sampling strategy employed in data collection. Thereafter, the specific sample that was used for the data analyses performed here is introduced and justified, after which the study variables are presented, and their conceptualization and operationalization discussed. The section that follows presents the steps taken to prepare the data for analysis and the specific techniques used for descriptive, bivariate, and multivariate analyses. Special focus is placed on the presentation and justification of the selected method for multivariate analysis (loglinear analysis). The chapter concludes with discussions of data quality assurance and ethical considerations.

Philosophical Foundation

It is important to note that both the research questions and research design are based on certain ontological, epistemological, and methodological assumptions. The present study is inspired by a certain feminist methodological position which can be considered as belonging to the broader post-positivist research paradigm (Harding, 2003). This section briefly discusses the difference between positivism and post-positivism and presents the version of feminist methodology that is adopted here.

The traditional positivist approach to social science is generally associated with a realist ontological position, which assumes that reality exists independently of the researcher, and a corresponding epistemological position that suggests that knowledge can be produced through objective observation of the world (Lawrence Neuman, 2014). Against this background, the

[3] While the Young Lives project is a longitudinal study, the present study drew on data from a single round of data collection, thus the data that was used here can be described as cross-sectional.

positivist paradigm in the social sciences generally favors a quantitative research approach and statistical methods (Yilmaz, 2013, p. 314). Post-positivism, which essentially represents a version of positivism, shares the traditional positivist view that reality can be directly observed by the researcher (Marsh, 2010, p. 198). However, it also acknowledges that research is mediated by normative values and interpretations, which represents a deviation from a traditional positivist view (Marsh, 2010).

Feminist methodologies then, come in distinct versions for which different terms and categorizations have been proposed (see e.g. Hansen, 2010; Harding, 1991; Jacobsen, 2021). While a full discussion of the origins and debates on the issue of feminist methodologies is beyond the scope of this study, it can be noted that scholars especially within feminist economics have argued for a methodological position that consolidates an explicitly political (feminist) and normative position, with the ability to carry out objective empirical observations (Harding, 2003). Such a position, which by some has been referred to as feminist standpoint empiricism, "acknowledges one's standpoint explicitly and strives to practice empiricism that is as bias-free as is possible given that acknowledgment" (Jacobsen, 2021, p. 130). The present study is based on this methodological approach, the core tenets of which is consistent with the post-positivist research paradigm and the use of quantitative methods for data analysis (Jacobsen, 2021).

Data

The data used in this study was drawn from the Young Lives project, an international, longitudinal study of childhood poverty conducted since 2002 (Young Lives, N.D.). The Young Lives project follows children from four countries in the global south (Ethiopia, India, Vietnam, and Peru) from childhood into early adulthood. The sampling strategy employed in the Young Lives study involved non-random selection of 20 sentinel sites in each study country, with deliberate over-sampling of poor areas and exclusion of rich areas (Young Lives, 2017). From each sentinel site, children in the correct age groups were then randomly sampled, forming a younger and an older cohort (Young Lives, 2017). Specifically, the present study used the data collected as part of the extension of the Young Lives project titled "Young Lives at Work", which follows the sampled children into early adulthood. As a result of the pandemic, the methodology for this extension of the survey was revised to be conducted through phone interviews, and focus on the short-term impact of the pandemic (Young Lives, 2020). Three rounds of the phone survey were conducted in the course of 2020-2021, but the present study

draws only on data collected as part of the second round, in which the largest amount of information was collected. A stated aim of the phone survey is to understand the extent to which the pandemic has had differential impacts, for instance according to gender (Young Lives, 2020), making it an especially suitable data source for the present study.

Study Sample

This study used two sample versions of the Young Lives data: one full sample, which was used only for introductory descriptive analyses, and one main sample, which was used for further descriptive, bivariate, and multivariate analyses. Exclusion criteria and sample sizes for these two sample versions are presented below.

Full Sample

As mentioned above, the samples used in this study are drawn from the second round of the Young Lives COVID-19 phone surveys. The full sample included respondents from all four of the study countries (Ethiopia, India, Vietnam, and Peru), but excluded respondents from the younger cohort (born in 2001/2002), to include only respondents from the older cohort (born in 1994/1995). The justification for this exclusion criteria derives from the research objective; to evaluate how lockdown has affected the time use of men and women, specifically the time spent on paid work and domestic work. Since the respondents in the older cohort were more likely to be engaged in paid work than those in the younger cohort (which for instance included a higher proportion of students), focusing on this group for this purpose of this analysis was deemed appropriate. The full sample was used only for introductory descriptive statistics, for the purpose of providing context to the subsequent analyses by presenting the frequencies and proportions of males and females who were able to work as usual during lockdown, were not able to work as usual during lockdown, and did not have a job when lockdown started. The size of the full sample was N=2958.

Main Sample

The main sample, which was used for descriptive, bivariate, and multivariate analyses, excluded respondents who did not have a job when lockdown started. The justification for this exclusion criteria is related to the scope of this study: while the issue of whether men and women were equally likely to work before the outset of the pandemic is certainly interesting, it

is relevant here only as context, and not for the specific analyses performed to answer the research questions posed here. The size of the main sample was N=2010.

Study Variables

Loglinear analysis is a statistical method suitable for exploring associations between multiple categorical variables, when at least two variables are considered as response variables (Agresti, 2013, p. 339).[4] For mathematical purposes, this type of analysis treats all variables equally, without distinguishing between explanatory and response variables (Howell, 2010, p. 631). For the purpose of interpretation however, it is helpful to distinguish between variables, in which case the model can be referred to as asymmetric (Agresti, 2013, p. 340; Howell, 2010, p. 631).[5] This section proceeds with presenting the four variables included in this study: the response variables *paid work during lockdown* and *domestic work during lockdown*, and the explanatory variables *sex* and *economic sector*. The conceptualization and operationalization of each of these variables are discussed below. The section concludes by presenting the omitted variable *country* and offering a justification for its exclusion.

Response Variables

The first response variable in this study is *paid work during lockdown*, which signifies whether the respondent was able to work as usual during lockdown or not. Two versions of this variable were used in the analysis: a nominal version with three categories, and a dichotomous version with two categories. The former of these two versions include the categories *was able to work as usual during lockdown* (1), *was not able to work as usual during lockdown* (2) and *did not have a job when lockdown started* (3). This version was used in the full sample, for reasons presented above. The second version of the variable, which was used for the bivariate and multivariate analyses, is dichotomous and includes the categories *was able to work as usual during lockdown* (0) and *was not able to work as usual during lockdown* (1). Respondents who reported working the same hours as usual were coded into category 0, and respondents who reported not being able to work or having reduced their working hours were coded into category 1. This version was used in the main sample, where respondents who did not have a job when lockdown started were excluded.

[4] The terms explanatory and response variables are preferred here as they are used by among others Agresti (2013), whose book Categorical Data Analysis is a key source for the methods employed in this study.
[5] Howell (2010, p. 631) specifically uses a model including a gender variable as an example of an asymmetric loglinear model.

The second response variable in this study is *domestic work during lockdown*. This variable is also operationalized as dichotomous, with the two categories *did not spend more time on domestic work during lockdown* (0) and *spent more time on domestic work during lockdown* (1). Respondents were coded into the latter category if they reported agreeing, or partially agreeing, with having spent more time than usual during lockdown on either household chores, or childcare. Respondents who reported disagreeing (or N/A[6]) with both of these provisions were coded into the former category.

Explanatory Variables

The first explanatory variable in the study is *sex*. This variable conceptually refers to respondents' biological sex and is operationalized as dichotomous with two mutually exclusive categories; males (0) and females (1). The reason for using the conceptual term *sex* instead of *gender* is that the former is available in the Young Lives data, while the latter is not. It is important to note that the scores on this variable does not necessarily reflect respondents' gender identity.

The second explanatory variable included in this study is *economic sector*. This is a discrete variable, which conceptually refers to the economic sector in which the respondent was working before lockdown started. The original datafile included a total of 21 categories for this variable, corresponding to the latest version of the International Standard Industrial Classification of All Economic Activities (ISIC) (ILO, N.D.). For the purpose of this analysis, these categories were collapsed in accordance with the ISIC broad sector aggregation (ILO, N.D.), producing four categories: Agriculture (including agriculture, forestry and fishing); Industry (including manufacturing, construction, mining and quarrying, and electricity, gas and water supply); Market services (including trade, transportation, accommodation and food and business and administrative services); and Non-market services (including public administration, community, social and other services and activities). A table detailing which of the original categories were included in the four final categories is available in Appendix A.

Omitted Variable

While the sample data included observations from four countries (Ethiopia, India, Peru, and Vietnam), the analyses conducted here did not include the *country* variable, and thus this

[6] Most N/A responses were recorded for the question of whether more time was spent on childcare. These N/A responses were interpreted by the author as indicating that there were no children in the household, and that therefore, no additional time was spent on childcare.

study does not offer a comparison of outcomes between the four countries. There are multiple reasons for excluding this variable; firstly, and most importantly, inclusion of another variable with four levels would cause expected cell frequencies in some cells in the multiway contingency table to drop very low, which would negatively impact the power of the analysis (Tabachnick & Fidell, 2014). Since there was no meaningful way to collapse categories, the most appropriate course of action was to instead omit a variable from the analysis (Tabachnick & Fidell, 2014). Furthermore, while loglinear analysis is a highly flexible analysis method, inclusion of an additional variable would make interpretation considerably more complex. For this reason, Tabachnick and Fidell (2014) caution against including so many variables as to make interpretation overwhelming. Finally, it can be noted that the Young Lives sample, as mentioned above, was not intended by its owners to be nationally representative of each study country, but rather the intention was to "generate a large enough sample for general statistical analysis" (Young Lives, 2017, p. 1). The implications of excluding this variable are discussed further in the discussion chapter.

