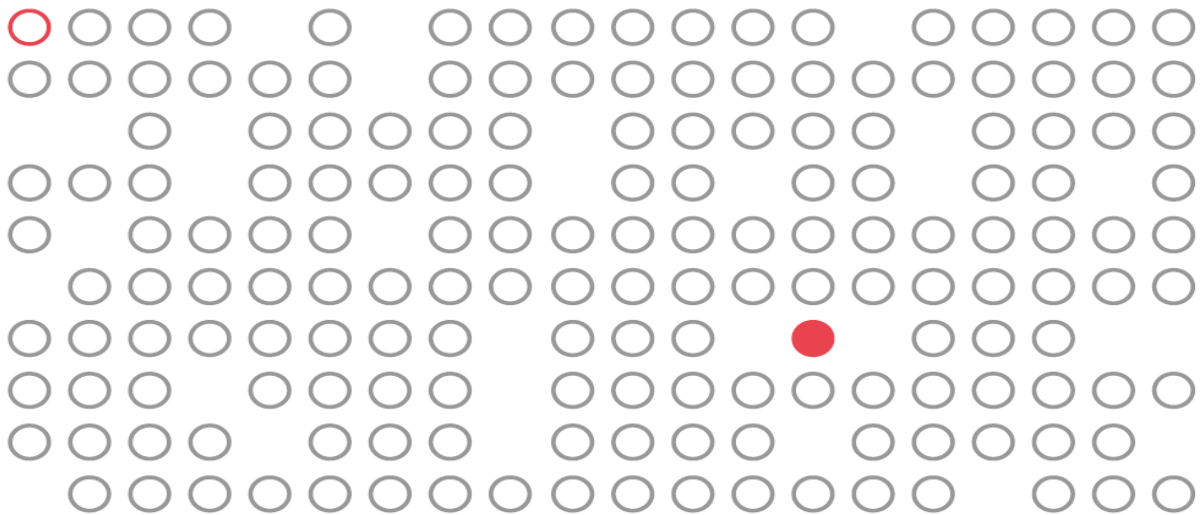# Labor Market Inequalities in Egypt: Some Causes and Consequences for Youth and Women

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Chapter 1 – Labor Market Inequalities in Egypt: Causes and consequences for women and youth (Overview Article)

1. Motivation

This thesis considers the aspect of labor market inequalities in terms of labor market vulnerabilities faced by women and youth. Labor market vulnerabilities, hereinafter also referred to as labor market disadvantages, have been spreading in many countries (Buchholz et al., 2009; Scherer, 2009). Labor market disadvantages can be manifested in various forms. First, vulnerability can be reflected in the characteristics of employment which can be a primary factor for disadvantaged workers (Goldthorpe & McKnight, 2004). As a result of the rise of labor market flexibilization and deregulation over the last decade, disadvantages have increased (Kalleberg, 2003, 2011). This resulted in changing the nature of work, manifested in the shift of the risk from employers to employees, in the form of hiring employees on fixed-term contracts, making it easier for employers to fire them when needed. As a result, employees find themselves in a weaker position than employers in power relations, giving rise to nonstandard employment relationships and resulting vulnerabilities in the labor market (Kalleberg, 2011; Kalleberg & Marsden, 2015).

Various employment characteristics can raise the level of disadvantages in the labor market, rendering the job nonstandard (Kalleberg, 2000, 2011). To be more precise, low job quality, inability to access some employment benefits, or concentration in certain jobs raise the level of vulnerability, such as (1) working in jobs with a high level of insecurity (i.e., fear of losing the job in the near future) either due to lack of coverage by legal agreements such as for informal workers and seasonal and casual employees or on fixed-term employment (i.e., working on limited-duration contracts) (Benach et al., 2010; Kalleberg, 2011); (2) limited or unavailable access to fringe benefits such as maternity leave and health insurance; (3) low level of earnings for an extended period due to low wages or engagement in nonstandard employment (Saunders, 2003); (4) concentration of certain groups in particular occupations which is highly related to disparities in wages and job quality (Kalleberg, 2003).

Vulnerabilities can be present at certain life events and transitions (Brehm & Buchholz, 2014; Buchholz et al., 2009; Maeda & Ishida, 2021). Individuals witness sensitive periods/transitions in the life course, such as the transition to adulthood, school-to-work transition, family formation, and childbearing. For example, youth want to make the transition to adulthood by finding good jobs and work prospects. This puts pressure on them in such a sensitive period in their life course. For example, previous research has shown that labor market entrants are more prone to engage in temporary employment (Buchholz et al., 2009). In addition, women's transition

to motherhood put them in a critical situation regarding their employment and moving upwards in the occupational hierarchy (Abendroth et al., 2014; Brehm & Buchholz, 2014; Budig & England, 2001; Hipp, 2020).

According to the previous explanations, several heterogeneous groups suffer the most from labor market vulnerabilities and disadvantages, such as women, youth, migrants, individuals with low socio-economic backgrounds, non-skilled workers, and individuals with disabilities (Goldthorpe & McKnight, 2004; Monastiriotis & Laliotis, 2019; Saunders, 2003). The problem is exacerbated if those vulnerable groups work in nonstandard jobs, which might be temporary (fixed-term) or informal (jobs with no contract or social insurance). Working in nonstandard jobs results in economic insecurity (Auguste et al., 2022) or negatively affects subjective wellbeing, health, and mental health (de Witte, 2005; Utzet et al., 2020; Voßemer & Eunicke, 2015).

These disadvantages are exacerbated in developing countries compared to developed countries where differences are apparent in characteristics of the labor market in addition to family formation trends and transitions, such as the prevalence of nonstandard employment, namely informal employment, the concentration of women and youth in nonstandard employment, differences in fertility rates and cohabitation preferences (an issue that will be explained in detail in the following sub-sections of this motivation section). Based on this understanding, labor market disadvantages and vulnerabilities should be highly considered in developing countries' contexts to counteract its effect and protect vulnerable individuals on the economic and social levels.

In addition, it is crucial to study the consequences of labor market disadvantages in terms of mental health outcomes, especially in developing countries. Mental illness prevalence and health burden measures show the severity of the situation globally. Worldwide, mental illnesses are among the highest sources of health burden for countries (Vigo et al., 2022). In addition, illness prevalence is high; globally, almost 37 percent suffer from stress, while 50 percent witness psychological distress (Nochaiwong et al., 2021). Despite this high prevalence, the global median of public expenditure on mental health is 2.1 percent of government health expenditure (World Health Organization, 2021). Variation between countries' spending is present where the figures are quite low for low and middle-income countries (World Health Organization, 2021). This shows the necessity to shed light on mental health outcomes and grab governments' attention to spending more on mental health, especially in low and middle-income countries.

Using a sociological perspective, in this thesis, I focus on the vulnerability of two groups, namely youth and women. In particular, I cover both employment characteristics and life events that can negatively affect their labor market and health outcomes in a developing country context, specifically Egypt. Before digging deeper into the motivation and the main research questions, I would like to introduce the concepts used throughout this thesis. Concerning the dependent concepts, I use various health and labor market outcomes. In particular, I cover three main effects: (1) the effect of commuting time to work on hourly wages, labor supply (working hours and days), (2) the effect of employment transitions on mental illness measures, namely prevalence, depth, and severity. Various employment transitions are used to compare the results across different standard and nonstandard employment forms. In identifying the various types of employment, I focus on the objective job insecurity that can be identified through the employment arrangements that carry uncertainty and instability, focusing on informal, temporary, seasonal, and casual employment as forms of nonstandard employment. Standard employment refers to both permanent employment on an indefinite period and formal employment, which refers to employment with a contract (Assaad & Krafft, 2021; Roushdy & Sieverding, 2015; Wahba & Assaad, 2017). Informal work is employment that lacks legal coverage, generally without a contract or social security (Roushdy & Sieverding, 2015). Temporary employment is a regular job with a definite employment period (Assaad & Krafft, 2021). Casual and seasonal jobs are also employment with limited duration, but they are irregular and unstable based on their duration on a daily basis or in a particular season, and are mostly informal (Assaad & Krafft, 2021; ILO, 2016; Roushdy & Sieverding, 2015; Wahba & Assaad, 2017). (3) I estimate the effect of family formation (marriage and childbirth) on occupational status.

The remainder of this motivation section is organized as follows. In sections 1.1 and 1.2, I explain why it is crucial to study the outcomes for youth and women and what they witness as disadvantages in the labor market. To get more context, I will take a step back to explain why I am focusing on women and youth in Egypt in Section 1.3. The main research questions answered in this thesis are introduced in section 1.4.

1.1. Labor market disadvantages of youth

Youth are at a critical phase of their transition to adulthood and school-to-work transition (Amer & Atallah, 2019; Dhillon et al., 2009; Gebel & Heyne, 2014; Hartmann & Swartz, 2006). The intersection of these transitions renders them vulnerable in the labor market. They might suffer the

most from nonstandard employment. The conflicting arguments about nonstandard employment for youth reflect a stepping stone or an entrapment debate. In some cases, non-standard employment can be considered a stepping stone toward permanent and formal employment (Booth et al., 2002; Gash, 2008). In other cases, youth are usually entrapped in bad jobs (Stuth & Jahn, 2020). Their worse-off position is exacerbated by the rise in labor market flexibilization and deregulation that led to an increase in the use of nonstandard employment (Kalleberg, 2011). Youth are highly vulnerable to these jobs. Youth witnessed a rise in their share of temporary employment (Baranowska & Gebel, 2010; Chung et al., 2012). In addition, they suffer from an inability to transition to standard employment (Stuth & Jahn, 2020), negatively affecting their employment trajectory and wellbeing.

Inequalities on the monetary level can arise due to nonstandard employment, particularly wage penalties for informal employment (Tansel et al., 2020a) or initial wage penalties for temporary employment compared to permanent employment (Gebel, 2011). The impact can go beyond the economic consequences and can have a non-economic effect, particularly on the subjective wellbeing of individuals.

Previous literature reviews have mainly focused on the effect of job insecurity in temporary employment on the wellbeing of the working-age population (de Witte, 2005; Utzet et al., 2020). One exception is the review by Voßemer and Eunicke (2015), which examines the literature that focuses on youth only. However, focusing on the wellbeing outcomes for the whole working-age population hides existing heterogeneity between youth and older workers. For example, both groups are different in perceptions about employment and career stability (Morgenroth et al., 2021), subjective insecurity (fear of the consequences of job loss) (Glavin, 2015), and reemployment chances (de Witte, 1999). Therefore, it is crucial to study the mental health effect of nonstandard employment only for youth (individuals younger than 30 years old) separately.

In chapter 3, I study the effect of the transitions from nonemployment (unemployed and inactive individuals who are not in education) to standard (formal or permanent jobs) or nonstandard employment (temporary, seasonal, casual, or informal jobs). And how these transitions affect young people's mental health. Comparing those in either standard or nonstandard jobs to the non-employed provides a comprehensive view of youth's situation in the labor market by depicting the effect of various employment types (standard or not) on mental health.

1.2. Labor market disadvantages of women

Globalization has increased the integration of women in the labor markets (Buchholz et al., 2009). However, up-to-date, women witness several labor market disadvantages. For example, they suffer from wage inequalities, gender gap in travel time to work, occupational segregation, a modest increase in labor force participation (LFP), and gender disparities in participation (Blau & Kahn, 2017; Borrowman & Klasen, 2019; Giménez-Nadal et al., 2022; Klasen, 2019; Verick, 2018). In addition, they face occupational status penalties after motherhood (Abendroth et al., 2014) and occupational prestige penalties, specifically after first birth (Brehm & Buchholz, 2014). Furthermore, women are usually concentrated in nonstandard jobs (Buchholz et al., 2009).

Various reasons are cited in the literature for these disadvantages. Life-course transitions and the unequal gendered effect are widely researched. The literature on the impact of marriage and motherhood on wages is well-developed. Women face penalties in their wages after marriage (Dougherty, 2006; Glauber, 2007) and after transitioning to motherhood (Hipp, 2020; Oesch et al., 2017). These life events interrupt careers due to household responsibilities and care activities (Budig & England, 2001; Evertsson et al., 2016; Kahn et al., 2014; Miller, 2011). Another reason for the labor market disadvantages of women might be due to gender norms in the division of labor. Traditional gender norms oblige men to be the primary breadwinners while women's main responsibility is to cater to all household work (Becker, 1981, 1985). This is reinforced by lower earnings for women compared to men, depleted efforts due to household responsibilities and their inability to travel longer to work (Becker, 1985). After childbearing, married women are faced with an increased demand on their time allocated to childcare, on top of their other household responsibilities (Grunow et al., 2012). This time constraint might influence women's ability to work after transitioning to marriage and motherhood and decisions regarding the intersection between time, wages, and labor supply (Becker, 1985).

Given the traditional division of labor, another aspect that could explain the labor market disadvantages for women is time poverty. Recently, time poverty has gained attention in the literature as an essential measure that can complement measures of economic poverty (Bardasi & Wodon, 2010; Harvey & Mukhopadhyay, 2006). Time poverty refers to the unavailability of sufficient time for leisure and self-care after deducting the time spent on the paid and unpaid work (Bardasi & Wodon, 2010). Women suffer more from time poverty compared to men. Research shows that women have a higher probability of being time poor than men (Bardasi & Wodon,

2010; Gammage, 2010) due to their household duties and responsibilities (Turner & Grieco, 2000). These conditions affect their choices about spending time, particularly their travel decisions (Turner & Grieco, 2000) and eventually their travel time to work (i.e., commuting time).

As a result of these conditions and disadvantages, women will be less competitive in the labor market. Faced with their domestic responsibilities and limited work options, women are left with no choice but to work in nonstandard positions with bad prospects (Budig, 2006) or into inactivity (Boeri et al., 2020; Verick, 2018). The adverse effects on earnings of some types of nonstandard employment (namely, self-employment) are more pronounced for married and childbearing women (Budig, 2006). Hence, women are forced into jobs that might not meet their expectations to reconcile work and family.

As indicated, various sources put women at a disadvantage concerning their labor market and health outcomes. In an effort to understand the disadvantaged situation of women, I focus on three topics: (1) I investigate the effect of travel time to work, whereas my first paper focuses on the gendered effect of commuting time on labor market outcomes, namely hourly wages, number of working hours and working days (Chapter 2). (2) I study the gendered effect of various employment types, including nonstandard employment, on mental health. Specifically, I emphasize the differences by gender of nonstandard employment on mental health. (3) The effect of marriage and childbirth on the occupational status of women (Chapter 4) is investigated.

1.3. Why conduct the study on Egypt?

Egypt, a Middle East and North African (MENA) country, is an excellent case to study the labor market and health outcomes. Studying these topics in a non-Western country like Egypt is essential for several reasons. First, Egypt has a population of more than 100 million, precisely 102.98 million.[1] Hence, Egypt is a sizeable country with a huge demographic mass, especially among the Middle East and North African countries (Engelhardt et al., 2018). The large population size warrants the importance of studying the topics of labor market disadvantages in such a populous developing country.

Second, Egypt has a comparative advantage over other developing countries in the availability of high-quality panel data covering a broad spectrum of topics that allows me to study

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[1] CAPMAS, www.capmas.gov.eg

my specialized topics. Egypt Labor Market Panel Survey (ELMPS) and Survey of Young People in Egypt (SYPE) are nationally representative datasets and publicly available through the Open Access Micro Data Initiative (OAMDI)[2] initiated by the Economic Research Forum (ERF) for the Arab countries, Iran and Turkey (Krafft et al., 2021; Roushdy & Sieverding, 2015). These surveys are longitudinal in nature, providing an opportunity to take into account observed variables and unobserved time-constant variables. In addition, the highly accurate retrospective data (Assaad et al., 2018) offer the chance to conduct life course analysis, especially on marriage, childbearing, and employment history (Krafft et al., 2021). The availability of a health module in SYPE and occupational data at a detailed level in ELMPS allows me to conduct my analysis on mental health and occupational outcomes, which are under-researched topics in developing country contexts.

Third, various types of nonstandard employment are extensively used in Egypt. In particular, informal employment is rampant due to the sizeable informal sector. It is the leading job creator in the Egyptian labor market (Assaad et al., 2019; Assaad, Krafft, et al., 2020). In addition, temporary work is increasing due to the introduced flexibility in the labor market. Furthermore, casual and seasonal work is widespread due to the considerable agriculture and construction sectors (Assaad, 1993; Roushdy & Sieverding, 2015; Wahba & Assaad, 2017). In the following sections, I will highlight the labor market disadvantages of youth and women in Egypt, showing their concentration in these nonstandard jobs and the importance of studying these vulnerable groups.