Methods for Data Analysis

Statistical data analyses were performed using IBM SPSS Statistics Version 26. For production of a mosaic plot, RStudio version 1.0.153 was used as this feature is not available in SPSS. The significance level for the inferential analyses was set at $p < 0.05$, as is common in social science research (Punch, 2014, p. 272). Cases with missing values were included for the descriptive statistics, while for subsequent analyses they were excluded on an analysis-by-analysis basis. This section begins by describing steps taken in data management, before briefly outlining the techniques that were used for descriptive and bivariate analyses. It then describes in greater detail the multivariate statistical technique chosen for this study and discusses the justification for this choice of method.

Data Management

The purpose of the data management was to prepare the dataset for analysis through creation of a master datafile, recoding of variables and variable categories. Firstly, the four datasets containing observations for the four respective countries were merged into a master dataset. Frequency tables for relevant variables were inspected and categories collapsed in cases of few observations in each category, in order to forego the issue of small expected cell frequencies (Tabachnick & Fidell, 2014, p. 488). Where relevant and possible, variables were

coded such that 0 represented the "reference category" and 1 (or higher values) represented the "response category" in order to simplify interpretation, as recommended by Tabachnick and Fidell (2014, p. 510).

Descriptive Statistics

As all variables included in the analysis were categorical (dichotomous or nominal), descriptive statistics were limited to frequency distributions and corresponding percentages.

Bivariate Analyses

In order to test the bivariate relationships between the explanatory and response variables, a series of chi-square tests for independence was performed. This nonparametric test is suitable for exploring the bivariate relationship between two categorical variables (Gravetter & Wallnau, 2016, p. 574; Pallant, 2016, p. 237). Chi-square tests for independence were performed to test the pairwise relationships between all four variables included in this study.

Multivariate Analyses

For the purpose of exploring the associations between the explanatory variables and the response variables, multivariate analyses were performed. Firstly, a multiway contingency table and corresponding mosaic plot were produced to allow for visual inspection of observed frequencies. A fuller explanation of the use and interpretation of mosaic plots is offered in the results chapter. Thereafter, a loglinear model was fitted to the data. Loglinear analysis is a non-parametric statistical technique that is suitable for analyzing associations and interactions between categorical variables, where at least two variables are considered to be response variables (Agresti, 2013, p. 339; Tabachnick & Fidell, 2014, p. 916). In the present study, paid work during lockdown and domestic work during lockdown are both considered to be response variables, making loglinear analysis a suitable technique. While the analyses performed here are limited in their ability to establish causal relationship (as they cannot determine, for instance, whether a reduction in paid working hours caused an increase in domestic work or vice versa), loglinear analysis is useful for identifying significant associations and interactions, which is helpful not least for informing future research. Loglinear analysis has previously been used to, inter alia, study cross-national variation in occupational sex-segregation (see e.g. Charles & Grusky, 1995; Nermo, 2000) a topic that is partly analogous to the one explored in the present study.

The steps taken in the multivariate analysis involved firstly, producing a saturated, hierarchical loglinear model (using SPSS HILOGLINEAR command) that included all possible effects (main effects, two-way, three-way, and four-way effects). Model fitting proceeded with backward elimination of non-significant effects, resulting in a model that included only the highest-order effects that contributed significantly to the model fit. Since the final model was hierarchical, it necessarily included all lower-order terms and interaction terms that are components of a higher-order term (Agresti, 2013, p. 341). In order to interpret specific effects, the final model was subsequently produced using SPSS LOGLINEAR command, as this command can produce parameter estimates for non-saturated models, unlike HILOGLINEAR (Tabachnick & Fidell, 2014). Interpretation of effects was restricted to the highest-order terms in which each of the variables was included (Agresti, 2013, p. 352). Goodness of fit of the overall model was assessed with Likelihood Ratio Chi-square statistics, where a good model fit is indicated by a non-significant statistic (Tabachnick & Fidell, 2014). After assessing the overall model fit, interpretation of specific model effects was done through examination of individual parameter estimates, calculation of separate chi-square values for three-way associations, and calculations of odds ratios.

Finally, it is worth commenting more specifically on the calculation and interpretation of odds ratios, as these are easily misinterpreted and to some extent unintuitive (Persoskie & Ferrer, 2017). Odds ratios are appropriate for describing the relationship between categorical, variables, and are commonly used to present and interpret results from logistic regression and loglinear models (Easter & Hemming, 2021; Field, 2013; Rudas, 1998). The calculation of odds ratios is simple: given the two dichotomous variables X and Y are presented in a 2x2 contingency table with a, b, c and d representing the frequencies in each cell of the table, the odds ratio is given by $(a/b) / (c/d)$ (Bland & Altman, 2000). Based on the odds ratio, a confidence interval (CI) can be calculated to determine whether the result is statistically significant (Easter & Hemming, 2021). Since an odds ratio of 1 indicates no association between the variables, a CI that includes the value of 1 represents a non-significant result (Easter & Hemming, 2021). It is imperative to note that the odds ratio should not be interpreted as a probability, but as a measure of the strength of an association. For instance, an odds ratio of 2 between a treatment and effect does not indicate that the effect was twice as likely given the treatment, but rather that the odds of the effect occurring were twice as high given the treatment (Persoskie & Ferrer, 2017).

Data Quality Assurance

In order to ensure that the study holds high academic quality, it is essential to examine the quality of the data that will be used. Quantitative data and research are commonly assessed on the basis of two criteria: reliability and validity (including external validity, or generalizability) (Yilmaz, 2013, p. 317). This section assesses the data used in the present study in relation to these criteria in turn.

Firstly, the term validity refers in a general sense to accuracy of data, in other words, whether the data used accurately represents what it is supposed to represent (Yilmaz, 2013, p. 318). Using data that accurately represents the phenomenon being investigated is a central quality criteria for both quantitative and qualitative research (Valsiner, 2000). To ensure external validity, or generalizability, the owners of the Young Lives data have performed analyses to ensure the quality of the data, such as attrition bias tests and tests comparing Young Lives data to other, larger samples (Young Lives, 2017, p. 42). It is important to note however, with regards to generalizability, that the Young Lives sampling method cannot be considered to produce nationally representative data, partly as a result of deliberate over-sampling of poor areas (Young Lives, 2017, p. 13). While this fact needs to be kept in mind when drawing inferences from the analysis, the use of this dataset is still justified as it offers high-quality, in-depth data about respondents from multiple study countries (Young Lives, 2017, p. 13). Moreover, the relatively considerable number of missing values for the economic sector variable admittedly negatively impacts the generalizability of the findings, as is discussed further in the limitations section below.

Apart from external validity, it is also imperative to ensure that the measurement instruments used in the study capture the construct that they intend to measure, which Punch (2014, p. 239) refers to as "measurement validity". Latent constructs, where one or more indicators are used to measure underlying phenomena or traits, are perhaps most sensitive to validity (and reliability) issues (Punch, 2014, p. 239). With regards to the four variables included in this study, three of them (*sex*, *economic secto*r, and *paid work during lockdown*) corresponded directly to the survey questions asked of the respondents, and thus should be relatively insensitive to validity issues. One of the variables (*domestic work during lockdown*) was constructed on the basis of two indicators that were available in the data set: time spent on childcare, and time spent on household chores. While these two indicators combined were deemed appropriate as a measure of domestic work for the purpose of this study, it should be

acknowledged that there may exist aspects of domestic work that were not captured by either of these indicators, which would negatively impact the validity of the measurement. However, given the design of the survey questionnaire and the availability of data in the data set, these indicators were assessed to be the most useful for measuring time spent on domestic work.

It is also important to note that the variables used in the study have highly disaggregated categories, to enable for robust statistical analysis given the availability of data (sample size). Thus, there can exist considerable variation between subjects within a given response category, as for instance, the category "was not able to work as usual" in the *paid work during lockdown* variable includes both respondents who lost their employment entirely and respondents who kept working but with reduced working hours. While this does admittedly reduce the exactness of the results to a certain extent, it does not present a validity issue as long as the full range of possible responses within a given category is clearly and transparently stated, as was done in the data and methods chapter.

Finally, the term reliability refers to the "consistency or the degree to which a research instrument measures a given variable consistently every time it is used under the same condition with the same subjects" (Yilmaz, 2013, p. 317). While all measures used in research suffer from some degree of unreliability, these issues are expected to be greatest when measuring, for instance, psychological or social phenomena (Punch, 2014, p. 239). With regards to the variables used in this study, they are based on responses to interview questions, which could make them sensitive to issues such as interrater reliability (Yilmaz, 2013, p. 318). However, given the unambiguous and relatively unsensitive nature of the questions on which the variables are based, it is not expected that the variables should suffer from any reliability issues which would gravely impact the quality of the findings of the present study.

Ethical Considerations

Research ethics is an important topic which needs to be engaged with at each phase of the research project, from planning to execution and follow-up (Punch, 2014, p. 36). Principles of autonomy, trust and beneficence are cornerstones of an ethical approach to research (Punch, 2014, p. 55). While it might be tempting when conducting a study based on secondary data analysis to excuse oneself from engaging with ethical considerations, it is the researcher's responsibility to ensure that ethical principles are upheld even in cases where data collection was conducted by someone other than the researcher him/herself.

Access to the Young Lives data was granted to the author by the UK Data Service in March of 2021, after the author had specified what the data would be used for. With regards to data collection, ethical principles have guided the Young Lives project since its inception (Young Lives, 2017, p. 10). Ethical clearance has been granted to the data collection project by research committees in all study countries, as well as at the Social Science Division at Oxford University (Young Lives, 2017, p. 10). Strict procedures are in place for guaranteeing that participation in the survey is premised on informed consent, which should be obtained from the participants themselves at the earliest possible age (Young Lives, 2017, p. 11). Guidelines and measures are also in place to ensure anonymity of participants and respect and protection for the same (Young Lives, 2017, p. 11). Finally, an ethical principle which is of particular importance for this project is that the data is used for its intended purpose. As mentioned above, the objectives of this project match the aims of the survey as established by the owners of the data, thus fulfilling this requirement.

Results

To reiterate, the objective of this study is to explore the gendered effects on paid and domestic labor among young adults in the global south during the lockdown in the first wave of the COVID-19 pandemic. The specific research questions to be explored are:

> *RQ1: How has the time spent on paid and domestic work by men and women been affected during the lockdown of the first wave of the COVID-19 pandemic?*
>
> *RQ2: What are the associations between sex, economic sector of occupation, time spent on paid work and time spent on domestic work during the lockdown of the first wave of the COVID-19 pandemic?*

To answer these questions, this chapter begins by presenting descriptive statistics for the key variables. Thereafter, bivariate analyses (chi-square tests for independence) are presented for the same variables, after which a loglinear model including all study variables is fitted and interpreted.

Descriptive Statistics

Full Sample

The full sample consisted of 2958 respondents from India, Ethiopia, Vietnam, and Peru, of whom 51.0% (n=1509) were males and 49.0% (n=1449) were females. The number of

respondents from India, Ethiopia and Vietnam was relatively even, while the number of respondents from Peru was smaller (India: 30.0%, n=886; Ethiopia: 26.2%, n=774; Vietnam: 28.0%, n=828; Peru: 15.9%, n=470). Table 1 presents the frequency distributions and percentages for the variable paid work during lockdown by sex. Among men and women combined, the number of respondents across the three categories were relatively equal, with a slightly larger number reporting having been able to work as usual during lockdown, while almost a third respectively reported not having been able to work as usual, or not having a job when lockdown started. However, within the group of women, 41.8% (95% CI [39.3, 44.4])[7] reported not having a job when lockdown started, as compared to only 22.2% (95% CI [20.1, 24.4]) of men.

Table 1

Frequency Distributions of Paid work during Lockdown by Sex.

Paid work during lockdown	Males (%)	Females (%)	Total (%)
Was able to work as usual	656 (43.5)	419 (28.9)	1075 (36.3)
Was not able to work as usual	518 (34.3)	424 (29.3)	942 (31.8)
Was not working when lockdown started	335 (22.2)	606 (41.8)	941 (31.8)
Total	1509 (100.0)	1449 (100.0)	2958 (100.0)

Main Sample

The main sample excluded respondents who did not have a job when lockdown started, giving a sample size of N=2010. Tables 2-4 present frequency distributions and percentages for each of the three variables paid work during lockdown, domestic work during lockdown, and economic sector, by sex. In this sample, males were overrepresented (n for males=1174, 58.4%, while n for females=836, 41.6%). Moreover, the distribution across the four study countries

[7] Confidence intervals for proportions were calculated using the binomial exact calculation method.

was relatively even between Ethiopia (n=485, 24.1%) and India (n=496, 24.7%), slightly smaller for Peru (n=376, 18.7%) and slightly larger for Vietnam (n=653, 32.5%).

Inspection of the total frequencies (for males and females combined) showed that almost half of the respondents (46.5%, 95% CI [44.6, 49.0]) were not able to work as usual during lockdown. Furthermore, a wide majority of the total number of respondents (75.4%, 95% CI [73.4, 77.2]) reported having increased the time spent on domestic work during lockdown. Inspection of the total frequencies for the economic sector variable show a roughly equal number of respondents working in the sectors agriculture, industry, and non-market services, while the number of respondents working in market services was substantially higher. It is also worth noting that the economic sector variable contained a relatively large proportion of missing values (6.5 %). The considerable number of missing values for this variable can be attributed to the design of the survey questionnaire used in the data collection. The drawbacks of this are discussed in more detail in the limitations section.

Table 2

Frequency Distributions of Paid work during Lockdown by Sex

Paid work during lockdown	Males (%)	Females (%)	Total (%)
Was able to work as usual	656 (55.9)	419 (50.1)	1075 (53.5)
Was not able to work as usual	518 (44.1)	417 (49.9)	940 (46.5)
Missing	0 (0.0)	0 (0.0)	0 (0.0)
Total	1174 (100.0)	836 (100.0)	2010 (100.0)

Table 3

Frequency Distributions of Domestic work during lockdown by Sex

Domestic work during lockdown	Males (%)	Females (%)	Total (%)
Did not spend more time than usual on domestic work	404 (34.4)	89 (10.6)	493 (24.6)
Did spend more time than usual on domestic work	769 (65.5)	746 (89.2)	1515 (75.4)
Missing	1 (0.1)	1 (0.1)	2 (0.1)
Total	1174 (100.0)	836 (100.0)	2010 (100.0)

Table 4

Frequency Distributions of Economic Sector by Sex

Economic sector	Males (%)	Females (%)	Total (%)
Agriculture	244 (20.8)	162 (19.4)	406 (20.2)
Industry	276 (23.5)	146 (17.5)	422 (21.0)
Market services	369 (31.4)	239 (28.6)	608 (30.2)
Non-market services	233 (19.8)	210 (25.1)	443 (22.0)
Missing	52 (4.4)	79 (9.4)	131 (6.5)
Total	1174 (100.0)	836 (100.0)	2010 (100.0)

Bivariate Analyses

In order to test the bivariate relationships between the variables, chi-square tests for independence were performed between all pairwise combinations of the four variables. The results from the chi-square tests for independence revealed significant associations between all pairwise sets of variables at the p <0.05 level. A medium sized association effect[8] was found between sex and domestic work during lockdown, χ^2 (1, n = 2008) = 147.661, p = .000, *phi*= .272.[9, 10] Calculation of the odds ratios for this relationship shows that the odds of spending more time on domestic work was 4.4 times higher for females than for males (OR=4.40, 95% CI [3.43, 5.66]). A medium sized association was also found between economic sector and paid work during lockdown, χ^2 (3, n = 1879) = 130.680, p = .000, *Cramer's V*= .264. Using agriculture as a reference category, calculations of the odds ratios for this relationship show that the odds of not having been able to work as usual were between 2.85 and 4.51 times higher for persons working in the other economic sectors (industry: OR=2.85, 95% CI [2.10, 3.87]; market services: OR=4.51, 95% CI [3.38, 6.00]; non-market services: OR= 4.32, 95% CI [3.19, 5.85]). A slightly less strong effect was found between paid work during lockdown and domestic work χ^2 (1, n = 2008) = 63.761, p = .000, *phi*= .179. Calculation of the odds ratios for this relationship showed that the odds of not being able to work as usual during lockdown were 2.39 times higher for those who spent more time on domestic work than those who did not (OR=2.39, 95% CI [1.82, 2.97]).

For the remaining three pairwise associations (sex * paid work during lockdown, sex * economic sector, economic sector * domestic work during lockdown) the effect sizes were small or very small, with phi- or Cramer's V coefficients ranging between .057 and .090. Calculations of odds ratios showed that the odds of having stopped working was slightly higher for females than for males (OR=1.26, 95% CI [1.05, 1.51]). For the pairwise association between sex and economic sector, the largest odds ratio was recorded between the sectors industry and non-market services, where the odds of being female was 1.7 times higher in the non-market service sector than in the industry sector (OR=1.70, 95% CI [1.30, 2.24]). Finally,

[8] According to Cohen's (1988) criteria, a phi-coefficient of .1 represents a small effect size, .3 represents a medium effect size, and .5 represents a large effect size.
[9] This presentation of results is interpreted as a recorded chi-square value of 147.661, for a sample size of 2008 with 1 degree of freedom, with a significance level of p=.000 and a phi-coefficient of .272.
[10] For 2x2 tables, phi-coefficients and chi-square values with Yates' Continuity Correction are reported. For tables larger than 2x2, Cramer's V coefficients and regular chi-square values are reported (Pallant, 2016, p. 241).

the largest odds ratio for the relationship between economic sector and domestic work was found between the agriculture and non-market service sector, where the odds of having spent more time on domestic work was 1.6 times higher for those working in agriculture than in the non-market service sector (OR=1.60, 95% CI [1.17, 2.19]). The full results of the chi-square tests for independence can be found in Appendix B. None of the tests violated the assumption of an expected cell frequency of more than five for all cells (Pallant, 2016, p. 240).

Multivariate Analysis

In order to explore the associations between all four variables, multivariate analyses were performed. Firstly, a multiway contingency table and corresponding mosaic plot were produced to visually represent the data and detect deviations from the null model (i.e., a model with no associations between variables). Thereafter, a loglinear model was fitted to the data through backwards elimination of non-significant effects, and assumptions for loglinear analysis evaluated. Lastly, the results from the loglinear analysis were interpreted and odds ratios calculated.

Visualizing the Data: Mosaic Display of Observed Frequencies

Before fitting the loglinear model to the sample data, a mosaic plot of the observed frequencies was produced using RStudio. Mosaic plots are useful for visually representing frequencies in a multiway contingency table (Friendly, 1994, 1999; Hofmann, 2008; Meyer et al., 2008). A mosaic plot consists of a set of rectangles, referred to as "tiles" that each represent one cell in the multiway contingency table. Each tile in the plot is proportional to the cell frequency in the table, thus small tiles represent low frequencies, and large tiles represent high frequencies (Friendly, 1994). In extended versions of mosaic plots, coloring and shading of tiles are used to achieve greater visual effect (Friendly, 1999). In these plots, tiles are given different colors and shades based on the size of the standardized (Pearson's chi-squared) residual from independence (Friendly, 1999). Cells that are shaded with light blue or red have medium-sized (positive or negative) residuals, and cells that are colored with clear blue or red have large (positive or negative) residuals. This allows the viewer to easily detect the cells that deviate from the model of independence (the null model), that is, the cells with frequencies that are significantly smaller or larger than would be expected given no associations between the variables (Meyer et al., 2008, p. 602).

The present study includes three binary variables and one variable with four categories, which gives a full multiway contingency table of 2 x 4 x 2 x 2 cells, presented in Table 5. Cases with missing values for any of the variables were excluded, leaving a total N=1878. The corresponding mosaic plot is presented in Figure 1, below.