Fourth, marriage is considered a prerequisite for leaving the parent's house and childbearing (Hoodfar, 1997). Family formation is regarded as an essential milestone in the transition to adulthood in Egypt (Assaad & Krafft, 2021; Gebel & Heyne, 2014). Major differences between Egypt and western European countries are higher total fertility rates, 3.3 compared to 1.7 in OECD countries in 2019 (The World Bank, 2021), and motherhood prevalence (Gebel & Heyne, 2014; Krafft, 2020; Radovich et al., 2018). Research on the effect of family formation on occupational status for women in developing countries is scant. The results of the previous research show heterogeneity between countries with various welfare regimes and attitudes towards women's work regarding the effect of motherhood on employment (Kahn et al., 2014; Steiber &

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[2] www.erfdataportal.com

Haas, 2012) and occupational mobility (Aisenbrey et al., 2009; Evertsson et al., 2016). These reasons render it a necessity to study labor market disadvantages in Egypt.

1.3.1. Youth in the Egyptian labor market

Egypt has a "youth bulge" (Assaad & Barsoum, 2019; Engelhardt et al., 2018; Krafft, 2020), which results in a high labor supply of youth who competes and struggles in the labor market (Assaad and Barsoum 2009; Kabbani and Kothari 2005). Egyptian youth has a high preference for government and public sector jobs (Barsoum, 2015b). However, due to the increasing number of labor market entrants, the public sector jobs are not sufficient to employ all these individuals. In addition, there is a strategy to decrease the public sector hiring to avoid the enlarged public sector.

As a result of the demand and supply-side situation in the labor market, youth are faced with two choices: either facing exclusion from the labor market (in the form of unemployment and inactivity) or working in nonstandard employment. Labor market exclusion is highly prevalent among young women. On average, youth (not in education) had a labor force participation (LFP) of almost 50 percent in 2014. However, the differences by gender are stark. Young men have an LFP rate of 79 percent, while the figure is low for young women at 18 percent (Roushdy & Sieverding, 2015). In addition, young women and new entrants to the labor market suffer from high unemployment rates (Barsoum et al., 2014; Krafft & Rizk, 2021).

Working in the private sector does not provide youth with standard jobs. On the contrary, despite improving their educational attainment, their chance of transitioning to a good job is low (Assaad & Krafft, 2021). In particular, youth in Egypt are concentrated in informal employment, with 80 percent of youth working informally (without a contract or social insurance) (Roushdy & Sieverding, 2015). Almost 54 percent of youth in 2014 are concentrated in temporary, seasonal, and casual employment (Roushdy & Sieverding, 2015). The rise in labor market deregulation and flexibilization has resulted in increasing temporary employment in Egypt (Wahba & Assaad, 2017). The spread of seasonal and casual work is due to the sizeable agriculture and construction sectors (Assaad, 1993; Roushdy & Sieverding, 2015; Wahba & Assaad, 2017). Hence, Egyptian youth are concentrated in nonstandard employment, suffering greatly from labor market vulnerabilities.

These nonstandard employment conditions might affect the wellbeing of youth. Although Egypt has both mental health legislation and policy (Jacob et al., 2007), studying the mental health-

employment relationship has not received wide attention. The mental health–employment relationship may differ in two ways between developed and developing countries. (1) The scarce availability of mental health facilities and treatment in developing countries. This means that access to treatment is asymmetric based on earnings and socioeconomic status, resulting in untreated illnesses for the poor (Das et al., 2007), the most vulnerable in the labor market. (2) Social support systems in developing countries can act as a buffer against mental illnesses. The availability of large households and social support in the village can lower the risk of mental illnesses (Das et al., 2007). Hence, it is essential to study mental health from a developing country's perspective and refrain from using screeners and strategies tailored to developed countries (Kopinak, 2015). The SYPE provides an excellent opportunity to examine the effect of employment on mental health and illness, given the use of a self-reporting questionnaire (SRQ-20) that the World Health Organization has developed mainly as a screening tool for developing countries (Beusenberg & Orley, 1994; Roushdy & Sieverding, 2015).

1.3.2. Women in the Egyptian labor market

Women in Egypt suffer from labor market disadvantages. This is manifested in their low LFP despite improving their educational attainment (Assaad, Hendy, et al., 2020; Krafft & Kettle, 2019). The LFP is not only the lowest across countries (World Economic Forum, 2021) but also very low compared to that of men. The LFP for men was 76 percent and for women 21 percent (standard market definition) in 2018 (Krafft et al., 2019). Moreover, the percentage of women in broad unemployment has increased from 25.8 percent in 2012 to 27.8 percent in 2018, suggesting a discouraged worker effect (Krafft et al., 2019; Krafft & Kettle, 2019). Gebel and Heyne (2014) have shown that 57 percent of women in Egypt transition from school to inactivity, which gave rise to the "school to home transition" instead of the standard "school to work transition."

The disadvantages go beyond the LFP to be seen in the wages and presence in specific roles. The gender wage gap represented 21 percent in 2012, has broadened across the years, and most of this gap is not explained by worker characteristics (AlAzzawi, 2016; Biltagy, 2019). The situation is no different when comparing women's percentages in specific work roles. According to the Global Gender Gap report, women are underrepresented in managerial positions (7.3 percent) and professional and technical workers (33.4 percent) (World Economic Forum, 2021).

The labor market disadvantages that Egyptian women witness can be attributed to several factors that can be divided into demand and supply-side factors, as well as gender norms. On the demand side, employers do not prefer to hire women because of the high indirect costs associated. One of these costs is stipulated in the law where employers employing more than 100 women provide childcare services (Economic Research Forum & UN Women, 2020).

On the supply side, several factors might explain the labor market disadvantage of women. Heterogeneity in the preferences for job characteristics is prevalent by gender. Ezzat and Ehab (2019) found that the impact of the job characteristics is gendered, where men have a higher level of job satisfaction in response to the level of hourly wages. On the contrary, women's job satisfaction is improved not by the monetary dimension but by job stability, availability of social insurance, and shorter working hours (Ezzat & Ehab, 2019). This indicates that women prefer standard employment that is permanent and formal.

However, standard employment is not widely available in the labor market. This could be partially explained on the one side by the decreasing opportunities for working in the public sector and on the other side by the unsuitability of the working conditions in the private sector (Assaad, Hendy, et al., 2020; Assaad & Barsoum, 2019; Barsoum, 2019, 2020). Public sector jobs are the most secure form of employment in the Egyptian labor market. It also offers women job flexibility, particularly in working hours, and access to paid and unpaid leaves. However, the availability of these jobs is limited given the public sector contraction (Assaad & Barsoum, 2019; Barsoum, 2020). The available jobs for women are either on fixed-term or informal employment in the private sector (Amer & Atallah, 2019; Assaad & Krafft, 2015; Roushdy & Sieverding, 2015). This has resulted in extended job search duration and long periods of unemployment, particularly for women (Gebel & Heyne, 2014; Heyne & Gebel, 2016). The prevalence of informal and irregular jobs is considered the main feature of labor market segmentation in Egypt. Women, particularly young women, are more vulnerable to these job insecurities. These job characteristics have varying impacts on wellbeing by gender.

Nonstandard job characteristics are considered a key barrier to staying in employment after family formation for women. After marriage, women employed in the public sector do not exit employment, while those working in the private sector have a different situation (Assaad & El-Hamidi, 2001; Selwaness & Krafft, 2020). The probability of private wage work is reduced by marriage (Assaad, Krafft, & Selwaness, 2017). As a result, married women witness more

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transitions from the formal private sector to the public sector or from the informal private sector to non-wage work (Selwaness & Krafft, 2020).

Gender norms might result in occupational segregation and limit women's access to specific jobs.[3] Gender roles in Egypt are mainly traditional. Men are principal breadwinners, while women focus on household work regardless of their employment status (Dovis et al., 2019; Nazier & Ezzat, 2021). Comparing market work to household and care work, women in Egypt spend the least amount of time on market work, care work next, and the most considerable amount of time is spent on household work. For men, it is the opposite, where market work is a priority while care work gets the least hours (Dovis et al., 2019; Nazier & Ezzat, 2021).

A gender gap in time allocation to unpaid care work exists. On average, globally, women spend 4 hours and 37 minutes of their day on unpaid care work (includes care, household work for oneself or others and volunteer work) compared to 1 hour and 51 minutes for men (Charmes, 2019). When we look at the numbers for Egypt, stark differences can be hidden by using the averages and not differentiating by marital status. Ever-married women spend almost 5 hours of their day on care and household work, while single women spend almost 2 hours per day on these activities.[4] The differences are larger when compared to single and ever-married men (42 minutes and 1 hour and 12 minutes spent on care and household work) (Nazier & Ezzat, 2021). Although the definitions used for the global average and Egypt figures are different, general conclusions can be made. The gender gap in household and care work in Egypt is vast, putting extra pressure, especially on married women.

Given their time constraints and preference for shorter working hours and standard employment, Egyptian women suffer from further disadvantages in access to work. Women cannot take certain jobs far away from their homes due to their household responsibilities. It might be attributed to women's restricted mobility, with lower and stable commuting rates than men. While commuting is considered essential to accessing non-governmental jobs, women did not increase their commuting times to reap the benefits of the availability of new jobs (Assaad & Arntz, 2005). The difficulty in accessing secure employment is another source of vulnerability.

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[3] It is important to note that there are other factors, other than gender norms, that might result in low labor force participation, including religion and some regulatory barriers (Heyne, 2017).

[4] This definition does not include volunteer work. So, the figure of unpaid care work including volunteer work is probably higher than this estimate.

1.4. Main research questions

As shown, women and youth suffer from various labor market disadvantages. Youth are highly concentrated in nonstandard employment. Women are under family and time constraints that might affect their labor market outcomes. Studying these topics can help further understand their situation and the impact of their vulnerability to suggest policies that build their resilience. Their increased resilience means that they will have robust choices and can cope with risks, resulting in a society functioning at its total capacity (UNDP, 2014). Hence, it is crucial to study the effect of some of these labor market disadvantages for youth and women on labor and health outcomes.

Against this background, three main research questions about women's and young women's status in the labor market are the central focus of this thesis.

First, what is the gendered impact of commuting time on the labor market outcomes?

Second, what is the gendered effect of transitioning from non-employment to standard or nonstandard employment on the mental health outcomes of youth?

Third, what is the effect of family formation events on the occupational status of women? These questions consider women's labor market inequalities as both outcome variables and explanatory variables to identify their vulnerabilities and areas of improvement of their status quo. The analysis is conducted separately for men and women for the first two questions. This comparison of the heterogeneous effects shows how women are faring in the labor market compared to men. For the third question, the analysis of marriage and family formation is only done for women to show the impact of these life events on women's occupational status.

My cumulative dissertation is mainly composed of three empirical articles to answer these research questions. Article 1 tackles the effect of commuting time on labor market outcomes, comparing the differences in the effect according to gender (Chapter 2). Article 2 investigates the impact of transitions into permanent, temporary, casual/seasonal, and informal employment compared to non-employment on the psychological health of youth in Egypt (Chapter 3). Finally, Article 3 measures the marriage and motherhood penalties, particularly the effect of those family transitions on occupational status (Chapter 4). These chapters include the theoretical background, the research design, and the empirical results for each article to answer the three main questions posed in this thesis.

2. The state of the art and contribution of this thesis

In this section, I review the state of research separately for each of the three articles. This literature review aims to provide a comprehensive overview of the area of research for each article and to shed light on the limitations in the previous literature. The following sections include central findings of prior research for the three articles. In addition, methodological differences across the literature are presented for articles one and three. Each section concludes with a summary of the limitations of the previous studies and the article's contribution. Finally, section 2.4 concludes this chapter by introducing the thesis's structure and general contributions.

2.1. Commuting time effect on labor market outcomes

Time is a scarce resource. Given that women spend a considerable amount of time on care work, they are constrained in their choices for the remaining time. This time scarcity is heightened when women get married, and their unpaid care responsibilities heighten. As a result, the gender gap in commuting time is witnessed in most countries. They sometimes have to choose proximate jobs to save on the time spent on commuting to be able to conduct market work. Employing Dutch Time Use data for the years 2000 and 2005, Gimenez-Nadal and Molina (2016) found that the inability of women to take longer commutes might affect the job search area, reduce the time available for market work, or affect the wage level.

The gender gap in commuting is prevalent in several countries where men take longer travel times to work than women (Giménez-Nadal et al., 2022). These differences in commuting mean that women are at a disadvantage in the labor market when commuting to work (van den Berg & Gorter, 1997). The difference becomes starker across the life course. As explained earlier, given the traditional gender norms, women act as the secondary breadwinner, resulting in restrictions on their commuting preferences compared to their husbands (White, 1986). Furthermore, depending on US census data, Black et al. (2014) showed that married women and women with young children are susceptible to longer commutes. To conclude, their labor market choices are constrained concerning travel time from home to work, which is seen as a cost they need to minimize.

High commuting time and costs might force women to reject job offers with long commutes and prefer a more proximate job to their homes due to their household and childcare responsibilities (van den Berg & Gorter, 1997). These decisions about commuting time could

negatively affect their wages. The differences in commuting time preferences might explain the gender differences in wages. Given these gender differences, I will estimate the models separately for men and women.

Previous empirical studies on the effect of commuting time on wages have found positive effects depending mainly on cross-sectional data. Using cross-sectional setup and US data, French et al. (2020) found a positive effect of one-way commuting time on log hourly wages. In addition, the magnitude of the effect is the same by gender (French et al., 2020). Other researchers have also shown that commuting time positively affects monthly wages using cross-sectional data (Ruppert et al., 2009). Another researcher studied the effect of commuting time on the logarithm monthly wages and found a positive effect specifically for a sample of low-educated workers, using cross-sectional data in Hungary (Bartus, 2011). Others examined the effect of commuting distance on wages and found a small positive impact that increases over time (Mulalic et al., 2014).

When looking at the literature on labor supply, there are divergent views on its impact on commuting time. For example, using Dutch time use data and quasi-experimental methods, Gimenez-Nadal and Molina (2014) found a positive effect of commuting time on labor supply (measured as time devoted to market work during a day) in the Netherlands. Similar results were found drawing on German panel data, when estimating the effect of commuting distance (used as a proxy for commuting time and cost) on working hours, where it is found to increase the daily and weekly working hours (Gutiérrez-i-Puigarnau & van Ommeren, 2010). On the contrary, one study found heterogeneous effects by gender of commuting time on weekly working hours, where a positive impact on the hours is found for women and a zero result for men, using British panel data (Gutiérrez-i-Puigarnau & van Ommeren, 2014). These results show that women might react to the increase in commuting time by increasing their weekly working hours while men's labor supply is unaffected.

In Egypt, renting a house is not a popular or affordable option. The housing market mainly focuses on homeownership (Assaad, Krafft, & Rolando, 2017; Beidas-Strom et al., 2009; Dhillon et al., 2009). This constrained housing market gives insights into the inflexibility of relocating to another city for a new job and requires long commutes to access employment opportunities. Assaad (2002), using descriptive analysis of two household surveys in Egypt, showed that Individuals take longer commutes to access distant jobs rather than changing their residential location

These mobility requirements to access jobs can constrain women's outcomes. Assaad and Arntz (2005) found women did not reap the benefits of structural adjustment compared to men, using Egyptian panel data. However, women's labor outcomes did not reflect the improvement on the macro level and did not catch up with men's outcomes. This can be partially attributed to their inability to commute as long as men. On the other hand, men could reap the benefits of structural adjustment and obtain jobs in the private sector by taking longer commutes. Not only did women have lower travel times to work, but also it did not change over time which has put a barrier to access to labor market opportunities. Constrained mobility puts an extra burden on uneducated women who initially face limited labor market opportunities and are trapped in non-wage work (Assaad & Arntz, 2005). The study by Assaad and Arntz is the only empirical research covering commuting time in Egypt's labor market.

One main issue to the relationship between commuting time to work and labor market outcomes is the endogeneity of commuting time. Endogeneity can be caused by omitted variable bias or reverse causality between wages and commuting time. On the one hand, omitted variable bias could be due to failure to control for confounders of the relationship between the two variables (Angrist & Krueger, 1999; Gangl, 2010). For example, failing to control for some important individual characteristics or government-level variables that affect both commuting time and wages and labor supply. On the other hand, reverse causality (also called bi-directional causality or simultaneity) could be the reason for endogeneity (Wooldridge, 2010). This could be explained by showing that wages could affect the travel time to work in two ways. First, if individuals are offered higher wages, they might accept to take longer commutes in exchange for this wage, this shows a positive relationship (French et al., 2020; Ross & Zenou, 2008). Second, some individuals might be living in rich areas with concentration of jobs or choose to relocate nearer to their jobs and hence higher wages might decrease the commuting time to work (Caliendo et al., 2017; Levinson, 1998).

The optimal solution for addressing the endogeneity problem is the instrumental variable (IV) approach. However, given the difficulty of finding good instruments (Wooldridge, 2010), research that depends on this method is limited. As a result, the literature tackling the effect of commuting time has been divided into cross-sectional studies, a few studies that use IV, and studies that use other methods in an effort to tackle the endogeneity of commuting time.