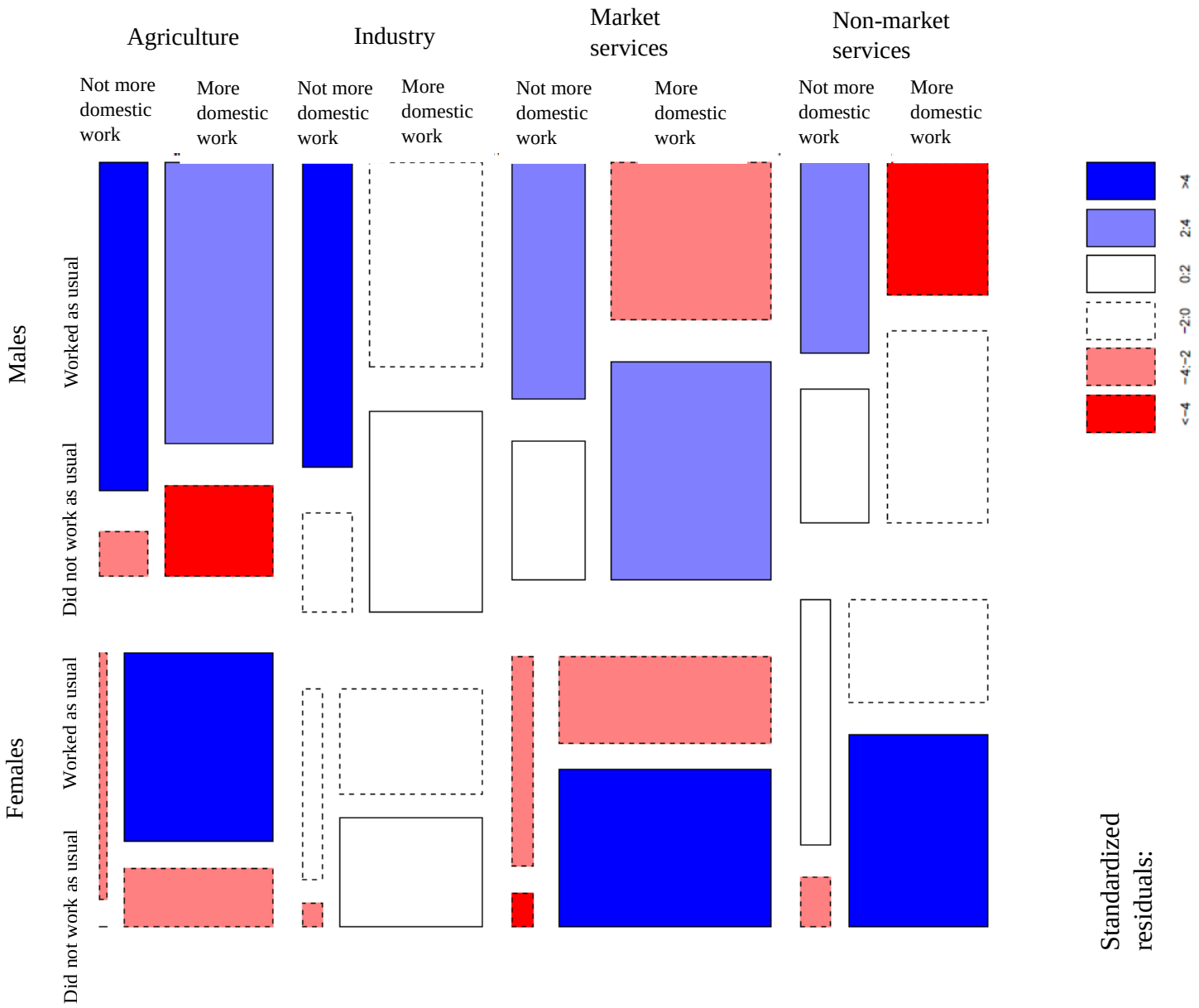
Table 5

Multiway Contingency Table of Observed Frequencies

		Agriculture		Industry		Market services		Non-market services	
Sex	Paid work during lockdown	Not more time on domestic work	More time on domestic work	Not more time on domestic work	More time on domestic work	Not more time on domestic work	More time on domestic work	Not more time on domestic work	More time on domestic work
Male	Worked as usual	67	127	64	96	73	106	55	57
	Did not work as usual	9	41	21	95	43	147	38	82
Female	Worked as usual	8	118	16	63	19	77	31	61
	Did not work as usual	0	36	2	65	3	140	6	112

Figure 1

Mosaic Plot of Observed Frequencies



A number of interesting observations can be made through inspection of the mosaic plot, the most important of which are discussed here. Firstly, the considerable variation in sizes and colors/shades of tiles in the plot indicate significant deviations from the null model, in which all variables are independent of each other. Furthermore, it appears as though the largest deviations from the independence model can be observed within the agricultural sector, as indicated by the variations in both size and shade/color in this column. This suggests that the associations between the remaining three variables are strongest within this sector. In contrast, associations between variables in the industry sector were relatively weak. Moreover, the

frequencies of males who were able to work as usual and did not spend additional time on domestic work during lockdown were higher across all economic sectors than would be expected given independence. In contrast, the frequencies of females who were not able to work as usual and did not spend additional time on domestic work were lower across all economic sectors than would be expected given independence.[11]

Among males, the clear blue tiles indicating substantially higher frequencies than expected under independence were displayed for workers within the agriculture and industry sectors, who were able to work as usual and did not spend more time than usual on domestic work. Conversely, for males, the frequencies were smaller than expected under independence among workers in the agriculture sector, who were not able to work as usual but also did not spend more time on domestic work, and among workers in the non-market sector who worked as usual and spent more time on domestic work. Turning to females, the clear blue tiles indicating higher than expected frequencies were displayed for workers in the market and non-market service sectors, who were not able to work as usual, and who spent more time than usual on domestic work. The bright red tiles indicating lower than expected frequencies were displayed for workers in the agriculture and market service sectors, who did not work as usual and did not spend more time than usual on domestic work.

Fitting the Loglinear Model and Evaluating Assumptions

A saturated, hierarchical loglinear model was produced using SPSS HILOGLINEAR, including all main, two-way, three-way, and four-way effects. As shown in Table 6 on k-way and higher-order effects, elimination of the 3-way and higher-order effects, or the 3-way effects alone, significantly impacted the fit of the model. This indicates that there were significant three-way and lower-order effects in the model. Inspection of the partial associations, shown in Table 7, indicates that the three-way association between sex, paid work during lockdown, and domestic work during lockdown was clearly significant, while the three-way association between sex, economic sector, and domestic work during lockdown was ambiguous.[12] The remaining three-way effects were clearly not significant.

[11] The cell corresponding to the tile in the bottom left corner of the plot, representing females working within the agriculture sector who did not work as usual and did not spend more time on domestic work, contained zero observations. Since the area of the tile is proportional to the cell frequency, this tile is virtually non-existent. Naturally, this cell is expected to have a large negative residual, indicating a lower frequency than would be expected given the independence model.

[12] Tabachnick and Fidell (2014) describe an effect with a p-value between .01 and .05 as ambiguous.

Table 6

K-Way and Higher-Order Effects

			Likelihood Ratio		Pearson		
	K	df	Chi-Square	Sig.	Chi-Square	Sig.	Number of Iterations
K-way and Higher Order Effects [a]	1	31	1088,341	,000	959,436	,000	0
	2	25	419,668	,000	395,116	,000	2
	3	13	27,013	,012	24,903	,024	6
	4	3	,780	,854	,591	,898	4
K-way Effects [b]	1	6	668,673	,000	564,270	,000	0
	2	12	392,656	,000	370,263	,000	0
	3	10	26,233	,003	24,311	,007	0
	4	3	,780	,854	,591	,898	0

a. Tests that k-way and higher order effects are zero.

b. Tests that k-way effects are zero.

Table 7

Partial Associations

Effect	df	Partial Chi-Square	Sig.	Number of Iterations
Sex*Economic sector*Domestic work	3	10,913	,012	4
Sex*Economic sector*Paid work	3	1,359	,716	4
Sex*Domestic work*Paid work	1	18,357	,000	4
Economic sector*Domestic work*Paid work	3	,725	,867	5
Sex*Economic sector	3	22,017	,000	5

Sex*Domestic work	1	127,632	,000	5
Economic sector*Domestic work	3	32,956	,000	5
Sex*Paid work	1	,086	,769	5
Economic sector*Paid work	3	153,955	,000	5
Domestic work*Paid work	1	91,789	,000	4
Sex	1	71,000	,000	2
Economic sector	3	52,968	,000	2
Domestic work	1	523,791	,000	2
Paid work	1	20,914	,000	2

Model fitting proceeded with a backward elimination procedure, producing a final model with two significant three-way effects and one two-way effect, between

1) sex, paid work during lockdown, and domestic work during lockdown;

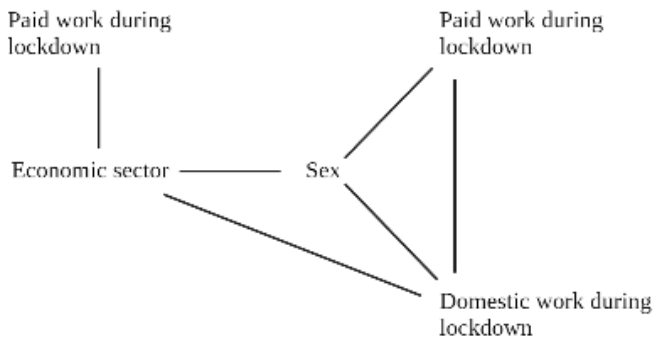
2) sex, economic sector, and domestic work during lockdown;

3) economic sector and paid work during lockdown.

As previously mentioned, this hierarchical model includes all lower-order effects included in a higher-order effect in the model. A table detailing the steps of the backwards elimination procedure is available in Appendix C. The final model is represented visually in Figure 2.