Various papers used cross-sectional methods to estimate the impact of commuting time and distance (Bartus, 2011; French et al., 2020; Ruppert et al., 2009). However, cross-sectional studies cannot claim to estimate a causal effect of commuting time on the labor market outcomes but have only estimated associations. For example, one study tackled the effect of commuting time on annual earnings and hourly wage for youth using cross-sectional data in the United States (French et al., 2020). Using cross-sectional data only estimates associations between the variables and does not solve the endogeneity problem.

Other studies have attempted to use fixed effects estimation and using the relocation of firms as an exogenous source of change of commuting time to assess the effect of commuting on labor market outcomes. Mulalic et al. (2014) have used firms fixed effects and data from Denmark to calculate the effect of change in commuting distance on wages. Another study examined the effect of commuting time on labor supply using firm relocation as a source of changing commuting time (Gutiérrez-i-Puigarnau & van Ommeren, 2014). They estimated this equation using individual fixed effects using British data.

Only a few studies have attempted to use an IV estimation, given the difficulty in finding suitable instruments. Previous literature with IV used the mode of travel, kilometers of roads per capita in the governorate, and car density as instruments (Niebuhr et al., 2012; Russo et al., 2014). However, I argue against using these instruments. These are variables that reflect the city's level of development or the individual's level of wealth. Hence, these instruments affect both the commuting time and labor market outcomes and are eventually endogenous.

While several studies estimated the effect of commuting time on wages or labor supply, results are sometimes mixed, context-specific, or use cross-sectional data. Furthermore, only a few studies addressed endogeneity issues. This raises the need to address these issues using an instrumental variable approach in a panel setup. Against this background, I contribute to this literature through using Egypt Labor Market panel survey, a nationally representative survey, to estimate the effect in a panel setup. In addition, I coupled it with using an IV, namely the number of accidents (I explain in more detail in the Methods section the reasons behind choosing this instrument and why it is expected to be a strong instrument). The number of accidents was never used before in the IV literature, and using a panel IV estimation is expected to take us closer to causal inference.

Using Egypt as a case study, my research contributes to this literature by estimating commuting time's effect on labor market outcomes using panel IV estimations. I try to understand the direction and magnitude of the effect of commuting time on wages and labor supply, particularly by taking a closer look at various measures of labor supply, namely working days, daily, and weekly working hours. So, contrary to the previous literature, I try to understand the effect on multiple labor market outcomes in an effort to provide a comprehensive picture of the effect of commuting time in the labor market. In addition, I provide a gendered analysis by estimating the models separately for men and women.

2.2. Employment transitions effect on wellbeing and mental health

The rise of nonstandard employment raises concerns about job quality. Although nonstandard employment does not necessarily mean bad jobs, what is witnessed in the United States and Europe is that employees in these jobs are worse off than those in standard employment (Kalleberg, 2011). These jobs are insecure, have low quality, and might offer lower wages (Giesecke & Groß, 2003; McGovern et al., 2004). In addition, they might lack legal protection, especially when unionization is limited (Kalleberg, 2011). As a result, job insecurity is increasingly becoming widespread in labor markets (Kalleberg, 2018; Scherer, 2009).

Growing labor market insecurities have increased the research on the effect of these insecurities on individuals, particularly their wellbeing and health. The literature has been focused on the effect of unemployment and becoming unemployed on wellbeing (Gander et al., 2021; Johansson et al., 2020; Kivijärvi et al., 2020; Liu et al., 2017; Rokicka et al., 2018; Voßemer, Gebel, Nizalova, et al., 2018; see Voßemer & Eunicke (2015) for a literature review). Other papers show positive effects of obtaining employment or re-employment or differentiating between permanent and temporary employment on wellbeing (Carlier et al., 2013; Gebel & Voßemer, 2014; Liu et al., 2017). The research focuses on temporary versus permanent employment as the primary labor market segmentation (de Cuyper & de Witte, 2007; Scherer, 2009). Hence, research on unemployment and temporary employment effects on wellbeing is well-documented in the literature for Western countries.

Empirical research on the heterogeneous effect of various types of nonstandard employment is scant, particularly for informal work, youth's wellbeing, and mental health. For instance, three papers considered some aspects of temporary work or informality for the working-

age population. Using panel data, Karabchuk and Soboleva (2020) cover the differentiation between permanent, temporary, and informal employment and their impact on European countries' *wellbeing*. Using cross-sectional data, one paper tackled the differentiation between permanent and temporary work and its effect on several outcome variables, including *life satisfaction* (de Cuyper & de Witte, 2007). They assessed differences across temporary employment (fixed-term employment in this context) using objective and subjective job security measures. They considered tenure with the current employer, expectations about renewing the contract, and preference for the current contract arrangement (to measure whether it is a voluntary choice of temporary employment). Another paper considers the impact of some aspects of non-standard work, mainly temporary, casual, and involuntary part-time or temporary employment, on *mental health outcomes* in Italy using cross-sectional data (Pirani, 2017).

In the literature on wellbeing and mental wellbeing, various measures have been utilized. Most wellbeing research focuses on life satisfaction and general health, with only a few studies focusing on mental illness for the working-age population. Some scholars use the life satisfaction scales to assess cognitive wellbeing (Gebel & Voßemer, 2014; Voßemer, Gebel, Täht, et al., 2018). Others rely on self-reported health (Ciccarelli et al., 2020; Voßemer, Gebel, Täht, et al., 2018). For the mental health outcomes, two outcomes have been used in the literature, namely the prevalence of mental illness through using dichotomized variables (Pirani, 2017).

Focusing on youth instead of the working-age population is crucial given the differences between different age groups in perceptions about career stability (Morgenroth et al., 2021), distinct fear, consequences of losing jobs (Glavin, 2015), and the possibilities of reemployment (de Witte, 1999). However, only two papers focused on mental health outcomes for youth in the Egyptian context. They focused on the number of symptoms that youth witness rather than a binary variable for prevalence (Liu et al., 2017; Sharaf & Rashad, 2020). Specifically, one article focused on the effect of transition in and out of employment on mental health but concentrated mainly on associations and did not differentiate between various types of employment (Liu et al., 2017). The authors conducted the analysis using SYPE panel data for the years 2009 and 2014 and employing ordinary least squares on the first differenced data, including baseline individual characteristics. Employing the same dataset and fixed effects model, the second paper covered upward comparisons of some types of nonstandard employment with full-time formal employment (upward comparison) (Sharaf & Rashad, 2020). The considered nonstandard employment forms

are (1) fixed term-employment that is informal, whether temporarily or irregular basis (such as casual or seasonal basis), and (2) underemployment, mainly part-time employment that is involuntary.

Building on this research, I estimate the causal effect of various types of non-standard employment on youth's mental health in a developing country context. Contrary to the second paper, I conduct the analysis with a downward comparison to nonemployment rather than an upward comparison. The paper by Liu and others captured associations between the number of symptoms and various variables including transitions into and out of employment. In contrast to this paper, I measure the causal heterogeneous effects for various types of nonstandard employment in a matched difference-in-differences setup. In addition, I do not pool all the transitions together but rather estimate each transition separately. This enables me to compare the outcomes of transitioning from nonemployment into several types of employment and capture the differences in the effect of standard versus nonstandard employment.

Furthermore, my research adds to prior literature by examining the impact of employment transitions on new indicators of mental illness. I focus on the extensive margins of mental illness, such as the number of symptoms and prevalence, as well as the intensive margins, such as depth and severity. The literature has been silent about the intensive margins of mental illness. As a result, I contribute to the literature by using several factors that account for the distribution of mental illness beyond the cut-off point/threshold to capture the depth and severity of the mental illness. To sum up, I implement a longitudinal design by using matched difference-in-differences. Combining these two methods allows for eliminating unobservable fixed effects and controlling for observable baseline individual differences. I estimate the impact of various employment transitions (standard and nonstandard employment) on the extensive and intensive margins of mental illness for youth (younger than 30 years old) in Egypt. In addition, I examine the gendered effect of job characteristics depending on panel data from the survey of young people in Egypt.

2.3.   Family formation effects on occupational status

Previous literature has focused on the wage penalties and premiums across major life course events such as the effect of marriage on women (Budig & England, 2001; Budig & Lim, 2016; Dougherty, 2006; Killewald & Gough, 2013; Loughran & Zissimopoulos, 2009). There is almost a consensus about the existence of motherhood wage penalty (Budig & England, 2001; Ejrnæs & Kunze, 2013;

Gangl & Ziefle, 2009; Livermore et al., 2011; Molina & Montuenga, 2009; Petersen et al., 2010; see Cukrowska-Torzewska & Matysiak (2020) for meta-analysis and Gough & Noonan (2013) for a review). The wage disparity continues after childbirth (Avellar & Smock, 2003). The penalty is visible after a period of time rather than immediately after birth (Livermore et al., 2011). The penalty worsens over time for mothers of one child, but the gap is narrowed for higher-order births (Jee et al., 2019).

Contrary to the literature on wage penalties, only a few papers considered the effect on the occupational status or prestige of women, only in developed countries context and mainly on motherhood effect (Abendroth et al., 2014; Aisenbrey et al., 2009; Brehm & Buchholz, 2014; Kahn et al., 2014). The majority of these empirical papers have focused on occupational prestige measures, except for the paper by Abendroth and others. Using panel data setups, the literature has evaluated the effect of career interruption in the United States, Sweden, and Germany (Aisenbrey et al., 2009) and the timing and spacing of children on the occupational prestige in Germany (Brehm & Buchholz, 2014). Using panel data from the United States, Kahn et al. (2014) also studied the effect of motherhood on occupational prestige along with wages and LFP, employing fixed effects models. They mainly measure birth parity by including the number of children and long-term motherhood effects through accounting for age. They found that the occupational motherhood penalty decreases as women age is between the 30s and 40s for all birth parities. Mothers in their 50s have higher occupational prestige than childless women.

Two papers focused on the change in occupational prestige (the change in Treiman's occupational prestige index, SIOPS) due to work interruption. The first paper by Aisenbrey et al. (2009) examines the effect of career interruption due to childbirth on the change in occupational prestige in the United States, Sweden, and Germany, using hazard models. The results differ across countries. A penalty (a downward occupational move) is witnessed in the United States after both short and long-term interruptions. On the contrary, the career interruption negatively affects the upward occupational move in Sweden. The second paper by Evertsson et al. (2016) estimated the relationship between career interruption (due to unemployment, motherhood, or other reasons) and occupational movements, using occupational prestige measures for Germany and Sweden using hazard models. The results differ by country, where there is no significant relationship between the interruption and changing occupational prestige in Germany. On the other hand, in Sweden, the extended length of career interruption negatively affects the upward occupational move. The

authors argue that this difference reflects variation in women's attachment in the labor market where women in Sweden are expected to work while women in Germany exit the labor force after motherhood (Evertsson et al., 2016).

Only one paper has focused on the effect on occupational status as a measure of socioeconomic condition. Abendroth et al. (2014) considered the impact of family expansion on women's socioeconomic status covering 13 European countries. Using fixed-effects methods, they found evidence for occupational status penalty where motherhood results (for the first two children) in a decline of their occupational status compared to women without children. A steeper effect is found for the first child. Differences in public spending to provide childcare across European countries result in differences in motherhood's impact on occupational status. Abendroth et al. (2014) found that higher spending results in a lower penalty. Using time since birth for each child parity, they show the scarring effect of the first birth over the life course.

Research on Egypt has focused on the gender wage gap and effect of marriage on employment transitions. Some papers focused on calculating wage differentials by gender in an effort to uncover the gender wage gap and its determinants (Biltagy, 2014, 2019; Nazier, 2017; Tansel et al., 2020b). They showed that the gender wage gap still exists but is declining over time using decomposition analysis (Biltagy, 2014, 2019) or quantile regressions that highlight the conditional gender wage gap (Nazier, 2017). Furthermore, Tansel et al. (2020b) studied the public-private sector wage gap. Using quantile regression, they found, in the public sector, a wage penalty for men and, in most cases, a premium for women.

Other researchers have focused on the effect of marriage on the employment transitions. For example, Selwaness and Krafft (2020) investigated the effect of the transition to marriage, marriage, and anticipation of marriage on spells of non-employment and employment transitions using retrospective data from ELMPS 2012. They tried to disentangle the factors that lead women to exit employment and employment transitions. While Assaad et al. (2022) investigated the effect of early marriage on the probability of market work using retrospective data from Egypt (ELMPS 2012), Jordan and Tunisia. In general, they found that early marriage results in a reduction of the probability of market work and particularly work in the private sector.

A crucial issue always discussed in the research on the marital premium is selection. If selection into marriage or motherhood is not accounted for, then the estimated effects do not

capture the causality between those life events and labor market outcomes. The aforementioned literature that tackles the effect of motherhood on occupational status used hazard models (Aisenbrey et al., 2009; Brehm & Buchholz, 2014; Evertsson et al., 2016) or fixed-effects models (Abendroth et al., 2014). As shown in the previous section, two papers have used hazard models to estimate the effect of all or child-related work interruptions on the occupational move of women in Germany, Sweden, and the United States (Aisenbrey et al., 2009; Evertsson et al., 2016). On the other hand, Abendroth et al. (2014) considered the impact of family expansion using birth parties on women's occupational status using Fixed Effects. They empirically control for selection based on occupational levels only. This strategy addresses time constant unobserved differences between mothers and non-mothers that are expected to affect the level of occupational status.

However, differences between mothers and non-mothers or married and single women may be based on the growth level of occupational trajectories (Cheng, 2015). Both the level and slope of occupational status trajectory of married and single women may differ before marriage. However, fixed effects methods address only the issue of time-constant unobserved heterogeneity. Research that uses within individual analysis fails to account for selection based on the growth of the occupational status. An issue that has been raised in the literature on marital wage premium discussing that selection into marriage depends not only on the level of wages but also the steepness of the wage trajectories (Cheng, 2015; Loughran & Zissimopoulos, 2009).

Another equally important methodological aspect is the way of introducing the marriage variable. Including marriage as a binary indicator provides an average estimator over the whole period after marriage (Dougherty, 2006; Ludwig & Brüderl, 2018, 2021), which is sometimes referred to as the static approach (Cheng, 2015). This averaging conceals the effect heterogeneity across the life course, i.e., how the effect varies with time after marriage.

In the Egyptian context, it might be necessary to measure the anticipation effect of marriage. Using the distributed fixed effects, I can also investigate the anticipation effect of marriage (up to three years before the wedding).[5] In Egypt, women are found to leave work in anticipation of marriage, mainly one and two years before marriage (Selwaness & Krafft, 2020). In addition to the anticipation effect, we can also measure the short, medium, and long-term impact

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[5] The anticipation effect needs to be interpreted with caution because it might include residues of reverse causality (Ludwig & Brüderl, 2018, 2021).

of marriage on occupational status (i.e., the occupation trajectory over the years). So, I examine the time path of the effect of marriage (years before and after marriage) on occupational status.

To the best of my knowledge, studies tackling major life transitions, especially getting engaged and married on women's occupational status in a developing country context, are non-existent. I build on the previous research in trying to move beyond the use of wages and employment transitions as the main cursors of women's outcomes in the labor market in an effort to understand the effect of marriage and motherhood on occupational status. Specifically, chapter 4 focuses on the change in women's occupational mobility, reflecting their socioeconomic status after major life transitions, including engagement and marriage anticipation as introductory events to the transition to adulthood.

The literature has mainly focused on the effect of motherhood on occupational status or prestige in developed countries. I build on this research by estimating the anticipation and long-term effects of marriage on occupational status. In addition, I investigate the impact of motherhood in a developing country context with a distinct welfare regime, fertility, and cohabitation roles as indicated. Furthermore, contrary to the strand of literature on motherhood penalties, I use occupational status rather than wages as an assessment of the social status of women (Explanation of the choice of this measure in section 4). This provides further insights on the effect of these life events compared to the commonly used outcome (wages).

Next to the abovementioned contributions, my additional contributions to the literature are threefold. First, I estimate the anticipation effect of marriage as it is expected to affect the occupational trajectories of women. This is particularly important where previous research has shown that women transition out of employment or to non-wage work in the years before marriage (Selwaness & Krafft, 2020). Second, I account for the self-selection of women based not only on levels of occupational status but also on its growth through the use of fixed effects individual slopes, an issue that was not addressed in the literature on the effect of marriage and motherhood on occupational status. Third, I capture changes over the life course of marriage rather than averaging the effect of marriage on occupational status.

2.4. Structure, specific research questions, and contribution of the thesis

My cumulative thesis consists of this overview chapter and three single-authored research articles (Chapters 2-4).[6] Chapters 2 and 3 have been published as working papers at the Economic Research Forum (ERF), submitted to journals, and are currently under review, while chapter 4 is currently under preparation for submission. Table 1 provides an overview of the status of each article. Furthermore, during my Ph.D. studies, I have collaborated and published a research paper on job satisfaction.[7] In addition, another manuscript is accepted to be published.[8] It covers the employment transitions of women in the Egyptian labor market. Finally, I was a co-author on a book chapter.[9] Although I did not include these published manuscripts in the thesis, they have shaped my research and competencies during the previous years.

Table 1: Overview of the articles

Chapter	Author	Year	Title	Journal/Status	Published as working papers
2	Ehab, M.	2018	Commuting times: Effect on labor supply and wages	Submitted to *the International Journal of Transport Economics*	Ehab, M. (2018). *The commuting gender gap and females' participation and earnings in the Egyptian labor market* (ERF Working Paper No. 1211). Economic Research Forum.
3	Ehab, M.	2019	Standard or not? The effect of different types of employment transitions on mental illness's prevalence, depth, and severity for youth	Submitted to *the Social Science and Medicine – Mental Health Journal*	Ehab, M. (2019). *Employment transitions of youth and health implications in Egypt* (ERF Working Paper No. 1365). Economic Research Forum.
4	Ehab, M.	2021	Family formation and occupational status: Penalties for women?	Planning to be submitted to *the Journal of Marriage and Family*	

Source: Own illustration.

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[6] Part of my PhD studies was supported by the Bamberg Graduate School of Social Science (BAGSS) through funding by the German Research Foundation (DFG) under the German Excellence Initiative (GSC1024).

[7] Ezzat, A. and M. Ehab (2019). The determinants of job satisfaction in the Egyptian labor market. *Review of Economics and Political Science,* 4(1), pp. 54-72.

[8] Ehab, M. (*Forthcoming*). Women's employment exits in Egypt: The roles of marriage, children, job characteristics, and women's empowerment. *Middle East Development Journal (accepted).*

[9] Selwaness, I., and M. Ehab (2022). Social protection and vulnerability in Egypt: A gendered analysis. In C. Krafft and R. Assaad (Eds.). *The Egyptian labor market: A focus on gender and economic vulnerability.* Oxford University Press.

In Chapter 2, *"Commuting times: Effect on labor supply and wages,"* I investigate the main research question: what is the gendered impact of commuting time on the labor market outcomes? In particular, what is the impact of commuting time on wages and working hours? Does the effect differ by gender? This paper provides new insights into the effect of travel time to work. It is motivated by the importance of time poverty, especially for women burdened by care and household work (Nazier & Ezzat, 2021). For several reasons, women tend to have shorter commutes. The longer commutes are seen in the literature as a way to access a broader range of job opportunities with higher wages (Assaad & Arntz, 2005; Gimenez-Nadal & Molina, 2016)

The aim of Chapter 3, *"Standard or not? The Effect of Different Types of Employment Transitions on Mental Illness's Prevalence, Depth, and Severity for Youth,"* is to answer the central question: What is the gendered effect of transitioning to standard versus nonstandard employment on the mental health outcomes of youth? Four specific research questions are posed: (1) what is the effect of transitioning to various employment statuses on youth's mental health in Egypt? (2) whether temporary jobs, more than informal ones, have integrative potential by improving non-employed workers' mental health, or variances of low-quality jobs similar to irregular jobs (i.e., seasonal or casual jobs) which may have detrimental consequences on the mental health of youth? (3) are there differences in the effects of mental illness prevalence, depth, and severity? Finally, 4) what are the differences in the impact between men and women?

Chapter 4, *"Family Formation and Occupational Status: Penalties for Women?"* addresses the main question: what is the effect of family formation events on the occupational status of women? Specifically, three specific research questions are answered: (1) How do women's careers develop before and after marriage and childbearing in Egypt? (2) How does the effect of motherhood differ by the number of children (parity-wise effects)? (3) What is the effect of specific mechanisms that explain the relationship between these life events and occupational status? I mainly study the effect of the experience years on the women's occupational mobility (human capital depreciation hypothesis) and the effect of specific job characteristics (compensating differentials) like work stability and the employment sector. This paper disentangles the effect of engagement, marriage, and childbearing on women's occupational status.

The three papers in this thesis, as mentioned in section 2, build on the limitations of earlier studies to make specific contributions to their corresponding fields of research. In section 1, I

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highlighted the importance of studying the labor market and health outcomes for women and youth as groups that suffer from labor market disadvantages. Three general contributions can be discerned in addition to the importance of the topic and the specific contributions.

First, I examined labor market inequalities focusing on the labor market and health outcomes using a set of innovative variables. The previous subsections show that I try to tackle these topics by utilizing different variables. In Chapter 2, the suggested instrumental variable has not been used in the transport literature before. Chapters 3 and 4 examine several variables that show the complete picture of labor market disadvantages. Contrary to the strand of literature that focuses on wages and life satisfaction, I used health outcomes and occupational status to provide a full picture of the status of women in the labor market. Precisely, in Chapter 3, several measures capture the health outcomes. I used measures that reflect the intensive and extensive margins of mental illness. The intensive margins of mental illness have not been applied before in the wellbeing literature. Using occupational status in Chapter 4 to capture the marriage premium or motherhood penalty was rarely used in the literature and mainly not explored in the Egyptian literature. Section 4 provides a detailed explanation of the conceptualization of both the dependent and the independent variables.

Second, I used causal analysis methods that reflect state of the art (explanation of the methods in section 4). These are selected in light of the research topics and hypotheses that were theoretically derived. Chapters 2 and 3 use prospective panel data, while Chapter 4 depends on retrospective life and work history data. The causal analysis methods are chosen to address endogeneity issues, such as selection, reverse causality, and omitted variable bias. The methods used are panel data methods or quasi-experimental methods, specifically instrumental variable regressions, distributed fixed effects, and fixed effects individual slopes and matched difference-in-differences. Section 4 discusses these methods in detail, including their main assumptions and limitations.

Third, I utilized well-established and profound longitudinal data sets to examine the research questions in a developing country context. Availability of such data is considered a privilege for Egypt as a developing country. In section 4, I show the strengths of the ELMPS (used in Chapters 2 and 4) and the SYPE (used in Chapter 3). Furthermore, studying these specialized topics in a developing country rather than a developed country is essential. As shown in section 1, there are differences in life course transitions, widespread use of nonstandard employment, and

wide gender gaps in time use. This situation renders the necessity of conducting this research in the context of Egypt as a case study.

3. Theory and Hypotheses

3.1. The labor market outcomes of commuting time

3.1.1. The effect of commuting time on labor supply

The starting point in analyzing any time-use research is that individuals have limited time in a given day or week. Consumption of goods or use of time can be considered choices. Individuals have a set of preferences for consumption and choices. So every preference is ranked by the individual to reflect their level of satisfaction with such a choice. Individuals try to maximize their utility function in a particular period (Fishburn, 1968). The maximization of the utility function comes with the constraint of available time.

Commuting time is seen as a fixed cost of lost time needed to travel to and from work. This cost increases as individuals live further away from work. In other words, the increase in commuting time is reflected in the commuting costs. According to Cogan (1981), fixed costs are an essential determinant of labor supply and reservation hours. These commuting costs are considered an inevitable cost that the individual has to pay daily, which as a consequence increases the individual's reservation hours of work. Figure 1 summarizes the theoretical mechanisms that explain the effect of commuting time on labor supply.

Gender differences are expected in the effect of commuting time on labor supply based on disparities in the labor market and housework. According to Becker's theory of time allocation, individuals make these decisions regarding time use and labor supply at the household level (Becker, 1965). However, the same concepts can be similarly applied on the individual level. For example, Becker's specialization and comparative advantage theory states that, in the household, the individual that has lower wages is expected to contribute more to the household work. On the other hand, the partner with higher wages is expected to contribute more to the market work. The assumption is that the former are women while the latter are men. As a result of women's household responsibilities, there are more demands on their time due to their increased responsibilities at home next to their market work. Hence, their response in the labor market to an increase in the commuting time might be to work less. This trade-off is seen as a way to preserve time for other activities that are deemed necessary. In addition, the response of female work time

is expected to be more sensitive to changes in commuting costs than men. According to the specialization theory, men would specialize in market work. Therefore, men are expected to be more willing to spend more time at market work to compensate for the increase in commuting costs. This is the opposite for women, who are less inclined to spend more time at work due to increased commuting time. Within this framework, my first hypotheses would be that an increase in time spent on commuting time is expected to decrease the labor supply for women (H1a) and increase the labor supply for men (H1b).

Figure 1: The causal effect of commuting time on labor supply
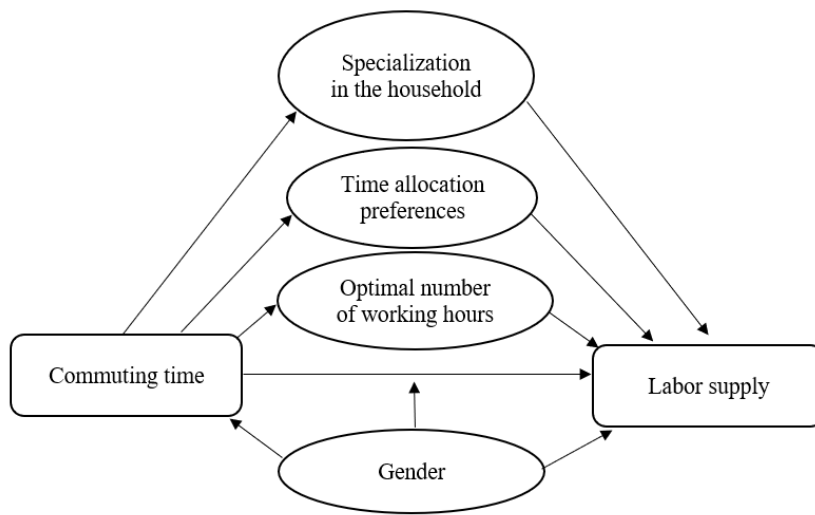
Source: Own illustration.

3.1.2. The effect of commuting time on wages

Commuting time and costs are expected to influence the individual's reservation wage (Cogan, 1981). In addition, they are considered a primary determinant for accepting a job offer. The higher the commuting time means fewer time individuals have for leisure and work. This means that this loss of time has to be compensated by higher wages, given the diminishing marginal utility of leisure consumption (White, 1986). In addition, high commuting costs might result in rejection of the job and choosing a more proximate job (van den Berg & Gorter, 1997). This is in line with what is mentioned previously: travel time to work is considered a fixed cost that needs to be minimized (a dis-utility). However, Mitchelson and Fisher (1987) see commuting, contrary to migration, as a mechanism that brings wages and income to regional equilibrium (such as a utility). Commuting allows people who do not have access to nearby jobs to accept distant jobs by

commuting longer. In addition, Bunting (1956) explains that commuting performs a crucial function in local labor markets, setting wages to an equilibrium (Figure 2).

Against this background, commuting time is considered a fixed cost for both men and women. This is a cost that cannot be avoided. Therefore, they are willing to take longer travel times to work in exchange for higher wages. A concept explained in the literature is the willingness to pay for commuting time (le Barchanchon et al., 2021). This means how much they are willing to accept as a wage for a shorter commute. Women value shorter commutes higher than men, where the rate of value of commuting time of gross hourly wage is at 98% compared to 80% for men (le Barchanchon et al., 2021). So, an increase in commuting time is expected to increase the reservation wage and finally the actual hourly wage for both men and women, but I expect that the increase for women will be higher given their higher willingness to pay for a shorter commute. This leads to the second hypothesis. H2: An increase in commuting time would result in higher wages for both men and women, but the effect is expected to be larger for women.

Figure 2: The theoretical mechanisms explaining the effect of commuting time on wages
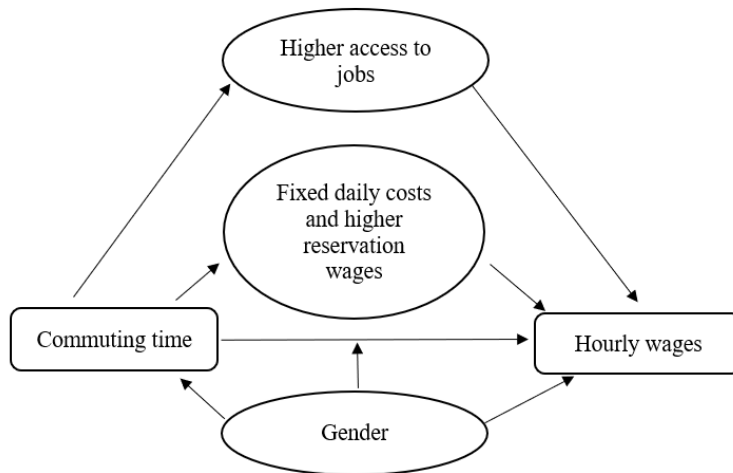
Source: Own illustration.

3.2.   The mental health consequences of non-standard employment

Individuals make several transitions in their life course; one is transitioning to a job. It is considered part of the transition to adulthood. School-to-work transition or transition to a job from unemployment is a central part of youth's life course (Hogan & Astone, 1986). It brings a sense of responsibility, financial independence, and autonomy. However, it can be a source of stress,

especially with high levels of job insecurity. Job insecurity has become a widespread phenomenon in labor markets due to the extensive use of non-standard employment (Kalleberg, 2018).

Nonstandard employment can cover not only temporary employment but also seasonal and casual jobs (de Cuyper et al., 2008). The nature of these jobs lends itself to poorer job characteristics than permanent employment (Warr, 2017). For example, these jobs lack stability and security (Sverke et al., 2006). They are also more prone to poor working conditions, including high working hours, hazardous work situations, and a higher risk of occupational injuries (Benach et al., 2004; Benavides et al., 2006; Fabiano et al., 2008). These conditions are likely to affect the individual's psychological health negatively.

Several theories explain the relationship between work and psychological health (Figure 3). The concentration here is mainly on two theories where job insecurity is part of them: the job strain model developed by Karasek (1979) and the job demands-resources model (JD-R) developed by Bakker & Demerouti (2007) and Demerouti et al. (2001). The JD-R explains the effect of job insecurity by dividing the job characteristics into job demands and resources. Job features and conditions such as job insecurity and job demand levels are two potential explanations for the negative effect of work on mental health. My research particularly considers the effect of employment in general and standard and non-standard employment as changes that affect work conditions. The varying working conditions between standard and non-standard employment can be seen as stressors for individuals working in the latter and finally affect mental illness.

Job insecurity means that individuals are falling under the threat that their employment might be terminated against their will, which gives a sense of powerlessness and inability to continue in a job (Greenhalgh & Rosenblatt, 1984). According to the job strain model, this low job security level is called low job control. The low job control comes from a higher risk of job loss, lack of income, and a necessity to secure a job afterward, increasing individual stress levels (Clarke et al., 2007; Ferrie et al., 2008). According to the job demands-resources model, job resources cover the rewards that the individual receives from a job, including wage, opportunities to be promoted and supported by colleagues, and level of job security, among others. The lack of these resources leads to disengagement and subsequently stress, increasing mental distress. These various factors of job strains and job resources affect the wellbeing of individuals and are expected to increase the mental distress they witness.

The problem is exacerbated in nonstandard employment, characterized by a low level of job security (Sverke et al., 2006; Warr, 2017). Heightened levels of job insecurity can be due to the absence of the contract in the informal jobs or the fixed-term nature of employment (employment that runs for a short and predetermined term) (Benach et al., 2004). Hence, individuals working in these jobs are subjected to low levels of job control with a high expectation of job loss. The anticipation of job loss is higher for informal employment since they work without a contract. Given the lack of insurance, any health issues (whether due to work accidents or illness) could result in the loss of their jobs and their inability to find future employment. In fixed-term employment, they are at risk that their contract can be terminated or renewed. Hence, I expect that those working in informal employment would have lower mental health outcomes than those working in fixed-term employment. In addition, differences are expected between temporary, seasonal, and casual workers. Temporary workers are expected to see higher mental health benefits than seasonal and casual workers, given the longer duration of employment for temporary workers. On the other hand, individuals working in permanent or formal employment have a high level of job security. This means they are not at risk of losing their jobs and have better expectations for the future. Hence, they have higher job control and resources, reflected in fewer stressors at work and thus better mental health.