Figure 2

Model of Associations after Backwards Elimination of Non-Significant Effects



Before the model was interpreted, the assumptions for loglinear analysis were assessed, namely independence, ratio of cases to variables, adequacy of expected cell frequencies, and absence of outliers in the solution (Tabachnick & Fidell, 2014, pp. 919-921). Observations in the sample were independent, suggesting no violation of the assumption of independence. In order for the assumption of ratio of cases to variables not to be violated, the number of cases should be at least five times the number of cells in the design (Tabachnick & Fidell, 2014, p. 920). As the model fitted here contained 32 cells (2 x 4 x 2 x 2), the number of cases would have to be at least 160. After fitting the model, the valid N of cases included was 1878, suggesting no violation of the assumption. In order for the assumption of adequate expected cell frequencies not to be violated, no more than 20% of the cells for two-way associations should have an expected frequency of less than five, and no cells for two-way associations should have an expected frequency of less than one (Tabachnick & Fidell, 2014, p. 920). Inspection of the expected cell frequencies for two-way associations identified that none of the cells had an expected cell frequency of less than five.[13] Finally, inspection of the standardized residuals produced by the model showed that none of the cells had a standardized residual

[13] Some authors suggest that the assumption of adequate expected cell frequencies applies to the full contingency table, and not only to two-way associations (see e.g. Field, 2013). If applied in this way, the present analysis would violate the assumption, as one cell had an expected cell frequency of less than one. This does not increase the risk of Type 1 error, but could decrease the power of the analysis (Tabachnick and Fidell, 2014). However, Howell (2010) suggests that the biggest problem arises when a large number of cells in a contingency table are empty, which is referred to as a sparse matrix. In existing examples of the use of loglinear analysis, it is not uncommon that one or a few cells with an expected cell frequency of less than 1 (see e.g. Tabachnick & Fidell, 2014, Pugh, 1983).

exceeding the critical z-value of 1.96, suggesting no presence of outliers (Tabachnick & Fidell, 2014, p. 952). The full table showing the standardized residuals is available in Appendix D.

Interpretation of the Loglinear Model

The fit of the loglinear model was interpreted with the likelihood ratio χ^2 statistic, and inspection of the standardized residuals for the model (Tabachnick & Fidell, 2014, pp. 951-952). When interpreting the likelihood ratio statistic, a non-significant result indicates a good model fit (Tabachnick & Fidell, 2014, p. 945).[14] As shown in Table 8, in the case of the model tested here, a good fit between observed and expected frequencies was indicated by a highly non-significant likelihood ratio χ^2 (9) = 2.702, p = 0.975. The standardized residuals produced by the model were generally quite small, as seen in the normalized probability plot of standardized residuals (available in Appendix E), which further indicates a good fit between observed and expected frequencies. In summary, the model was assessed to fit the observed data very well.

Table 8

Goodness-of-Fit Test for Final Model

	Chi-Square	df	Sig.
Likelihood Ratio	2,702	9	,975
Pearson	2,428	9	,983

Interpretation of specific effects was done through inspection of standardized parameter estimates (z-scores) and related confidence intervals, calculation of separate chi-square tests for three-way associations, and calculations of odds ratios (Field, 2013; Tabachnick & Fidell, 2014). As previously mentioned, interpretation was restricted to the highest-order effects for each variable included in the model (Agresti, 2013; Field, 2013). In order to interpret standardized parameter estimates (z-scores) for the final model arrived at through backwards elimination, it was produced using SPSS LOGLINEAR. The z-scores are most useful to

[14] While both Pearson's χ^2 and the likelihood ratio χ^2 statistic are available in the output produced by SPSS, Tabachnick and Fidell (2014, p. 945) recommend favoring the latter when assessing model fit.

compare effects in terms of their importance in influencing cell frequency, with higher (positive or negative) scores indicating greater importance (Tabachnick & Fidell, 2014, p. 955). Since the economic sector variable has four levels, effects including this variable has three separate standardized parameter estimates. The full table of parameter estimates is available in Appendix F. The largest among the relevant standardized parameter estimates was recorded for two of the parameters in the two-way effect between economic sector and paid work during lockdown, with z-scores of 10.85 and -6.32. Slightly less important was the three-way effect between sex, domestic work, and paid work, with a z-score of -3.82. The largest of the z-scores for the parameters of the three-way effect between sex, economic sector and domestic work was 2.74, indicating that this effect was less important in predicting cell frequency than the other two.

For the two three-way effects retained in the model, separate chi-square tests of independence were performed between two of the variables included in the interaction across the levels of the third variable in the interaction (Field, 2013). The results of these tests are summarized in table 9, below. As is shown in the table, all of the chi-square tests reached statistical significance.

Table 9

Separated Chi-Square Tests for Three-Way Associations

Effect	Chi-square (df = 1)[15]	95% confidence interval for chi-square[16]	
		Lower limit	Upper limit
Paid work * domestic work [a]	24.39**	8.87	47.59
Paid work * domestic work [b]	44.79**	22.94	75.86
Sex * domestic work [c]	39.18**	18.48	67.56
Sex * domestic work [d]	16.67**	4.51	36.51

[15] Chi-square results are reported with Yates' Continuity Correction.

16 As recommended by Tabachnick and Fidell, the confidence intervals was calculated with Smithson's (2003) scripts for SPSS, available here: http://www.michaelsmithson.online/stats/CIstuff/CI.html.

Sex * domestic work [e]	39.60**	18.78	68.11
Sex * domestic work [f]	25.73**	10.12	50.42

a: sex=males

b: sex=females

c: economic sector = agriculture

d: economic sector = industry

e: economic sector = market services

f: economic sector = non-market services

**: $p < 0.001$

Lastly, odds ratios and related confidence intervals were calculated for each of the three relevant effects. For the purpose of ease of interpretation, effects were broken down into logical 2x2-tables and odds ratios calculated and compared (Field, 2013). Since the odds ratios for the two-way interaction between economic sector and paid work has already been reported in a previous section, this section focuses solely on the significant three-way effects. Starting with the three-way interaction between sex, domestic work and paid work, a breakdown of this effect showed that for males, the odds of not having worked as usual were 1.88 times higher for those who spent more time on domestic work than for those who did not (OR=1.88, 95% CI [1.47, 2.42]). For females, the odds of not having worked as usual was 6.26 times higher for those who spent more time on domestic work (OR=7.37, 95% CI [3.84, 11.28]). Turning to the three-way interaction between sex, economic sector and domestic work, a breakdown of this effect showed that within agriculture, the odds of having spent more time on domestic work were 8.71 times higher for females than for males (OR=8.71, 95% CI [4.07, 18.63]). The corresponding odds ratios for the other economic sectors were for industry: OR = 3.16, 95% CI [1.82, 5.52], for market services: OR= 4.52, 95% CI [2.77, 7.39], and for non-market services: OR=3.13, 95% CI [2.01, 4,86]. These results indicate that while the odds of spending more time on domestic work was higher for females in all economic sectors, the largest difference in odds between males and females was found in the agriculture sector.

Discussion

This chapter begins by discussing the results related to the pre-pandemic situation on the labor market, in particular men and women's different representation on the labor market and the level of occupational sex segregation in the four study countries. Thereafter, the results related to the two response variables paid work during lockdown, and domestic work during lockdown, are discussed in turn. The section that follows discusses the gendered association between paid work and domestic work during lockdown. All results are related to the previous literature on this subject, and to the theoretical framework guiding this study. The section concludes with highlighting the strengths and contributions of this study, as well as some central limitations.

Setting the Scene: Pre-Pandemic Labor Market Inequalities

To reiterate, the objective of this study is to explore the gendered effects on paid and domestic labor among young adults in the global south during the lockdown in the first wave of the COVID-19 pandemic. However, before assessing and interpreting the gendered effects of the pandemic, it is important to understand the gendered structures that existed on the labor market in these global south countries before its onset. As the descriptive statistics indicated, 42% of women in the full sample reported not having a job when lockdown started, as compared to only 22.2% of men.[17] This shows that already at the outset, women's labor force participation did not match that of men, which is consistent with previous reports (OECD, 2014; World Bank, 2012). Among those who did work, there was a small, but statistically significant association between sex and economic sector. This suggests a modest level of sex segregation in the labor market across the four study countries, where the proportion of women and men varied most between the industry sector (where men made up 65.4%) and the non-market service sector (where men made up 52.5%). It is worth bearing in mind that in absolute terms, men outnumbered women in all economic sectors.

[17] Throughout the discussion chapter, percentages that are referred to were calculated based on the valid N for each variable, with missing cases excluded. There may thus be some discrepancy between proportions reported in the results chapter and those mentioned here.

Impact on Paid Work

The results presented above show that the COVID-19-lockdown drastically impacted work opportunities for both men and women, with almost half of the respondents who were working before lockdown reporting that they reduced their working hours or stopped working altogether during lockdown. The bivariate analyses showed that overall, women were slightly more vulnerable to job loss or reduction than men. However, a larger difference in vulnerability to job loss or reduction was recorded across economic sectors, where odds of remaining at work as usual were highest for those working in agriculture, and lowest for those working in service sectors (market and non-market).

The multivariate analysis shed further light on the associations between these variables; it is particularly worth noting that the three-way interaction between sex, economic sector and paid work during lockdown did not contribute significantly to the model fit, but only the two-way interaction between economic sector and paid work during lockdown was retained after backwards elimination. In other words, within economic sectors, there was no significant gender difference in vulnerability to job loss or reduction. Thus, the results suggest that to the extent that women had higher odds of stopping working or reducing working hours (as indicated by the significant bivariate association between sex and paid work during lockdown) this can at least partly be attributed to the fact that the odds were higher of them working in sectors in which were heavily affected by the pandemic.

The finding that vulnerability to work hour loss varies across economic sectors is consistent with previous academic and policy literature (e.g. ILO, 2021; Tejani & Fukuda-Parr, 2021). However, whether men's or women's employment has been most affected, and how gender interacts with economic sector in producing labor market outcomes, are questions to which scholars have presented slightly different answers. While some studies have argued that women were more likely to retain their employment as they were more likely to work in essential occupations such as health care (e.g. Witteveen, 2020), others have suggested that women have been more vulnerable to job loss as a result of their overrepresentation in sectors which were most affected by the pandemic (e.g. Churchill, 2020; Cook & Grimshaw, 2021; Mohapatra, 2020). The results presented here seem to lend support to the latter claim, although the aggregated level of the economic sector variable used does not allow for in-depth comparison of more specific economic sectors.

Looking beyond the proportions of male and female workers in different economic sectors, some previous studies (e.g. Adams-Prassl et al., 2020; Reichelt et al., 2020) have found that the effects of the pandemic have interacted with existing inequalities on the labor market, to produce unequal outcomes by gender and other socio-demographic factors. Reichelt et al (2020) specifically mention women's higher likelihood of working part-time as a risk factor for unemployment during the first wave of the pandemic. The present study did not include any variables on employment characteristics (such as wage, contract duration, employment terms, etc.), and thus cannot assess their importance in predicting labor market outcomes. However, as the association between economic sector and paid work during lockdown was independent of sex, the present study did not find any evidence that such factors should have a gendered impact on the vulnerability to job loss within any of the economic sectors. This does not exclude the possibility that the difference across economic sectors is associated with such factors. For instance, it is possible that employment terms in the most male-dominated sector (industry) are generally superior to those in the least male-dominated sector (non-market services). Further research is needed to explore whether this explains variation in vulnerability to employment loss across economic sectors.

As was presented in earlier in this study, early theoretical perspectives on the gendered impacts of crises have posited that women constitute a "flexible labor force", and thus are expected to be more vulnerable to job dismissal during economic downturns (Rubery, 2021). This argument has subsequently been criticized by scholars who argue that rather, patterns of gender segregation on the labor market result in differential impacts on men and women, where the nature of the differential gender impact will depend on whether the sectors of the economy that are hit hardest by the crisis are dominated by female or male employment (see e.g.Elson, 2010; Fukuda-Parr et al., 2013). Although this study showed that females were slightly more vulnerable to job reduction than men, the results presented here can be interpreted as favoring the latter claim, as women's greater vulnerability to job reduction seems to have been associated with their concentration in certain economic sectors.

Impact on Domestic Work

Like the early impact of the pandemic on paid work, the impact on domestic work was also pronounced across the board. Among all respondents (men and women) who were working before lockdown started, 75.5% reported having increased the time spent on domestic work during lockdown. There was, however, also a significant gender difference in the odds of

spending more time on domestic work, with the odds for women being higher than those for men. Thus, while a substantial proportion of men did increase the time spent on domestic work, the corresponding proportion of women was larger still. These results are largely consistent with those of previous studies of the early impact of the pandemic in the global south, which have indicated that the burden of domestic work during the early phases of the pandemic has fallen disproportionately on women (Chauhan, 2021; Nichols et al., 2020; Sarker, 2020; Yamamura & Tsustsui, 2020; Zamarro & Prados, 2020). At the same time, the results of this study also support findings of previous studies that have suggested that men on average have increased the time spent on domestic work, albeit not to the same degree as women (Chauhan, 2021).

The multivariate analysis shed further light on the issue of gendered patterns to domestic work during lockdown, revealing a significant three-way interaction between sex, economic sector, and domestic work during lockdown. A breakdown of this association showed that the agriculture sector displayed the largest gender imbalance in terms of time spent on domestic work. There are multiple potential explanations for this finding; for instance, it could be taken to imply that traditional gender norms are stronger in rural areas, where people working in agriculture typically live. However, it could also be the case that within this sector (which we should be reminded includes agriculture, forestry, and fishing), men and women occupy distinct roles that are more or less easy to combine with an added burden of domestic work. Thus, further research would be needed to uncover the specific causes behind this association. It should also be noted that the size of this three-way effect was relatively small, compared to the other effects in the model.

From a theoretical perspective, Elson (2010) argues that gender norms are "likely to suggest that it is women who must take the main responsibility for survival of household members […]" (p. 207). At the same time, she also contends that economic crises can lead to a breakdown of gender norms as men take on tasks considered to be typically female, such as childcare (Elson, 2010). In this way, she argues, crises can either lead to a decomposition or a reinforcement of existing gender norms (Elson, 2010, p. 204). The results of the present study suggest that both of these effects are occurring simultaneously; while the results revealed that women had higher odds than men of increasing time spent on domestic work, they also showed that a considerable number of men increased their domestic work contribution. The results relating to time spent on domestic work thus cannot be neatly classified as implying either a decomposition or a reinforcement of gender norms, but rather, both seem to be

happening simultaneously. This could be taken to suggest that the gendered impacts of economic crises can be ambiguous and difficult to classify as either positive or negative from a gender equality perspective.

Association between Paid Work and Domestic Work

Thus far, this chapter has discussed the early impacts of the pandemic on the two response variables of this study: paid work during lockdown and domestic work during lockdown, respectively. In this section, the dots between these two variables are connected in a discussion of the association between paid work and domestic work during lockdown. To begin, the bivariate analyses showed a statistically significant bivariate association between paid work and domestic work lockdown. As calculations of odds ratios for this relationship showed, individuals who spent more time on domestic work had higher odds of not being able to work as usual, and vice versa. The analyses performed here are not able to give an indication as to the direction of this relationship, that is, whether a reduction in paid work caused an increase in domestic work, or vice versa. What the subsequent multivariate analysis did reveal, however, was a statistically significant three-way interaction between sex, domestic work, and paid work during lockdown. An interpretation of this effect suggests that the interaction between domestic work and paid work varied between the sexes, irrespective of the economic sector of one's occupation. As calculations of the odds ratios for this interaction showed, the association between time spent on domestic work and time spent on paid work was significantly stronger for women as a group than for men as a group. Among those who kept working as usual during lockdown, the odds of spending more time on domestic work were significantly higher for women than for men. Similarly, among those who did not work as usual during lockdown, the odds of spending more time on domestic work were also significantly higher for women than for men.

There are multiple ways in which this interaction can be broken-down and analyzed. Firstly, the results suggest that women's vulnerability to employment loss compared to men's was more sensitive to whether or not they increased their time spent on domestic work. This result is consistent with findings of several previous studies, which have argued that women have reduced their working hours in order to meet the increased demands of caregiving (Adams-Prassl et al., 2020; Collins et al., 2020; Hazarika & Das, 2020). It is critical to note however, that several studies (e.g.Adams-Prassl et al., 2020; Collins et al., 2020), acknowledge that they

cannot with certainty show that women's reduction in working hours is caused by an increase in domestic work responsibilities but rather present this as a plausible explanation. The qualitative work by Hazarika and Das (2020) represents an exception in this regard, as their study of dual parent households in a town in India shows clearly that mothers' careers were more likely to suffer as a direct result of an added burden of care work than those of fathers. Nevertheless, more research on this topic is needed to provide more robust evidence of the impact of an added domestic work burden on men and women's employment.

Secondly, the fact that women who kept working as usual had higher odds of increasing time spent on domestic work than men who kept working as usual points to women's higher vulnerability to shouldering a double work burden, which is a topic that has frequently been raised in the previous literature on the gendered impact of the COVID-19 pandemic (Clark et al., 2020; İlkkaracan & Memiş, 2021). This finding supports the claim made by some scholars, that the pandemic has increased the time poverty of women, especially in the global south (Chauhan, 2021; Sarker, 2020). On this topic, it is worth noting that attention has been called to the negative mental health effects of the additional work burden for women, for instance, Hjalmsdottir and Bjarnadottir (2020), and Clark et al. (2020) have found that the additional work burden shouldered by women during the pandemic was a source of stress and frustration, and negatively impacted their psychological well-being.

From a theoretical perspective, it could be argued that these results provide support for the argument leveled by Chant (2011), that women in the global south are increasingly facing a double work burden as they take up work outside the home while simultaneously continuing to shoulder the main responsibility for domestic work tasks, which she refers to as a "feminization of responsibility and obligation" (Chant, 2011, p. 176). It should be noted however, that Chant's theory of the feminization of responsibility and obligation does not refer directly to the outcome of economic crisis, but rather, she sees this process as following from gradual restructuring of societies in the global south in a neo-liberal direction, whereby poor households in particular come under increasing pressure (Chant, 2011). Beyond this, the theoretical literature on the gendered association between paid work and domestic work is surprisingly scant. For instance, while scholars such as Elson (2010) emphasize the importance of considering impacts of economic crises in both the productive and reproductive sphere, her analytical framework largely treats these spheres separately, and she does not to any great extent address how impacts in one sphere relate to impacts in another. From this, it can be concluded

that there is a need for more theoretical reasoning on the association between crisis impacts on paid and domestic work.

Contributions and Strengths of the Study

The purpose of this section is to highlight the main empirical and theoretical contributions, as well as methodological strengths of the study. Firstly, the review of the previous literature that was presented earlier in this paper showed that there were a larger number of studies examining the impact of the pandemic on the gendered division of labor in the global north, than in the global south. One central contribution of this study thus is empirical; as it adds to the knowledge on the economic impacts of the pandemic in countries beyond Europe, North America, and Oceania. As the literature review and analysis of this study has suggested, the gendered division of labor appears to have been differentially impacted by the pandemic in different settings, which underscores the importance of not generalizing findings from one context to another.