Figure 3. An explanation for the relationship between work and mental health
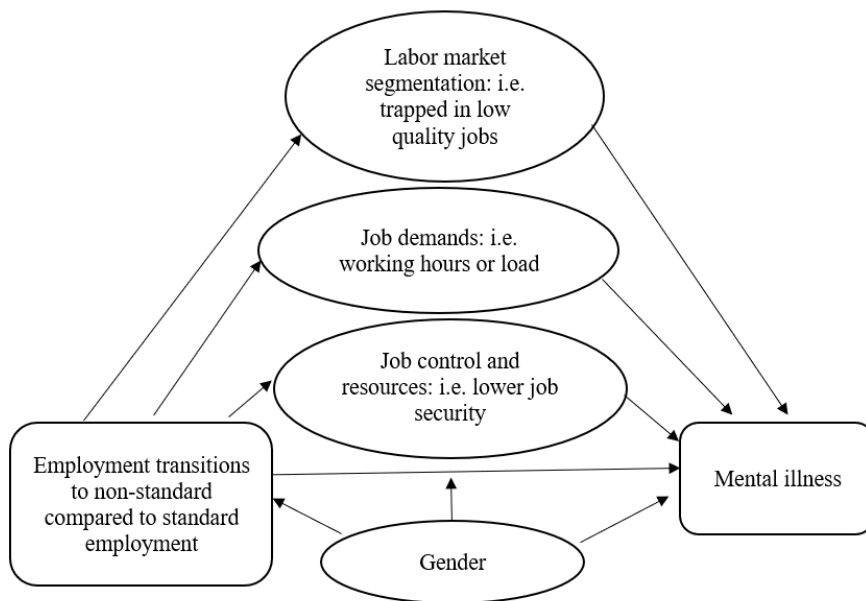
Source: Own illustration.

The effect of employment on mental health can be further explained through the mechanism of poor working conditions. Again, this could be explained by the job demands aspect in both the job strain model and the job demands-resources model. Job demands reflect what is required in the job and how that puts pressure on workers and leads to exhaustion. One can understand the job requirements as the workload, the number of working hours, or working in a hazardous environment (Bakker & Demerouti, 2007; Demerouti et al., 2001; Karasek, 1979).

One form of nonstandard employment is working informally. Informal workers are not covered by the labor law nor insured by health or social insurance. This can be reflected in the working conditions and the job demands. For example, individuals working in these jobs can witness frequent overtime work and hazards in their workplace. Given the informal nature of these jobs, this overtime can be unpaid. In addition, the heightened probability of accidents and the consequences on their physical health are not insured on the health level or the social security level. As a result, individuals working under such job demands would be more prone to stress and consequently suffer more mental illnesses. On the other hand, when the job is formal, various laws protect the employees, particularly labor laws and regulations, which in most cases provide them with reasonable job demands and hence are not under constant pressure.

This combination of low job control and high job demands is considered a source of stress in employment (Karasek, 1979). In addition, as Siegrist (1996) suggests, if there is an imbalance between effort and reward, the individual might witness psychiatric disorders. Security is one of the reward channels that Siegrist identified. Hence, transitioning to nonstandard employment is expected to affect workers' mental health negatively.

The mental health effect of transition from non-employment to various employment situations is identified by comparing those in different employment situations to those in non-employment. On a scale of job security, non-standard employment is between non-employment and permanent employment (de Cuyper et al., 2008; Taht et al., 2020). The former represents the highest job insecurity, and the latter represents the most secure job. Suppose the outcomes of those in non-standard employment are compared to permanent employment. In that case, this is an upward comparison. Alternatively, if nonstandard employment is compared to non-employment, this is considered a downward comparison (Gebel, 2013). The paper considers only the downward comparison since non-employment, rather than permanent employment, is the most prevalent state for young workers (Barsoum et al., 2014).

Against this background, the first hypotheses are H1: On average, becoming employed compared to remaining non-employed increases the mental health of the young workers. H2: The transition from non-employment to non-standard employment results in lower mental health rewards from finding a job where those in informal employment are expected to have the lowest level of mental health rewards compared to the formally employed, and those who have seasonal, casual employment are expected to have worse mental health than temporary employment, while the three are expected to be inferior to permanent employment regarding the mental health rewards.

When labor market and housework inequality are prevalent, a gendered effect of employment on mental health is expected (Strandh et al., 2013). Varying gender roles across countries in particular and their evolution over time will result in a different impact of employment on the wellbeing of men and women (Hammarström et al., 2011; Reneflot & Evensen, 2014; Strandh et al., 2013). The traditional gender roles indicate that men are the breadwinners while women are the housemakers. These gender roles result in unemployment negatively affecting men more than women (Jahoda, 1982). Men are expected to have the highest benefit from the transition to employment, given their role as primary breadwinners. This also means that women, regardless of their employment status, act as the primary housemakers. So, the fear of losing a job and insecurity consequences is less pronounced for women than men. Men would value their transition to employment more than women, given their household situations as the primary earner and economic security source (Morgenroth et al., 2021). Based on this, I expect gender differences in the impact of transitioning to employment. In particular, H3: On average, the transition from non-employment to employment has a larger positive mental health effect for men than women.

Women might be forced into jobs that are non-standard in nature, namely involuntary part-time work or temporary employment (Menéndez et al., 2007). According to Becker's theory of the gendered division of labor, women are the primary housemakers regardless of their employment status. This means that women are under pressure to reconcile work and family, which puts extra pressure on them. If women are working in non-standard employment, they will be under further stress of irregular working hours and worsening working conditions which is expected to affect their mental health compared to men negatively. In addition, they will have a heightened fear of losing their nonstandard jobs when they become mothers. They always fear that their employment will not be renewed after the maternal leave (Morgenroth et al., 2021) or due to repeated career breaks and interruptions (Hipp, 2020). Furthermore, working in informal employment will worsen

the situation for women because they are not entitled to health insurance, social security, or maternity leave. Consequently, their risks are higher, putting a further negative burden on their wellbeing in such insecure jobs that are not governed by the law.

As a result, gender differences are expected in the effect of transitioning to non-standard employment on wellbeing. The final hypotheses are H4a: The transition from non-employment to non-standard employment results in less mental health reward for women than men. H4b: The transition from non-employment to formal employment is expected to have the highest mental health reward for women compared to men.

3.3.   Family formation effect on women's occupational status trajectories

Four main supply-side theories explain women's labor market outcomes after marriage and motherhood (Figure 4): (1) the household specialization, (2) the fixed endowment of effort, (3) the accumulation of human capital, and (4) compensating differentials. According to these supply-side theories, marriage and motherhood are major life-course transitions that might negatively affect women's labor market outcomes, namely occupational status.

Becker's household specialization theory builds on comparative advantage differences where each member in the family specializes in the task they perform better (Becker, 1981). As a result, men specialize in wage work while women dedicate their time to housework. Based on this theory, I would expect women's occupational status to be negatively affected after marriage. However, contrary to this distribution of responsibilities, previous research has shown a marriage wage premium for women (Budig & England, 2001; Budig & Lim, 2016; Killewald & Gough, 2013). This means specialization is relatively asymmetric (Budig & Lim, 2016). Budig and Lim built on Becker's specialization theory and suggested that women will specialize in household work and work in the labor market simultaneously. This gives rise to the notion of "double shift" that working women face in their everyday life.

Figure 4. Theoretical mechanisms for the relationship between marriage, motherhood, and occupational status
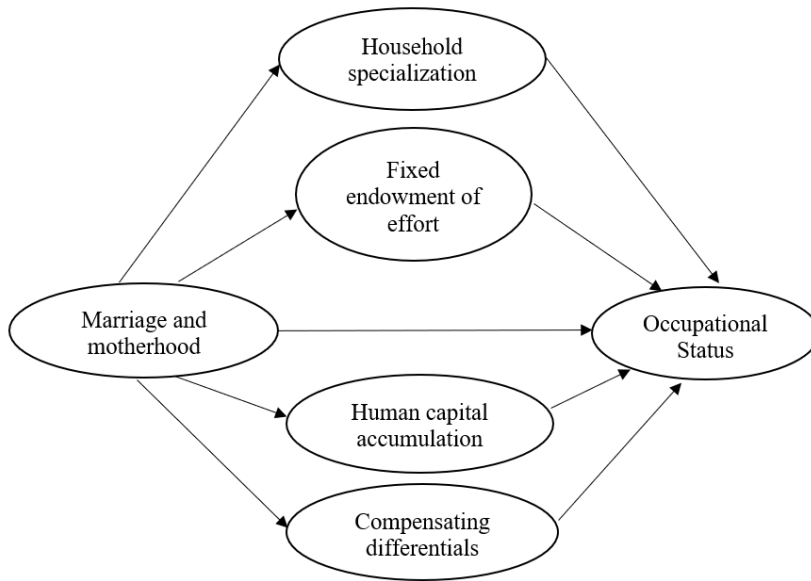
Source: Own illustration.

Based on Becker's theory of specialization and Budig and Lim's asymmetric specialization theory, married women and mothers will spend more time on household work and child care independent of their employment status (Budig & Lim, 2016). According to work effort theory, each individual has a fixed endowment of effort to spend on various activities (Becker, 1985). As a result of marriage and motherhood, women's fixed endowment of effort would be depleted in these care activities. The result is lower effort available for work which might translate into lower productivity at work and eventually less career mobility and promotion, all else constant. Hence, women accept jobs that can help them reconcile work and family even if these jobs do not provide them with the same occupational status as before childbirth. Hence, based on asymmetric specialization and depleted energy levels, the first hypothesis (H1) is that getting married will negatively affect women's occupational status. The second hypothesis (H2) states that transitioning to motherhood will result in a decline in their occupational status. This situation is worsened with the increase in the number of children, which puts an extra burden on women's limited resources of time and effort. Hence the third hypothesis (H3): The reduction in occupational status will be more pronounced with the increase in the number of children.

Over the years of marriage, husbands deviate toward a traditional gender division of household work (Grunow et al., 2012). This is reflected in the decline in the number of hours husbands spend on housework. The reduction in husbands' housework is more pronounced after childbirth. This change in the division of labor throughout the marriage is expected to put an extra burden on working women. As the double burden increases, they will have less leisure time. This will be reflected in their effort level and eventually on their work performance and career mobility. This leads to the fourth hypothesis (H4): the marriage penalty to occupational status will be more pronounced over the years of marriage.

One adaptation strategy followed by women is opting for flexible jobs. However, these flexible jobs do not necessarily offer wages or occupational status women aspire to. These jobs instead reflect a trade-off between compensation and flexibility. This is referred to as the compensating differential theory (Filer, 1985). In the Egyptian context, this flexibility in the working conditions is provided in the public sector employment (Assaad & Barsoum, 2019; Barsoum, 2020). Employment in the public sector is mainly formal and permanent, with a sound hierarchal system, allowing a chance for career advancement that is suitable for married women and working mothers (Barsoum, 2020). Hence, H5a: Employment in the public sector compared to the private sector is considered one of the mechanisms that explain the negative effect of marriage and motherhood on occupational status; women employed in the public sector can easily reconcile family and work, and hence have better occupational status after motherhood.

The human capital theory can be employed to explain the motherhood penalty (Becker, 1985). After giving birth, mothers interrupt their work experience in the form of maternity leave. Maternity leave, which might be deemed necessary for women and children, would result in prolonged work interruptions, lower work experience levels, and depreciation of human capital than single women or married women without children. This phenomenon is what Becker calls a reduction in the accumulation of human capital, both general and specific. This experience reduction leads to slow mobility in the occupational status, if not downward mobility. This leads to the fifth hypothesis (H5b): the stagnation in the years of accumulated work experience is one of the mechanisms that explain the negative effect of motherhood on occupational status.

3.4. Theoretically-driven hypotheses for the three chapters

Table 2 summarizes the hypotheses for the three papers. In particular, chapter 2 examines the effect of commuting time on labor market outcomes differentiating between men and women. The gendered impact of non-standard employment for youth is the focus of chapter 3. Finally, in chapter 4, the aim is to examine the effect of family formation on the occupational status of women.

Table 2: Overview and summary of the theoretical background, mechanisms, and hypotheses

Chapter	Theoretical background	Treatment (T) and outcome (O) variables	Hypotheses
2	Utility theory, allocation of time, and reservation wages	T: Commuting time O: Labor supply and hourly wages	H1a and H1b: An increase in time spent on commuting time is expected to decrease the labor supply for women (H1a) and increase the labor supply for men (H1b). H2: An increase in commuting time would result in higher wages for both men and women, but the effect is expected to be larger for women.
3	Job strain model and Job demands-resources model	T: transition to unconditional employment and to various employment statuses O: Mental illness	H1: On average, becoming employed compared to remaining non-employed increases the mental health of the young workers. H2: The transition from non-employment to non-standard employment results in lower mental health rewards from finding a job where those in informal employment are expected to have the lowest level of mental health rewards compared to the formally employed, and those who have seasonal, casual employment are expected to have worse mental health than temporary employment, while the three are expected to be inferior to permanent employment regarding the mental health rewards. H3: On average, the transition from non-employment to employment has a larger positive mental health effect for men than women. H4a: The transition from non-employment to non-standard employment results in less mental health reward for women than men. H4b: The transition from non-employment to formal employment is expected to have the highest mental health reward for women compared to men.
4	Household specialization theory, the theory of fixed endowment of effort, human capital accumulation, and compensating differentials theory	T1: Marriage T2: Motherhood O: Occupational status	H1: Getting married will negatively affect women's occupational status. H2: Transitioning to motherhood will result in a decline in their occupational status. H3: The reduction in occupational status will be more pronounced with the increase in the number of children. H4: The marriage penalty to occupational status will be more pronounced over the years of marriage. H5a: Employment in the public sector compared to the private sector is considered one of the mechanisms that explain the negative effect of marriage and motherhood on occupational status; women employed in the public sector can easily reconcile family and work and hence have better occupational status after motherhood. H5b: The stagnation in the years of accumulated work experience is one of the mechanisms that explain the negative effect of motherhood on occupational status.

Source: Own illustration.

4. Research designs

The quantitative research design is used in this thesis to reach causal explanations for the posed research questions. Section 4.1 introduces the data and samples used, followed by the independent variables in section 4.2 and the dependent variables in section 4.3. Section 4.4 gives a thorough background of the used causal analysis methods, different choices, assumptions, and limitations.

4.1. Data and samples

This section introduces the data and the main variables used in the empirical analysis to answer the main research questions in the three papers. As shown in Table 3, various data sets have been used in the analysis depending on each article's data needs. For each article, the justification for the choice of specific datasets is provided.

For all the papers in this thesis, panel microdata has been used. Different levels can be covered in panel data, namely micro (individual level), meso (firm-level), and macro (country-level). In this thesis, I use microdata on the individual level to estimate the causal relationships in question. Panel microdata covers the same individuals over several time periods.

Table 3: Roadmap of the Research designs

Chapter	Data used	Sample	Main independent variable	Outcome variables	Methods
2	ELMPS 2006, 2012 Accidents statistics from CAPMAS	Wage workers, men, and women	Commuting time is measured as the time taken to travel from home to work in minutes	Four measures of labor market outcomes: - Log of hourly wage - Daily working hours - Weekly working hours - Working days	FE, FEIV, RE, REIV
3	SYPE 2009, 2014	Individuals who transition between non-employment to employment, young men and women	Transition to various types of employment: - Unconditional - Permanent - Temporary - Seasonal or casual - Formal - Informal	Three indicators of mental illness - Prevalence - Depth - Severity	Propensity score-matched difference-in-differences

4	ELMPS 2018	Women who have either participated in wage work or non-wage work for at least two years	An impact function covering the years to and from marriage	Occupational status measured using International Socio-Economic Index of occupational status (ISEI-08)	Distributed FE, FEIS

Source: Own illustration.

Labor market panel surveys are available for Egypt, namely ELMPS and SYPE (Assaad & Krafft, 2013; Krafft et al., 2021; Roushdy & Sieverding, 2015). These surveys are longitudinal, which allows moving towards estimating a causal effect. As will be shown in this section, the questions in these surveys are elaborate and address the main issues that I want to study in the thesis. Since the thesis aims to discuss the causes and impact of labor market inequalities in Egypt, these datasets are seen as the best match to address the research questions.

ELMPS has four waves of data, fielded in 1998, 2006, 2012, and 2018. The survey is conducted collaboratively by the Economic Research Forum (ERF) and the Egyptian Central Agency for Public Mobilization and Statistics (CAPMAS). ERF's Open Access Microdata Initiative (OAMDI) provides access to the data (OAMDI, 2019). Two main questionnaires are the primary parts of the various waves: a household questionnaire and an individual questionnaire. Refresher samples are added in every wave for two main reasons: (1) to sustain a representative sample and (2) to capture a certain trend. In the wave of 2012, the focus was on international migration, whereas the refresher sample was focused on areas with high migration. In the wave of 2018, the focus was on economic vulnerability in the poorest areas, particularly oversampling in the impoverished villages (Assaad & Krafft, 2013; Krafft et al., 2021). The 2018 wave included several alterations in the individual questionnaire, namely adding more questions in the health module, adding an attitudes module, and improving the accuracy of retrospective data in the labor market history module (Krafft et al., 2021).