Secondly, from a theoretical viewpoint, this study has illustrated the salience and relevance of a gendered theoretical framework for analyzing the impacts of economic crises. Specifically, the results presented here illustrate the importance of considering effects in the reproductive sphere when evaluating the impacts of economic crises. As mentioned earlier in this paper, traditional economic approaches have previously been criticized by feminists for overlooking these effects. Furthermore, the analysis presented here has indicated that while effects on domestic work are important to consider in their own right, they also are associated with effects on paid work, and this association was found to be structured by gender. The lack of theoretical literature exploring this association points to a potential avenue for theoretical advancement. Moreover, the results have suggested that the gendered impacts of economic crisis are complex, as they can simultaneously reproduce and dismantle prevailing norms regarding the gendered division of labor. In sum, the results of this study can largely be seen as supporting, rather than refuting, the theoretical claims regarding the gendered impact of crises that were presented earlier in this study, but simultaneously, they have illustrated the need for further theoretical development in some key areas.

Finally, this study employed a relatively uncommonly used method for statistical data analysis (loglinear analysis). This method was considered suitable for the purpose of this study, as it allowed for more than one variable to be considered a response variable. A further strength of this method was that it allowed for an exploratory analysis of the complex association

structures between a set of discrete variables. Hopefully, this study has illustrated the virtues of loglinear analysis as an elegant and modern technique for analysis of categorical data, and in addition, illustrated the usefulness of mosaic plots for visually presenting relationships between categorical variables.

Study Limitations

As with all research, there are several limitations of the present study that need to be acknowledged. This section discusses the limitations emanating from two central aspects of the study: the overall research design, and the availability of data.

Limitations Related to Research Design

This study has explored the associations between sex, economic sector, paid work, and domestic work during the early phases of the COVID-19 pandemic, using quantitative data and statistical analysis methods. One of the main limitations of this research design and choice of methods is that it cannot determine the direction of the relationship between the two response variables, paid work during lockdown and domestic work during lockdown. Theoretically, a causal relationship in either direction, or both simultaneously, is plausible. Qualitative research methods could be used to further explore the nature of this relationship. It should be noted however, that the theoretically mutual nature of this relationship was the reason for the choice of method that could accommodate for the inclusion of two response variables, rather than treating one as an explanatory variable. Moreover, the results of this study point to a gender difference in terms of both paid and domestic work during lockdown, however, the research design does not allow for decisive conclusions to be drawn as to the reasons behind these differences. Whether they can be attributed primarily to traditional gender norms, different employment characteristics, or other factors is a question left unanswered here. Again, qualitative inquiry could be used to further investigate this issue.

Limitations Related to Data Availability

Within the scope of the chosen research design, there are also limitations of this study that can be traced to the availability of data. Specifically, one of the central assumptions of loglinear analysis is adequacy of expected cell frequencies, which requires a sufficiently large number of observations not only for each variable, but also for each combination of variables

(Tabachnick & Fidell, 2014). Tabachnick and Fidell (2014, p. 920) recommend ensuring adequacy of expected cell frequencies by estimating in advance of data collection which variable combinations are expected to be rare, and then sampling until these cells in the multiway contingency table are sufficiently filled. However, since the present study was based on secondary data analysis, this option was not available. In particular, the observed frequencies of females, who were not able to work as usual during lockdown and who did not spend more time on domestic work was exceedingly small in all economic sectors, and zero in the agriculture sector. While this does not constitute a violation of the assumption of expected cell frequencies in the definition of Tabachnick and Fidell (2014), the consequence of this circumstance is that a limited number of variables could be included in the analysis while still meeting the requirement of expected cell frequencies. The main limitation that results from this is that it was not feasible to conduct a cross-country comparison as a part of the analyses, hence, it cannot be ruled out that the association structures and the strengths of the relationships discovered here in fact differ across the four study countries.

Finally, as has previously been noted, the economic sector variable used in this study contained a relatively large proportion (6.5%) of missing values. The considerable number of missing values derives from the design of the survey questionnaire; specifically, the skip-pattern in the questionnaire resulted in data on this variable not being collected for all relevant respondents. Since listwise deletion was used in this study, the cases that had missing values on this variable were deleted in all analyses which contained this variable. This limitation in terms of data availability negatively impacts the generalizability of the findings presented in this study.

Conclusion

The objective of this study was to explore the gendered effects on paid and domestic labor among young adults in the global south during the lockdown of the first wave of the COVID-19 pandemic. The specific research questions to be addressed were how the time spent on paid and domestic work by men and women were affected during the lockdown of the first wave, and what associations existed between sex, economic sector of occupation, and time spent on paid and domestic work during lockdown. To answer these questions, this study drew on data collected as part of the “Young Lives at Work” project, which contains sample data on young adults from four countries: Ethiopia, India, Vietnam, and Peru. The results and analyses

showed statistically significant differences between men and women in terms of the impacts on time spent on domestic and paid work during lockdown. Women were found to be more likely than men to have spent more time than usual on domestic work during lockdown, and more likely than men to have had reduced their working hours, although the gender difference in terms of paid work was relatively small. The results also showed that women's slightly higher vulnerability to work reduction was associated with their overrepresentation in economic sectors that were heavily impacted by the crisis. Moreover, the association between reducing working hours and increasing time spent on domestic work was stronger for women than for men. Finally, it was shown that women were more likely than men to shoulder an added work burden during the lockdown, by continuing to work as usual and simultaneously increasing the time spent on domestic work. The central conclusion that can be drawn from these results is that the early impacts of the COVID-19 crisis were not gender neutral. The results of this study have shown that occupational sex segregation and a gendered division of the added burden of domestic work both worked to produce differential outcomes for men and women during the early phases of the COVID-19 crisis.

There are several important research and policy implications of these results. Firstly, this study has clearly illustrated the importance of studying the gendered effects of the crisis, not only in the productive but also the reproductive sphere. Future quantitative research could for instance further investigate the role of factors such as employment characteristics and parental status, as well as evaluate the efficiency of different policy responses to the COVID-19 crisis. Furthermore, qualitative and quantitative research designs could be used to explore the mechanisms whereby men and women are differentially impacted, and the role of gender norms and attitudes in influencing these outcomes. Relatedly, from a policy perspective, it should also be acknowledged here that the nature of the COVID-19 crisis, where both childcare and healthcare have been central issues in the public and policy debate, has resulted in a great deal of attention directed to the burdens of domestic work and care during this crisis, in comparison with previous ones. The current spotlighting of these issues thus presents a unique opportunity to design labor market recovery policies on the basis of an analysis which considers domestic work needs and the gendered division of labor. Secondly, the results of this study have shown that occupational sex segregation continues to be a key factor in determining the gendered impact of labor market disruptions. Importantly, comparison of the results of this study with some of the previous literature suggest that gendered patterns of employment loss can differ between countries and localities, depending on the concentration of male and female

workers, and the impact on different economic sectors. This finding clearly illustrates the need for further research into the gendered patterns of employment loss across economic sectors and countries, including in the global south. From a policy perspective, this finding underscores the need to consider the effects of occupational sex segregation when designing COVID-19 recovery policies.

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Appendices

Appendix A: Table of Collapsed Categories for Economic Sector Variable.

Agriculture	Industry	Market services	Non-market services
Agriculture, forestry, and fishing	Mining and quarrying	Wholesale and retail trade	Public administration and defense; compulsory social security
	Manufacturing	Transportation and storage	Education
	Electricity, gas, steam, and air condition supply	Accommodation and food service activities	Human health and social work activities
	Water supply and waste management	Information and communication	Arts, entertainment, and recreation
	Construction	Financial and insurance activities	Other service activities
		Real estate activities	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use
		Professional, scientific, and technical activities Administrative and support service activities	Activities of extraterritorial organizations and bodies

Appendix B: Full Results from Chi-Square Tests for Independence.

Paid work during lockdown * Sex

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6,507[a]	1	,011		
Continuity Correction[b]	6,277	1	,012		
Likelihood Ratio	6,505	1	,011		
Fisher's Exact Test				,011	,006
Linear-by-Linear Association	6,503	1	,011		
N of Valid Cases	2010				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 388,89.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	,057	,011
	Cramer's V	,057	,011
N of Valid Cases		2010	

Domestic work during lockdown * Sex

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	148,943[a]	1	,000		
Continuity Correction[b]	147,661	1	,000		
Likelihood Ratio	161,045	1	,000		
Fisher's Exact Test				,000	,000
Linear-by-Linear Association	148,868	1	,000		
N of Valid Cases	2008				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 205,01.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	,272	,000
	Cramer's V	,272	,000
N of Valid Cases		2008	

Economic sector * Sex

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	15,273[a]	3	,002
Likelihood Ratio	15,234	3	,002
Linear-by-Linear Association	6,634	1	,010
N of Valid Cases	1879		

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 163,57.

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	,090	,002
	Cramer's V	,090	,002
N of Valid Cases		1879	

Domestic work during lockdown * Economic sector

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	10,022[a]	3	,018
Likelihood Ratio	9,854	3	,020
Linear-by-Linear Association	6,545	1	,011
N of Valid Cases	1878		

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 98,37.

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	,073	,018
	Cramer's V	,073	,018
N of Valid Cases		1878	

Paid work during lockdown * Economic sector

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	130,680[a]	3	,000
Likelihood Ratio	137,890	3	,000
Linear-by-Linear Association	104,992	1	,000
N of Valid Cases	1879		

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 181,50.

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	,264	,000
	Cramer's V	,264	,000
N of Valid Cases		1879	

Domestic work during lockdown * Paid work during lockdown

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	64,594[a]	1	,000		
Continuity Correction[b]	63,761	1	,000		
Likelihood Ratio	66,161	1	,000		
Fisher's Exact Test				,000	,000
Linear-by-Linear Association	64,562	1	,000		
N of Valid Cases	2008				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 229,31.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	,179	,000
	Cramer's V	,179	,000
N of Valid Cases		2008	

Appendix C: Backward Elimination Statistics.

Step Summary

Step[a]			Effects	Chi-Square[c]	df	Sig.	Number of Iterations
0	Generating Class[b]		Sex*Economic sector*Domestic work*Paid work	,000	0	.	
	Deleted Effect	1	Sex*Economic sector*Domestic work*Paid work	,780	3	,854	4
1	Generating Class[b]		Sex*Economic sector*Domestic work, Sex*Economic sector*Paid work, Sex*Domestic work*Paid work, Economic sector*Domestic work*Paid work	,780	3	,854	
	Deleted Effect	1	Sex*Economic sector*Domestic work	10,913	3	,012	4
		2	Sex*Economic sector*Paid work	1,357	3	,716	4
		3	Sex*Domestic work*Paid work	18,357	1	,000	4
		4	Economic sector*Domestic work*Paid work	,725	3	,867	5
2	Generating Class[b]		Sex*Economic sector*Domestic work, Sex*Economic sector*Paid work, Sex*Domestic work*Paid work	1,505	6	,959	
	Deleted Effect	1	Sex*Economic sector*Domestic work	10,799	3	,013	5
		2	Sex*Economic sector*Paid work	1,197	3	,754	4

		3	Sex*Domestic work*Paid work	18,014	1	,000	5
3	Generating Class[b]		Sex*Economic sector*Domestic work, Sex*Domestic work*Paid work, Economic sector*Paid work	2,702	9	,975	
	Deleted Effect	1	Sex*Economic sector*Domestic work	10,403	3	,015	5
		2	Sex*Domestic work*Paid work	17,537	1	,000	5
		3	Economic sector*Paid work	157,775	3	,000	2
4	Generating Class[b]		Sex*Economic sector*Domestic work, Sex*Domestic work*Paid work, Economic sector*Paid work	2,702	9	,975	

a. At each step, the effect with the largest significance level for the Likelihood Ratio Change is deleted, provided the significance level is larger than ,050.

b. Statistics are displayed for the best model at each step after step 0.

c. For 'Deleted Effect', this is the change in the Chi-Square after the effect is deleted from the model.

Appendix D: Cell Counts and Residuals

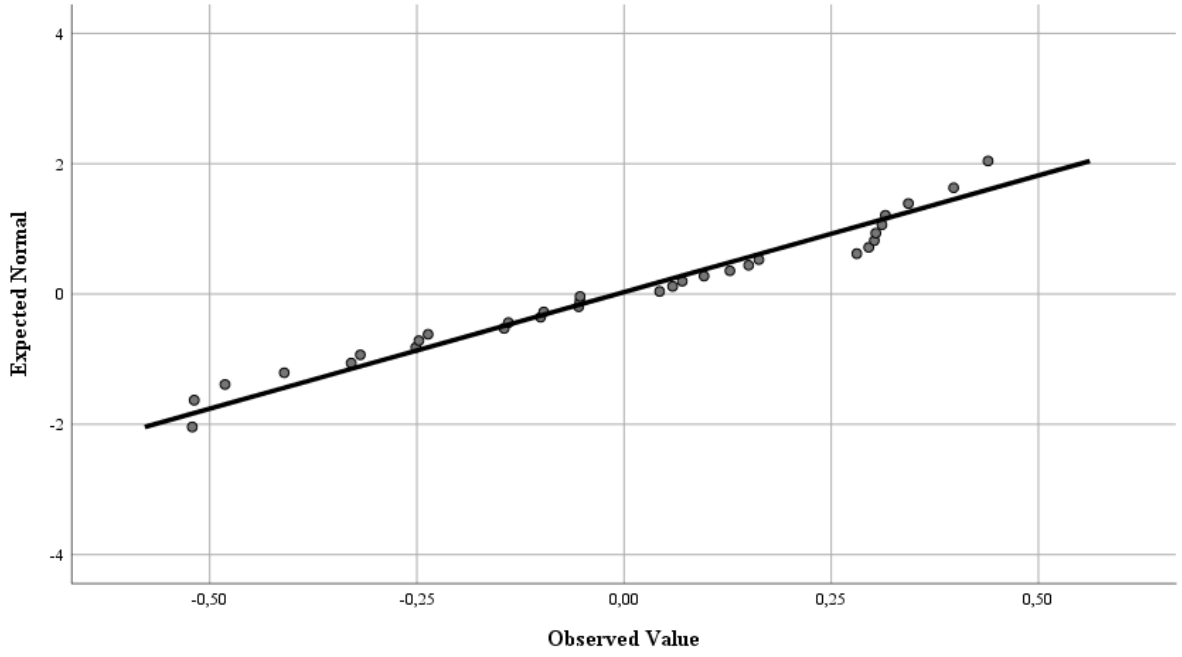
Sex	Economic sector	Domestic work during lockdown	Paid work during lockdown	Observed		Expected		Residuals	Std. Residuals
				Count	%	Count	%		
Male	Agriculture	Did not spend more time on domestic work	Was able to work as usual	67,000	3,6%	67,839	3,6%	-,839	-,102
			Was not able to work as usual	9,000	0,5%	8,186	0,4%	,814	,284
		Spent more time on domestic work	Was able to work as usual	127,000	6,8%	129,658	6,9%	-2,658	-,233
			Was not able to work as usual	41,000	2,2%	38,319	2,0%	2,681	,433
	Industry	Did not spend more time on domestic work	Was able to work as usual	64,000	3,4%	61,703	3,3%	2,97	,292
			Was not able to work as usual	21,000	1,1%	23,304	1,2%	-2,304	-,477
		Spent more time on domestic work	Was able to work as usual	96,000	5,1%	99,220	5,3%	-3,220	-,329
			Was not able to work as usual	95,000	5,1%	91,775	4,9%	3,225	,337
	Market services	Did not spend more time	Was able to work as usual	73,000	3,9%	72,666	3,9%	,334	,039

		on domestic work	Was not able to work as usual	43,000	2,3%	43,321	2,3%	-,321	-,049
		Spent more time on domestic work	Was able to work as usual	106,000	5,6%	102,849	5,5%	3,151	,311
			Was not able to work as usual	147,000	7,8%	150,166	8,0%	-3,166	-,258
	Non-market services	Did not spend more time on domestic work	Was able to work as usual	55,000	2,9%	56,788	3,0%	-1,788	-,237
			Was not able to work as usual	38,000	2,0%	36,192	1,9%	1,808	,300
		Spent more time on domestic work	Was able to work as usual	57,000	3,0%	54,285	2,9%	2,715	,368
			Was not able to work as usual	82,000	4,4%	84,732	4,5%	-2,732	-,297
Female	Agriculture	Did not spend more time on domestic work	Was able to work as usual	8,000	0,4%	7,734	0,4%	,266	,096
			Was not able to work as usual	,000	0,0%	,269	0,0%	-,269	-,519
		Spent more time on	Was able to work as usual	118,000	6,3%	114,769	6,1%	3,231	,302

	domestic work	Was not able to work as usual	36,000	1,9%	39,226	2,1%	-3,226	-,515
Industry	Did not spend more time on domestic work	Was able to work as usual	16,000	0,9%	16,236	0,9%	-,236	-,059
		Was not able to work as usual	2,000	0,1%	1,767	0,1%	,233	,175
	Spent more time on domestic work	Was able to work as usual	63,000	3,4%	61,842	3,3%	1,158	,147
		Was not able to work as usual	65,000	3,5%	66,153	3,5%	-1,153	-,142
Market services	Did not spend more time on domestic work	Was able to work as usual	19,000	1,0%	18,772	1,0%	,228	,053
		Was not able to work as usual	3,000	0,2%	3,225	0,2%	-,225	-,126
	Spent more time on domestic work	Was able to work as usual	77,000	4,1%	80,713	4,3%	-3,713	-,413
		Was not able to work as usual	140,000	7,5%	136,288	7,3%	3,712	,318
Non-market services	Did not spend more time	Was able to work as usual	31,000	1,7%	31,248	1,7%	-,248	-,044

on domestic work	Was not able to work as usual	6,000	0,3%	5,740	0,3%	,260	,109
Spent more time on domestic work	Was able to work as usual	61,000	3,2%	61,678	3,3%	-,678	-,086
	Was not able to work as usual	112,000	6,0%	111,336	5,9%	,664	,063

Appendix E: Normal Q-Q-Plot of Standardized Residuals



Appendix F: Parameter Estimates

Sex * Paid work * Domestic work

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
1	-,1736964233	,04545	-3,82209	-,26277	-,08462

Sex * Economic sector * Domestic work

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
2	,2156069840	,07859	2,74344	,06157	,36964
3	-,0811365010	,06228	-1,30267	-,20322	,04094
4	-,0189530911	,05789	-,32742	-,13241	,09450

Sex * Paid work

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
5	-,1373764716	,04557	-3,01459	-,22669	-,04806

Economic sector * Paid work

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
6	,5503722553	,05074	10,84697	,45092	,64982
7	-,0201349832	,04412	-,45633	-,10662	,06635
8	-,2484040673	,03932	-6,31677	-,32548	-,17133

Domestic work * Paid work

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
9	,3976986929	,04578	8,68808	,30798	,48742

Sex * Economic sector

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
10	,1879849838	,07854	2,39336	,03404	,34193
11	,0665571105	,06219	1,07025	-,05533	,18845
12	,0135160353	,05779	,23389	-,09975	,12678

Sex * Domestic work

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
13	,4704653049	,04903	9,59625	,37437	,56656

Economic sector * Domestic work

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 Ci	Upper 95 Ci
14	-,3616165021	,07932	-4,55884	-,51709	-,20615
15	,0217181247	,06356	,34170	-,10286	,14629
16	,0235045719	,05909	,39777	-,09231	,13932

Paid work

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 Ci	Upper 95 Ci
17	,4204762989	,04635	9,07149	,32963	,51133

Domestic work

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 Ci	Upper 95 Ci
18	-,8725580126	,04907	-17,78366	-,96873	-,77639

Sex

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 Ci	Upper 95 Ci
19	,5227973379	,04903	10,66311	,42670	,61889

Economic sector

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 Ci	Upper 95 Ci
20	-,5417017461	,08445	-6,41416	-,70723	-,37617
21	-,0308792878	,06415	-,48136	-,15661	,09486
22	,3501940892	,05882	5,95355	,23490	,46548