Comparability between ELMPS, labor force surveys (LFS), and Egypt Population Census is conducted by Krafft et al. (2021). In general, in most aspects, ELMPS, LFS, and the census are comparable with similar trends for the variables studied. Differences between the survey are in several aspects. First, the universes are marginally dissimilar where ELMPS excluded the Frontier Governorates, unlike the LFS and the census. However, the frontier governorates are characterized

by a small population which represents, in 2017, 1.7 percent of Egypt's population. Hence, excluding these governorates is assumed not to affect the comparability. The second difference is seen in the labor market participation comparing ELMPS and LFS due to discrepancies in unemployment and underemployment. This can be attributed to differences in the fieldwork strategy of both surveys. The LFS depends on one individual to answer the questionnaire for the whole household (i.e., a proxy individual), while the contrary happens in ELMPS where the labor market data is gathered from each individual (Assaad & Krafft, 2013). The industry of employment is the third area of difference. LFS reports a larger number of female wage workers in the agriculture sector and fewer women in the non-wage work in the same sector. This discrepancy might be due to mixing up the answers to employment identification questions on non-wage work and market work. Finally, the share of young people is higher in LFS, which could be another reason for the slight discrepancies between ELMPS and LFS. The comparability of ELMPS with other nationwide surveys in Egypt provides evidence on the quality of the dataset and its suitability for conducting labor market analyses.

SYPE is a panel survey consisting of two waves. It covers several aspects of the state of young people in Egypt, including various topics, ranging from individual characteristics, labor market characteristics to health modules and political participation. The first wave of the survey was fielded in 2009 in collaboration between the Population Council (responsible for questionnaire preparation and data management) and the Information and Decision Support Center of the Egyptian Cabinet of Ministers (IDSC). The second wave in 2014, targeting the same sample of 2009, was conducted in collaboration between the former and CAPMAS (Roushdy & Sieverding, 2015).

Both waves of SYPE are nationally representative samples covering all the Egyptian Governorates, including the Frontier Governorates and the informal districts (slums) in Urban regions. The number of youth interviewed in wave 2009 is 15,029; out of these, 72.6 percent are followed in wave 2014. The reason behind the attrition was household unit non-response (9 percent) and the inability to track respondents who had relocated (14 percent). The age of respondents ranges between 10-29 years old and 13-35 years old for 2009 and 2014, respectively. While the wave of 2009 included mainly three questionnaires for the individual, household, and community levels, on the other hand, the wave of 2014 consisted of one questionnaire with

branching and routing questions (Roushdy & Sieverding, 2015).

Chapter 2 (Article 1) depends on data drawn from two waves of ELMPS: 2006 and 2012 ELMPS 2006 and 2012, including 8,351 and 12,060 households comprising 37,140 and 49,186 individuals, respectively. The sample of 2012 includes 77 percent of the 2009 sample and 20,416 new individuals (Assaad & Krafft, 2013). Both waves incorporate various individual and household characteristics, labor market outcomes, job satisfaction, and travel time to work. Given its representativeness and the availability of the data, this data set is the most suitable for the first paper's analysis.

The analytical sample is restricted to only wage workers, given that wages, one of the primary outcome variables, are not recorded for other employment statuses in the survey.. Removing the non-wage workers (namely, employers, self-employed, unpaid family workers, and unpaid workers for others) leaves us with a sample of 12,209 individuals.

To capture the number of accidents on the road, the ELMPS data set is merged with data from CAPMAS for the number of accidents on the governorate level (more details on the reason for using this variable in the following subsection). CAPMAS issued an annual report on car and train accident statistics until 2015. This report includes a statistic on the number of car accidents for each Governorate.

Chapter 3 (Article 2) depends on the panel data of SYPE for the years 2009 and 2014 to examine the change in health outcomes for the same group of individuals over time. The data was extracted from the ERF data portal (OAMDI, 2017). In order to capture the transitions to employment, the analytical sample included those who managed to make a transition out of non-employment. The non-employed are those in unemployment or inactivity but are not in education. This restriction resulted in a sample of 2,561 individuals. To account for attrition, the weights are used to calculate the descriptive statistics and were used in a robustness check of the estimations of the model (For more information, see Article 2's methodology).

This data set is the best to be used in the data analysis. It covers essential areas of the situation of youth in Egypt particularly, the transition to employment, and the health module that describes the health situation of the young people in Egypt. It also covers the necessary background information of the individuals required for the analysis. SYPE was better suited for the analysis than the ELMPS for two reasons. First, the spectrum of the mental health questions is limited and

was only introduced in 2018, which does not allow for panel data analysis. Second, the health module in the SYPE is extensive, including a self-reporting questionnaire of 20 questions to identify mental disorders (The following subsection includes more details on the questionnaire).

Chapter 4 (Article 3) depends on the retrospective data from ELMPS 2018 examining the relationship between family formation and occupational status. Answering this research question requires a detailed labor market history and life events with marriage and motherhood. In this regard, ELMPS 2018 is the best-fitting data set since it includes questions on work history, individual, work characteristics, and main life events. In addition, person-year observations are created using retrospective questions. Furthermore, some macro variables are included to capture the period-specific effects (The World Bank, 2021).

The sample is restricted to women who have participated in wage work or non-wage work for at least two years. This means that women who worked only for one year or were constantly unemployed or inactive during the observation period are excluded from the sample. As a result of these restrictions, the analytical sample covers 612 women with 6,601 person-year observations.

The accuracy of the retrospective data is reliable regarding transitions between specific and well-articulated employment states like public, private wage work, and non-wage work (Assaad et al., 2018). However, the bias is usually higher among unclear categories like employer and self-employed. Fortunately, I do not depend on these categories in the analysis. Another area where recall bias is high is regarding the non-employment spells scattered across the individual's trajectories.

ELMPS wave of 2018 followed the recommendations by Assaad et al. (2018) to improve the retrospective questions and recall accuracy and reduce bias. The questionnaire design for the retrospective questions asked the labor market trajectories questions in chronological order starting with questions on labor market entry and first job. In addition, the non-employment questions are asked separately to avoid underreporting or misinterpreting this labor market status.

4.2. Independent variables

In the following subsections, I start first by introducing the independent variables used in the three Articles, followed by the dependent variables. Then, whenever necessary, I present the various definitions of the variables, the reason behind selecting a specific definition (in the case of multiple definitions), and the operationalization of the variables. The main independent and treatment

variables are used interchangeably in the following sections. Similarly, the dependent and outcome variables are also used to mean the same thing.

4.2.1. Commuting time

Commuting to work differs from commuting to other leisure activities. Travel time to work happens on a daily basis, cannot be avoided, and consumes a lot of time and money (Chatterjee et al., 2019). In the first article, I estimate the effect of commuting time on various labor market outcomes. I have chosen to use commuting time as a measure of commuting costs. The costs of commuting consist of monetary costs and time. Commuting time is said to be a better measure of the commuting costs than the commuting distance. This is based on the assumption that the time lost in commuting is the main component of travel cost (Gutiérrez-i-Puigarnau & van Ommeren, 2014). Furthermore, commuting time is mainly a function of the mode of transportation and distance (Laird, 2006).

Commuting time is measured as the time taken to travel from home to work in minutes per single trip. In the ELMPS questionnaire, commuting time is a recall question. In general, recall questions are perceived as not precise compared to time-use diaries. However, individuals usually remember perfectly how much time, on average, they spend every day traveling from home to work. Hence, recall bias does not affect commuting time data (Ruppert et al., 2009).

There is a gender difference in commuting time in Egypt, where males commute for 34.8 minutes on average compared with 23.4 minutes for females in 2012, a gap of 11.4 minutes on average for a one-way trip. This is in line with the literature (for example, Neto et al. (2015)). Furthermore, these differences are present by marital status. Married women have lower commute times than single and widowed/divorced women. Single and widowed/divorced women have similar commuting times. However, married men have the highest commute times, followed by single men, while widowed/divorced men have the lowest commute time.

This study uses the number of accidents on the road as an instrumental variable (IV) to tackle this endogeneity problem. The IV is meant to proxy for the commuting time. The number of accidents is defined as accidents resulting from the unintentional collision of vehicles that results in at least one of these: death, injury, or ruin in the car. This Governorate level data is retrieved from CAPMAS. Out of 27 governorates, 22 are represented in the ELMPS (Assaad &

Krafft, 2013). The governorate is the second unit after the national level (Assaad, 2002). The number of car accidents in 2012 was 15,516 compared to 18,061 in 2006, a decline of 14 percent.

One of the benefits of using the statistics on the accidents on the governorate level is that it is not related to the individual labor supply and wages. If the number of accidents were on the individual level, an increase in the number of working hours would increase the likelihood of tiredness and increase the probability of having a car accident. Another argument could be that workers who have a higher risk of individual accidents can ask for hazard pay, increasing their wages. However, the labor market situation in Egypt suffers from precariousness and informality. Individuals are usually working without a contract or medical insurance (Assaad & Krafft, 2021; Barsoum, 2015a; Wahba & Assaad, 2017). Therefore, it would be implausible to get hazard pay from accidents outside the occupation.

Another argument against the use of the instrument could be that individuals choose their residential and work locations. However, the choice of these locations is not flexible (as will be explained in the background on the housing market in Egypt in Article 1). Furthermore, housing market choices are based on financial abilities rather than proximity to work (Beidas-Strom et al., 2009).

One could argue that the wages are related to the number of accidents. Firms might compensate for the costs of commuting of workers via higher wages, where commuting costs include both monetary and non-monetary costs, with the latter including psychological expenses (i.e., stress and traffic jams) originated by car accidents. Thus, the number of car accidents may be related to higher wages. However, Tansel et al. (2020) has provided evidence that supports that the segmentation theory is more prevalent in the Egyptian labor market, where there is a wage gap between informal and formal employment, as indicated previously. Based on this evidence, I argue that the exclusion restriction is fulfilled. Therefore, the number of car accidents is expected to affect the commuting time but not affect the labor market outcomes.

Omitted variable bias might occur if there are factors that affect both the outcome variable and the instrument. For example, it may result from regional factors (such as higher economic development) that affect the number of accidents and the individual wage and labor supply. In this case, the regional characteristics confound the relationship. This would result in a violation of the exclusion restriction. In order to deal with the omitted variable bias, I control for some regional

characteristics. In particular, I control for governorates' characteristics in both the first and second stage regressions to substantiate the satisfaction of the conditional IV independence assumption (Brito & Pearl, 2002; Deuchert & Huber, 2017). These are the level of unemployment rate on the governorate level and the share of educated calculated from CAPMAS (several reports). I cluster my errors on the governorate level since the value of the number of accidents is on the governorate level and hence is the same for all individuals in the governorate. As mentioned in the data section, the sample contains 22 governorates.

4.2.2. Employment transitions

In the second article, I estimate the effect of various employment transitions on youth's mental health. Previous research is divided into papers that focus on the upward comparison and/or the downward comparison when considering employment transitions. The difference is in the comparison group. The upward comparison considers comparing those in fixed-term jobs with individuals in permanent employment. The downward comparison compares those in fixed-term employment with those in unemployment (Gebel, 2013).

Young people are mainly individuals transitioning from school to work or at the beginning of their careers, transitioning from non-employment (unemployment and inactivity) to employment. In addition, Egypt has increased the flexibility of the labor market regulations by expanding the use of temporary employment (Wahba & Assaad, 2017). Hence, in various contexts, those fixed-term jobs (jobs that are with limited duration, normally one year) are considered a step to integrate youth into the labor market (Gebel, 2011). So, my second paper considers the downward comparison where the outcomes of those in any employment (whether standard or not), standard (permanent or formal) and nonstandard (temporary, seasonal, casual or informal) employment are compared to staying in non-employment for youth, comparing the status of 2009 and 2014.

Before discussing in more detail the employment transitions, I will elaborate on the definitions of employment used here. A transition to any employment means that the individual moves to any job whether standard or not. The standard employment refers to both the permanent employment (indefinite period of employment) and formal employment (employment with a contract). On the other hand, nonstandard employment refers to temporary, seasonal, casual or informal employment. Informal work is employment without a contract or social security, hence

lacking legal coverage (Roushdy & Sieverding, 2015). Temporary employment which is considered a synonym of fixed-term employment in Egypt is a regular job with a definite employment period. Temporary employment can be formal or informal (Assaad & Krafft, 2021). Casual and seasonal jobs are also employment with limited duration with high instability and irregularity given their availability on daily basis or in particular season and are mainly informal (Assaad & Krafft, 2021; ILO, 2016; Roushdy & Sieverding, 2015; Wahba & Assaad, 2017). On the contrary, permanent employment is a work agreement with an unlimited period. Hence, similar to temporary employment, it is considered a regular job but it can be formal or informal. Contrary to temporary employment, permanent employment provides the highest level of stability and security given its long-term prospect (Assaad & Krafft, 2021; Roushdy & Sieverding, 2015; Wahba & Assaad, 2017).

The treatment variable is the individual's transition from non-employment to employment. The mental health effect of transition from non-employment to various employment situations is identified by comparing the outcomes of those in different employment situations to those who remain in non-employment. In an effort to estimate the effect of nonstandard employment, I compare transitions to unconditional (any) employment, permanent, fixed-term employment, casual and seasonal employment, formal and informal employment. In particular, these are individuals who were not employed in 2009 and became employed in 2014. The control group is those individuals who stayed in non-employment in 2009 and 2014.

The comparison is made by comparing those in various employment situations and individuals who stay unemployed or inactive. Nonstandard employment lies between nonemployment and permanent employment on the job security scale (de Cuyper et al., 2008; Taht et al., 2020). A permanent job is considered to provide the highest level of job security given its indefinite duration of employment, while nonemployment represents the highest job insecurity. As indicated before, nonstandard employment refers to temporary, seasonal, casual, or informal employment. Temporary employment (fixed-term employment renewed on an annual basis) is expected to provide a higher security level than seasonal and casual employment. Seasonal and casual jobs are irregular, so they are inferior to temporary jobs regarding their regularity (Assaad & Krafft, 2021; Roushdy & Sieverding, 2015). Suppose the outcomes of those in nonstandard employment are compared to permanent employment. In that case, this is an upward comparison. If nonstandard employment is compared to nonemployment, this is considered a downward

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comparison (Gebel, 2013). I consider only the downward comparison since nonemployment is the most prevalent state for young workers in Egypt (Barsoum et al., 2014).

4.2.3. Marriage

This research uses event time dummies for the time relative to first marriage as the treatment variable. The occupational status can vary over the individual's life course, depending on their family transition trajectories. The effect for women expecting to be married compared to those who recently married compared to women who got married a couple of years ago might differ (Dougherty, 2006). After getting married, the most demanding phase is in the early years of marriage when women are childbearing and rearing babies. After a couple of years, women will have older kids and more life experience, so the effect in these years can be different from the effect in the earlier years of marriage. Hence, the impact of marriage is not constant over the years.

The event time dummy variables measure the number of years since and to first marriage, reflecting a heterogeneous yearly effect of marriage in addition to the anticipation effect of marriage (Jee et al., 2019). The time relative to marriage is a series of dummy variables that reflect where the woman is located in her life course trajectory and family formation transitions. It reflects whether she is expecting to get married or in the engagement years before marriage. If she is in the years following marriage, this will be reflected in the years after marriage dummies, i.e., one year after marriage, two years up until ten or more years after marriage. The reference group includes all year-person observations for women at least three years before marriage and includes single women who did not eventually marry.

The time relative to marriage dummy variables (dummy impact function) is used instead of a single marriage dummy variable (step impact function). The latter assumes that the effect is time-constant once the woman gets married, averaging the result over all the marriage years. If the effect is rather time-varying, then depending on step impact function will encounter negative weighting bias (Ludwig & Brüderl, 2021). On the other hand, the dummy impact function shows the time path, accounting for both the short and long-term impact of marriage on women's occupational status (Dougherty, 2006; Ludwig & Brüderl, 2018, 2021).

After women are married, we can observe motherhood status represented by parity-specific births as a time-varying covariate. The parity-specific births capture the number of children by five dummy variables. These dummies are no children, first birth, second birth, third birth, and fourth

or more births. Hence, I add a dummy variable for having four or more kids, unlike Abendroth et al. (2014), who stopped at measuring the effect of three children. The reference group is women with no children. The parity-specific dummies are used instead of a continuous measure of motherhood like the number of children since the occupational effect of childbearing to be non-linear in the number of children (Jee et al., 2019).

A word of caution needs to be highlighted regarding interpreting the parity-specific births estimates. In this approach, I employed, for sequential life events, a single estimation sample strategy (Ludwig & Brüderl, 2021). This strategy starts with a sample of women without children and introduces dummies for the parity-specific births. These events might have heterogeneous effects. If the size of the bias created due to the heterogeneous effects is small, then one can use the single estimation sample strategy. Another concern for biased estimates is selection into later treatments based on outcomes from earlier treatments (Ludwig & Brüderl, 2021). In particular, when the size of the earlier birth parities effect can result into selection into later birth parities, which could bias the results for all parities. One could test for the presence of heterogeneous effects through estimating an interaction effect of ever treated in second parity interacted with the first parity. If the magnitude of the effect is negligible, then one can assume that there is no support for the argument that heterogeneous effects bias the estimates (Ludwig & Brüderl, 2021).

4.3. Dependent variables

4.3.1. Labor market outcomes

In this subsection, I introduce the labor market outcomes that are used in articles 1 and 3. In the first article, the labor market outcomes studied are earnings and labor supply. Earnings are measured by hourly wage in a log format, to capture a percentage rather than a change by Egyptian pounds. This means that the results can be interpreted as an increase in commuting time by one minute would result in a constant percentage change in hourly wages. This logarithmic transformation would allow comparability of the results with the international literature that have estimated the effect of commuting time and distance on the log of wages such as French et al. (2020) and Mulalic et al. (2014). Labor supply is measured by daily actual working hours, weekly working hours, and the number of working days. Working hours in ELMPS are measured as the number of hours per day spent on market work. I also control for several variables in the regressions. Including control variables help verify that my instrument provides exogenous

variation by comparing the estimates before and after controlling; in other words, adding the control variables justifies the satisfaction of the assumption of conditional IV independence (Brito & Pearl, 2002; Deuchert & Huber, 2017).

In the third article, I also consider a labor market outcome, namely the occupational status of women. Various measures are used in the literature to calculate occupational status from the occupational classifications, such as the occupational prestige (Treiman's Standard International Occupational Prestige Scale, SIOPS) or the occupational status (International Socio-Economic Index of occupational status, ISEI), among others (see Christoph et al., 2020 for a review of the occupational measures). Previous research has considered the effect of child parities on ISEI (Abendroth et al., 2014), while other studies assessed the impact of motherhood on occupational prestige (Aisenbrey et al., 2009; Brehm & Buchholz, 2014). Even though there is a high correlation between occupational socioeconomic status and prestige, they measure different things, produce different results, and are not substitutes (Treiman, 1977). The SIOPS measures the individual's subjective evaluation of the occupational relative prestige. In this context, I have chosen the ISEI since it is more objective to avoid using measures that use subjective judgments (survey respondents) for evaluation (such as SIOPS). In addition, the prestige scales have recently been criticized for providing an average prestige score for a rather heterogeneous group (Lynn & Ellerbach, 2017).

In this article, the International Socio-Economic Index of occupational status (ISEI-08) is used to measure socioeconomic status and is calculated depending on ISCO-08. I chose ISEI-08 instead of ISEI-88 since the latter only uses a sample of men. On the contrary, ISEI-08 compromises a sample of 198,500 individuals, including both men and women. This index measures the social and economic means necessary to change social status (Ganzeboom et al., 1992; Ganzeboom & Treiman, 2010).

ELMPS 2018 has retrospective data on the occupations classification ISCO-88. We used the ISCOGEN command to translate the ISCO into occupational status indices (Jann, 2019). We start with translating from ISCO-88 (4 digits codes) to ISCO-08 and afterward from ISCO-08 to ISEI-08. The ISEI-08 is considered a continuous variable and ranges hypothetically between 10 and 90 (Ganzeboom & Treiman, 2010). However, in our data, the ISEI-08 ranges between 15 and 89. This discrepancy is mainly attributed to dissimilarities between ISCO-08 and ISCO-88, where

the former introduces new occupations that were not present in the latter, such as food preparation assistants (Ganzeboom & Treiman, 2010).

4.3.2. Mental health outcomes

In the second article, I examine the effect on the psychological wellbeing of youth. Wellbeing is a multidimensional concept that may be measured both objectively and subjectively. In an effort to measure the effect of employment transitions on the psychological wellbeing of individuals, I exploit the self-reporting questionnaire (SRQ-20) in the SYPE to calculate the outcome variables. This questionnaire, designed and developed by the World Health Organization, is seen as a screening test for mental illness in developing countries. The questionnaire includes 20 yes and no questions, designed to count the number of mental illness symptoms that the individual suffers from (Beusenberg & Orley, 1994). The respondent's score reflects the number of 'yes' answers, with a higher score indicating a mental disorder. It ranges between zero and 20. If the individual is healthy with no symptoms, then the score is zero, and if the individual suffers from all symptoms of mental illness, then the score is 20.

Using the SRQ-20, three mental illness measures (Y) are used, prevalence, depth, and severity, following the methodology implemented by Bilger et al. (2017). These measures capture the intensive and extensive margins of the illness. In particular, the prevalence variable captures the extensive margins of whether the individual is ill or not. In order to calculate these measures, I use a cutoff score of 8 (c), as suggested by previous studies in Egypt and Syria (Roushdy & Sieverding, 2015). In the equation below, a is a parameter that sets the sensitivity of the mental illness measure to deviations above the cutoff point. When $a = 0$, Y measures the mental illness prevalence. Accordingly, the mental health dummy variable is zero for those with less than eight symptoms and one to show the prevalence of mental distress at eight or more symptoms.

$$Y = \begin{cases} (ns - c)^a \ if \ ns \geq c \, , \\ 0 \ otherwise \end{cases}$$

Several studies validated the selection of eight as a cutoff point in Egypt and other countries (Roushdy & Sieverding, 2015). However, the choice of the cutoff point is a core criticism for the use of the mental illness prevalence measure. In order to conduct a sensitivity analysis, I use the number of symptoms as an outcome variable, capturing the number of symptoms (ns, ranging from zero to 20) rather than a binary index of the prevalence of the illness.

Another criticism for the prevalence measure is its insensitivity to the uneven distribution of illness beyond the threshold. In particular, a person who suffers from nine symptoms is treated evenly as a person who suffers from twenty symptoms. Hence, the prevalence measure is not indicative of how ill the individual may be since it does not account for the mental illness distribution above the cutoff. To address this caveat, I used the depth and severity measures to capture the intensity of the illness instead of treating all sick people as having the same level of sickness. Hence, both the depth and the severity measures capture the intensive margins of psychological illness.

The depth of the mental illness measures the distance from the mental illness cutoff point. It takes zero for those who are healthy with less than eight symptoms and continuous for the ill people (having eight or more symptoms). In this case, $a = 1$, Y measures how far the *ns* of ill individuals lie above the cutoff point. For example, Y takes the value of one for a person with eight symptoms and a value of 13 for a person with 20 symptoms and takes zero for all individuals with seven or fewer symptoms.

The severity variable shows how severe is the mental health burden for the youth. Again, it takes zero for those with less than eight symptoms (i.e., healthy). It squares the difference between the number of symptoms and the threshold for those with eight or more symptoms (i.e., squaring the depth index). In this case, $a = 2$, Y increases quadratically above the cutoff point. For example, a person with nine symptoms will get a depth score of two and a severity score of four.

4.4. Methods of causal analysis

This section illustrates the methods implemented in the three articles of this thesis. Given the use of observational data, the focus is on providing a background on estimating causal effects. A detailed description of the methods used in this thesis is introduced. I have employed various estimation methods: Matched Difference-in-differences, Fixed Effects, Distributed Fixed Effects, Fixed Effects Individual Slopes, Fixed Effects two-stage least squares, and Random Effects two-stage least squares. In particular, the assumptions on causal identification and estimation of each method are introduced, in addition to the strength and weaknesses of these methods.

The optimal aim is to reach a causal interpretation of the treatment effect which is achieved through using suitable estimation methods. Using cross-section methods estimates a naïve estimator comparing two different individuals at the same point in time with the assumption of

unit homogeneity (Cameron & Trivedi, 2005). These estimations work well with experimental data where the independence assumption is satisfied without conditioning on confounders. This assumption is fulfilled in experiments where individuals are randomly chosen, and there is no self-selection into treatment with equivalent control groups and random assignment of treatment (Gangl, 2010). However, experimental data is hard and costly to obtain. Hence, researchers depend on observational data.

Using non-experimental data, in order to reach a correct causal effect, the exogeneity assumption needs to be satisfied (also called conditional independence assumption). In this assumption, we can achieve the independence assumption through conditioning on confounders (common causes for treatment and outcome variables). Controlling for confounders is considered enough to make the variation in the treatment unrelated to either endogeneity or heterogeneity (Angrist & Krueger, 1999; Gangl, 2010). In other words, regression is used to account for confounding variables to remove the bias from such comparisons (Angrist & Krueger, 1999).

4.4.1. Panel data models

With the lack of experimental data and the use of observational data, it is mainly hard to satisfy the assumptions of cross-sectional regression. In these cases, it is necessary to use panel data methods to account for unit heterogeneity and capture the dynamic of the relationships. Using panel data allows capturing inter and intra-variations between individuals (Hsiao, 2003). In addition, choosing the suitable panel data model can account for unobserved time-constant heterogeneity or individual unobservables.

Panel data can be pooled, and pooled OLS can be estimated. However, pooled OLS would require several strong assumptions to get consistent estimates, namely, linearity concerning independent variables, exogeneity, some characteristics of the error term, among other assumptions. One example of exogeneity is in the absence of omitted variable bias. This bias occurs when variables are not included in the model that are correlated with the independent and outcome variables. Omitted variable bias or unobserved heterogeneity would mean that the error term would be correlated with the regressors in the model (Brüderl & Ludwig, 2015; Wooldridge, 2010). These omitted variables, as mentioned earlier, might be time-variant or time-invariant.

Consider the error component regression model in matrix notation (Brüderl & Ludwig, 2015),

$$y_{it} = X_{it}\beta + \alpha_i + \varepsilon_{it} \tag{1}$$

In this model, y_{it} is an outcome variable across individuals i and time t. The independent variables are presented in a $1\times k$ vector (x_{it}) while β is a $k\times1$ vector of the coefficients. Estimating the error components model using Pooled OLS means that we do not differentiate between the two error parts α_i and ε_{it} but instead consider them as one component. The α_i is supposed to capture differences between individuals that are stable over time. The ε_{it} is an idiosyncratic error that changes over individuals and periods. Assuming that the unobserved characteristics are stable over time is an assumption that is often violated (Brüderl & Ludwig, 2015). This estimation technique shows that the use of panel data alone does not account for various problems. The choice of the estimation technique is crucial to avoid violating these assumptions.

4.4.2. Fixed effects

To avoid violation of the strong assumptions of the pooled OLS, one method that can be used to estimate a causal effect is Fixed Effects (FE). It builds on equation (1). FE estimates a causal effect under the assumption of strict exogeneity and that the unobserved heterogeneity is only time-invariant (Brüderl & Ludwig, 2015; Gangl, 2010; Wooldridge, 2010). The assumption of strict exogeneity indicates the exogeneity of the error term ε_{it}. This assumption must hold to achieve unbiasedness (Brüderl and Ludwig, 2015). It means that the

$$E(\varepsilon_{it}|X_{it},\ \alpha_i) = 0 \tag{2}$$

In order to estimate FE, the data is first transformed through demeaning or within transformation. This is done by taking the mean of equation 1 across periods, which gives the individual-specific means:

$$\bar{y}_i = \bar{X}_i\beta + \alpha_i + \bar{\varepsilon}_i \tag{3}$$

Averaging would result in an average of α_i for each individual that is equal to its value since it does not change its value over time. As a second step, we reach the demeaned data by subtracting the averaged equation (equation 3) from equation 1:

$$y_{it} - \bar{y}_i = (X_{it} - \bar{X}_i)\beta + \varepsilon_{it} - \bar{\varepsilon}_i \tag{4}$$

This subtraction would result in dropping the time constant α_i.

The pooled OLS estimation is now conducted on this transformed data to capture the FE, within individuals differences, comparing the same individual across time (Brüderl & Ludwig,

2015; Wooldridge, 2010). This transformation removes any time constant unobservables and only allows for estimating the effect of time-varying variables. For example, the impact of variables that do not change over time (such as gender or some family background information) cannot be estimated. This setup washes away the effect of confounders α_i that are considered stable over time. If there are time-varying unobservables that are correlated with the independent and outcome variables, then FE assumptions are violated, and we reach biased estimates (Brüderl & Ludwig, 2015; Wooldridge, 2010).

Research measuring wage premiums and penalties has departed from using the step impact function (binary variables capturing the treatment) and recently employed dummy impact functions in fixed-effects models (Cheng, 2015; Dougherty, 2006; Loughran & Zissimopoulos, 2009; Ludwig & Brüderl, 2018). Previously, marriage was included as a dummy variable that takes the value of zero and one over the individual's life course (step impact function). Including a step impact function might hide a lot of heterogeneity in the marriage premium since it averages the effect over the whole years of marriage (Dougherty, 2006; Ludwig & Brüderl, 2021). However, we witness that there might be a large premium in anticipation of marriage and decreases over time. To capture this effect heterogeneity, a more dynamic perspective is incorporated in the model, including a dummy impact function. This function includes a dummy variable for years relative to the marriage year (i.e., one year before marriage, the marriage year, one year after marriage, two years after marriage, etc.). It captures the yearly effect of marriage. Estimating impact functions address the time-varying effect of marriage rather than providing an average over the life course (Ludwig & Brüderl, 2021). Economists conduct the same thing by adding the independent variable's lags and capturing non-linear effects instead of using only the contemporaneous variable (Wooldridge, 2010).

Using dummy impact function is necessary especially if we have a staggered treatment design and time-varying treatment effect (Ludwig & Brüderl, 2021). For example, in our case, marriage could occur in various times and not necessarily at the same time for each woman. In addition, assuming a time-constant effect (using a step impact function such as a marriage dummy) would result in a negative weighting bias. In this case, the fixed effect estimate would be biased towards the effect of the early post-treatment periods (Ludwig & Brüderl, 2021).

Adding a control group in such a dynamic specification is necessary and implemented in the previous literature to estimate the impact of marriage and motherhood (Hsu, 2021; Ludwig &

Brüderl, 2018). In the case of marriage, the control group is those who are single and are still at risk of getting married (i.e., getting the treatment). If we only include ever-treated individuals with no control group (i.e., those who never get the treatment), there would be collinearity issues especially at the late post-treatment dummies where everyone is eventually treated. Therefore, to identify the dummy impact function, it is necessary to include a control group of individuals who never get the treatment (Ludwig & Brüderl, 2021). Another reason for including a control group is to weaken the assumption of temporal homogeneity (Brüderl & Ludwig, 2015). This group influences our estimates through supplying a time trend estimate. In the within comparison for the treated individuals, the time trend is differenced out. This differencing allows to differentiate between the maturation effect and the causal effect of interest (Ludwig & Brüderl, 2021). Failing to include a control group of never-treated women results in an effect that captures the maturation effect and the marriage effect.

The distributed FE allows the examination of the time path of the effect of marriage and the anticipation effect of marriage on occupational status. This allows me to measure the short, medium, and long-term effects of marriage on occupational status (i.e., the occupation trajectory over the years). I can also investigate the anticipation effect of marriage. I am arguing that these pre-treatment dummies reflect the anticipation effect of getting married, which has been shown in both the theory and the literature of marriage effects. However, a word of caution is warranted for the inclusion of pre-treatment dummy variables. These pre-treatment estimates might be biased if there are omitted time-varying confounders, self-selection based on growth in the outcome variable and reverse causality (Ludwig & Brüderl, 2021). However, I have opted to include control variables that might confound the estimates. In addition, I have accounted for the self-selection based on growth of the outcome variable through using the Fixed Effects Individual Slopes (This method is explained in the next sub-section). The only issue that is not accounted for is the reverse causality where a positive shock to the outcome variable (occupational status) might result in more women getting married. So, these pre-treatment estimates need to be interpreted with vigilance as it might capture both the anticipation effect and reverse causality.

One choice needs to be made about the length of the impact function. Previous research has varying lengths of the pre-treatment dummies (lags) and post-treatment dummies (leads). For the length of the lags, Dougherty (2006) has used ten lags to capture the anticipation effect of marriage while Hsu (2021) has added three lags of the first birth year for his first birth penalty

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models. The latter justification for choosing three lags is that women change their employment status in advance of childbirth to prepare for motherhood. On the contrary, Ludwig & Brüderl (2018) have used 0 lags with the justification that they want to avoid including any selection based on levels and growth of wages. Hence they did not include the years before marriage in their estimation of the marriage premium for men. My choice is to add pre-treatment dummies of up to three years before the wedding.

The reference period in the case of having zero leads is all person-years before treatment. On the other side, when we add leads, the reference period is altered to person-years before the leads start (Ludwig & Brüderl, 2021). So, in the case of adding three lags, the reference period changes from all women-years before marriage to women-years before the initial pre-treatment dummy (i.e., 3 years before the wedding).

The post-treatment dummies capture the long-term effect. The length of the leads is inconsistent across the literature. For example, one paper uses up to a certain number of years (up to 10 years) (Dougherty, 2006) or adds up after a certain number of years (10+) (Mari, 2019) or combines both (stop at year 15 combining years 11-15) (Ludwig & Brüderl, 2018). Grouping the dummies after a certain year is called a residual dummy (Ludwig & Brüderl, 2021). However, it is important to compare the changes in the results due to this grouping of the dummies after a certain point in time as it might introduce negative weighting bias (Ludwig & Brüderl, 2021). In a sensitivity analysis, the results are qualitatively comparable whether I keep the late post-treatment dummies or include a residual dummy for 9 or more years after marriage. In addition, there is not heterogeneity effect in these late treatment dummies that might bias the estimates. This shows that it does not introduce bias to the estimated effects of the dummy impact function.

4.4.3. Fixed effects individual slopes

If we want to compare within estimations with a control group, this requires the assumption of common baseline trend. This assumption ensures that the baseline outcome (outcome without treatment) of the treatment and control groups have the same growth rate but with varying levels. The violation of this assumption means that there is selection based on the growth of the outcome variable. In this case, some of the coefficients of the covariates will not be constant across individuals but rather vary, as shown in equation 5. In the presence of growth curves or individual

slopes, it is recommended to use Fixed Effects Individual Slopes model (FEIS) (Brüderl & Ludwig, 2015). It is also called Random Coefficients Model (Wooldridge, 2005).

When we have self-selection based on growth, the FEIS method is used to address this growth heterogeneity allowing the slopes to differ across individuals. In the FE, the intercept was allowed to differ within individuals (the time constant unobservables that are washed out in the demeaning process). In the FEIS, the slopes of certain variables (δ_i) differ across individuals.

$$y_{it} = \alpha_i + X_{it}\beta + z_{it}\delta_i + \varepsilon_{it} \tag{5}$$

Unlike FE, FEIS does not require the assumption of parallel trends between treatment and control groups. Hence, on top of controlling for time-constant heterogeneity, it controls for heterogeneous slopes. FEIS is detrending our outcome and independent variables. This is done by estimating the individual growth curve for each variable, predicting the value, and then subtracting the predicted values from the original values. This subtraction results in the detrended variables. Then, these detrended variables are used in the final estimation using POLS (Brüderl, 2015).

It is possible to control for more variables in the growth curve. Estimations can control for as many slopes as theoretically needed. However, the estimation will need j+1 person-years per individual where j is equal to the number of intercept and the slope parameters. For example, having two variables to calculate the slope will require at least four year-person observations to conduct the analysis.

The variables used as slopes are not limited to specific characteristics (Rüttenauer & Ludwig, 2020). This indicates flexibility in choosing the slope variable that determines the growth of the outcome variable. In the literature on wage premium and penalties, the slopes used vary. On the one hand, age is used. For example, Mari (2019) controls for age only to account for heterogeneous growth when estimating the fatherhood wage premium. Others use age and age squared to measure marriage wage premium for men in Switzerland (McDonald, 2020). On the other hand, Ludwig and Brüderl (2018) include experience and its square to calculate the individual slopes when estimating the marriage premium for men. The reason for choosing experience and its square as the slope variables is that it mimics the labor market theory this way. Experience is considered a time-varying variable that captures the growth potential of wages (Ludwig & Brüderl, 2018). Suppose we use experience as a slope in measuring the marriage

premium for women. In that case, experience has a constant effect among women in the FE model, while its effect varies in the FEIS.

4.4.4. Difference in differences

Another extension of the FE estimator is the difference in differences (DiD) estimator. In the counterfactual model context, the DiD estimator measures the difference in outcomes between the treatment (i) and control groups (j) before and after the treatment (in t1 and t2) as shown in the equation below (Angrist & Pischke, 2008; Lechner, 2010).

$$\text{DiD} = E(Y_{i,t2}{}^1 - Y_{i,t1}{}^0 | D=1) - E(Y_{j,t2}{}^0 - Y_{j,t1}{}^0 | D=0) \tag{6}$$

This identification strategy tackles the fixed unobservables. Since panel data is used, the estimator is based on individual differences in outcomes over time. This means that differencing done by the difference-in-differences removes time-constant confounding factors (Angrist & Pischke, 2008; Lechner, 2010). However, as in the FE model, one cannot control for time-varying unobservables.

The basic identifying assumption for DiD is the common baseline trend or the common trend assumption. It means that if the treatment is absent, the trend in the outcome variable (i.e., the change over time) between treated and control groups should not be different (Angrist & Pischke, 2008; Lechner, 2010). In empirical studies, an approximation is done to test the satisfaction of this assumption. It is done through checking that the trend in the outcome variable is the same in the pre-treatment period. One needs at least two points in time before the treatment occurs to conduct this test. Using this pre-treatment data, the average treatment effect is estimated and must be insignificant to ensure that the common trend assumption is satisfied (Falsification test). Unfortunately, the SYPE panel data used in this article is only available for the years 2009 and 2014. This limited number of waves does not allow us to conduct the falsification test. To make the common trend assumption more plausible, I conduct propensity score matching before the DiD.

The application of the matched DiD begins with performing the propensity score matching based on observed baseline characteristics (confounders). The propensity score matching results in creating statistical similarity between the treatment and the control groups regarding the confounders and differs with respect to the outcome variable (Gangl, 2015). Hence, the matching removes the initial heterogeneity between the two groups (Schultz & Strauss, 2008). Next, each

treated observation is matched to the control observation. The propensity scores are estimated using a logit model for the probability of being treated based on a function of individual observables in the base period before the treatment.

The observables used in the matching include temporally preceding correlates of treatment (i.e., pre-treatment confounding variables) (Gangl, 2015). Mediating variables are excluded to avoid over-control bias (Elwert & Winship, 2014). Theoretically, one can control for time-varying confounders. However, the SYPE data is only available for one year before the treatment. This allows to control for baseline covariates in 2009 only. Conditioning on these pre-treatment confounders results in expected outcomes that are equal for the treatment and the control groups in the absence of the treatment (Gangl, 2015).

After matching and achieving balance across the covariates, the DiD is estimated for the treatment and control observations on the common support (S). In particular, the counterfactual is estimated for the change in outcomes between treatment (i) and control groups (j). Then, we identify the effect of the treatment on the treatment group's outcome variable over time, comparing it to the counterfactual trend, incorporating the weights (w_{ij}) from the chosen matching algorithm. This effect would show the change in outcomes if they remained non-treated, approximated by the control group's outcomes. The matching ensures the control group has results like the treatment group in the absence of the treatment used as a counterfactual in calculating the differences. Finally, we calculate the average treatment effect on the treated (the ATT) as shown in the below equation (Lechner, 2010).

$$ATT = \frac{1}{N_{D_1}} \sum_{i \in D_1 \cap S} \left[\left(Y_{i,t2}^1 - Y_{i,t1}^0 \right) - \sum_{j \in D_0 \cap S} w_{ij} \left(Y_{j,t2}^0 - Y_{j,t1}^0 \right) \right] \tag{7}$$

4.4.5. Instrumental variables and two-stage least squares

Instrumental variables (IV) are considered a way to address the endogeneity problem. Endogeneity problem could be present due to problem of simultaneity and omitted variable bias. Simultaneity problem (also called reverse causality or bi-directional causality) occurs when not only the independent variable affects the outcome variable but the relationship also runs in the opposite direction where the outcome variable affects the independent variable (Wooldridge, 2010). The omitted variable bias occurs when the researcher fails to control for confounders of the relationship. The situation is problematic when these confounders are unobservables that affect both the treatment and outcome variables (Wooldridge, 2010).

Instrumental variables affect the outcome variable only through the treatment or the main independent variable and are not correlated with other factors affecting the outcome variable (Angrist & Imbens, 1995). An issue that will be indicated in more detail when explaining the assumptions of IV estimations. An IV must satisfy two conditions to be a valid instrument for the endogenous variable. First, it must affect the endogenous variable and cause variation in it which is not random but a systematic influence. Second, the exclusion restriction must be satisfied. This means that the IV must affect the outcome variable only through its relation with the endogenous variable (Gangl, 2010). In other words, the correlation between the instrument used and the error term in the structural equation should be equal to zero. This means that the instrument is exogenous in this equation. At the same time, the coefficient of z_i in the first stage should not be equal to zero. As Wooldridge (2010) explains it, this does not translate to a correlation between z_i and our endogenous variable. It instead means that these variables are partially correlated after controlling for the other variables.

One way to estimate the equation of interest with IV is through using two-stage least squares (2SLS). Another way that is not covered in this thesis is control functions. In the 2SLS, there are two stages for the estimation, as the name suggests. In the first stage, I am predicting the endogenous variable using the instrument and the control variables of interest in the estimation of the effect of the treatment on the outcome variable (Brito & Pearl, 2002; Deuchert & Huber, 2017). In the second stage (also called reduced form), the predicted values of the endogenous variable are used to estimate the effect on the outcome variable (Angrist & Imbens, 1995; Wooldridge, 2010). This method solves the endogeneity problems and allows for unbiased estimation of the impact of the endogenous variable on the dependent variable (Angrist and Pischke, 2009).

The local average treatment effect (LATE) is the average treatment effect for the target population of the instrument (i.e., also known as compliers in experimental designs, individuals who get treated due to changes in the instrument) (Angrist & Pischke, 2008; Imbens & Angrist, 1994). If we opt to use different instruments, the targeted populations will be different and hence the LATE will be different for each group of compliers (Imbens & Angrist, 1994). Hence, it is necessary to identify the group of compliers from the instrument to ensure the external validity of the results in another context (Angrist & Pischke, 2008). An example that Angrist and Pischke gave in their book is using the draft eligibility variables as an instrument for joining the military service. In this case, the compliers are those who were chosen through the draft lottery. However,

anyone who served in the military on voluntary basis is not included in the estimated effects. Hence, if we estimate the LATE based on the draft lottery instrument, the effect applies only to those who were draft eligible and excludes volunteers.

The instrument's strength is examined through an f-test of the instrument's significance. The test statistics need to be higher than the critical values of Stock and Yogo (2002) and higher than the rule of thumb of 10 provided by Staiger and Stock (1997). A high test statistic indicates that the instrument is strong. This strength is vital to avoid substantial bias in the estimates of the 2SLS even when the sample size is large (Wooldridge, 2010).

Equation 8 shows the structural equation. So, in this case, our structural equation has two exogenous variables (x_i) and one endogenous variable (s_i). μ_i reflects the individual unobserved characteristics that do not change over time. While u_{it} is the standard error term which is independent and identically distributed (iid) with a zero mean and constant variance (Wooldridge, 2010).

$$y_{it} = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \rho s_i + \mu_i + u_{it} \tag{8}$$

Our first step in the two-stage least squares is the estimation of the values of the endogenous variable (s_i) through the use of the instrumental variable (z_i) and control variables (x_i). This is interchangeably called the first stage or the reduced form equation (Wooldridge, 2010). The equation for the first stage is as follows:

$$s_{it} = \pi_0 + \pi_1 x_{1it} + \pi_2 x_{2it} + \pi_3 z_{it} + e_i + \varepsilon_{it} \tag{9}$$

After estimating the first stage, the predicted values of s_i are substituted in the structural equation, producing the two-stage least squares estimates. Equation 9 is the second stage or the reduced form for y_i where v_{it} is the reduced form error.

$$y_{it} = \alpha_0 + \alpha_1 x_{1i} + \alpha_2 x_{2i} + \rho \hat{s}_i + v_{it} \tag{10}$$

If we opt to use Fixed Effects with 2SLS (FE2SLS or FEIV), the within transformation will be applied. The within transformation, as indicated before, will remove the time constant μ_i through subtracting means at the panel level for every variable. This would result into within estimates. Combining the Fixed Effects with the instrumental variable approach has weaker assumptions, specifically that the instrument is only valid conditional on the fixed effects (i.e., assumes conditional exogeneity). In other words, there might be other variables that relate the

instrument to the outcome variable other than through the main independent variable (the endogeneous variable). If these unobservable variables are time-constant, then combining both methods tackles these confounders and makes the exogeneity assumption of the instrument more plausible. Another method to fit this equation is through using Random Effects (REG2SLS or REIV) under the assumption that μ_i is not correlated with covariates. So, the main difference between the FE2SLS and the REG2SLS is the assumptions about the time constant error term.

One of the main problems in estimating the effect of the commuting time on labor supply and earnings is the endogeneity problem (Wooldridge, 2010). This problem arises because there might be unobservables that affect both the commuting time and labor market outcomes . Hence, using an instrumental variable that satisfies the exclusion restriction is necessary. This instrument should be related to the main independent variable (i.e., commuting time) but not the outcome variables (i.e., wages or labor supply). Another important problem that the IV estimator solves is the simultaneity bias (Angrist & Pischke, 2008). This occurs due to reverse causality (bidirectional causality) between the main independent variable and the outcome variable. In my research, this occurs if the labor market outcomes affect commuting time, such as individuals travel longer to work to earn higher wages.

The instruments suggested in the literature are the mode of travel, kilometers of roads per capita in the governorate, and car density (Niebuhr et al., 2012; Russo et al., 2014). However, I believe that all these instruments might feature strength but not goodness in satisfying the exclusion restriction. For example, the exclusion restriction is violated when we use the mode of travel because it captures the level of wealth of the individual which confounds the relationship between commuting time and labor market outcomes. Using regional instrumental variables such as the kilometers of roads per capita or the car density capture the level of development of the city which again affects both the commuting time and labor market outcomes. This means that these factors have an effect on both the commute time and our dependent variables. I argue that the instrument that I use (the number of accidents on the governorate level) satisfies the exclusion restriction since it only affects the commuting time but not the labor market outcomes on the individual level.

5. Summary and conclusions

5.1. Main findings of the articles

In Article 1, *"Chapter 2 – Commuting times: Effect on labor supply and wages,"* I study the impact of the commuting time to assess the effect of the limited geographical mobility of women compared to men using ELMPS for the years 2006 and 2012. The selection problem that the commuting time, the working hours, and the accepted wage level are choices individuals make is addressed through implementing panel data instrumental variable methods.

In this paper, I find that increasing travel time to work has varying results by gender and outcome. Although positive effects of the commuting time on wages are theoretically supported (i.e., in terms of the utility and reservation wage theories where commuting time is looked upon as a tool to access jobs with higher wages), Article 1 does not point to any statistically significant positive impact of the commuting time on hourly wages for either men or women. However, the results of this article reveal statistically significant positive effects of commuting time for some labor supply variables. Specifically, Article 1 shows that travel time to work positively affects men's daily and weekly labor supply. The results are positive for women on their daily working hours. This is in line with what is found in the literature, where Gutiérrez-i-Puigarnau and van Ommeren (2010) found a positive impact of commuting distance on women's daily working hours in Germany. However, the result changes when I examine weekly labor supply, measured by working days or hours. Women witness a negative effect on their weekly working hours and the number of working days (yet insignificant). This is contrary to the results found by Gutiérrez-i-Puigarnau and van Ommeren (2014), who found positive and significant effects of commuting time on the weekly working hours for women in the UK, and the results by Gutiérrez-i-Puigarnau and van Ommeren (2010), who found slight positive effects on weekly labor supply in Germany. This means that if women are required to commute longer in Egypt, they will be forced to work shorter hours weekly or fewer working days. These results are in line with my hypotheses, where I expected that an increase in time spent on commuting time would decrease the labor supply for women and increase the labor supply for men. These results show that men devote more time to work in relation to the increase in commuting time. This can be explained that men prefer to stay longer at work to avoid commuting during the rush hours, as explained by previous literature. While the results for women show that they cannot increase their weekly labor supply so as not to

take from the time devoted to their household responsibilities, in line with the Household Responsibility Theory.

This study adds an essential component to the research on understanding the effect of commuting time on the labor market outcomes by gender. There is a gendered effect of commuting time where there are heterogeneous effects. Furthermore, the results differ depending on the outcome variable of interest. For example, although women might increase their daily labor supply, we might find varying results from studying their weekly labor supply. This shows the importance of examining these outcomes together, rather than in isolation, especially for women.

In Article 2, *"Chapter 3 – Standard or Not? The Effect of Different Types of Employment Transitions on Mental Illness's Prevalence, Depth, and Severity for Youth,"* I have examined the effect of job security on youth's mental health. This paper provided new aspects on moving beyond the typical wellbeing measures used in the literature and the types of jobs considered. As expected, formal or permanent jobs are the gold standard in the labor market. They are superior in their positive effect on mental health than other employment. This is in line with previous research. It also confirms our hypothesis that the lower the stability and security of the job, the less the mental health reward from finding a job.

On the contrary, results differ when temporary, seasonal, casual, and informal employment are compared. In most cases, transitioning to an informal, temporary, seasonal, or casual employment has the same effect on the individual's psychological health as staying in nonemployment. It has been shown that temporary employment is comparable to seasonal and casual employment compared to staying in nonemployment in its impact on the prevalence and depth of mental illness. This refutes the hypothesis that casual and seasonal employment has a higher negative impact since it has a lower level of job security than temporary employment with a fixed-term agreement. Informal employment has lower health rewards than formal employment, particularly in the effect on the illness's prevalence and depth. This provides evidence for hypothesis 2, showing that transitioning to informal employment has lower health rewards than transitioning to a formal job.

The psychological benefits are gendered, where men witness higher positive effects in line with hypothesis 3 that expected a larger positive mental health effect for men than women due to transitioning from non-employment to employment. However, results differ based on the

measurement of the illness. Transitioning to a job improves the prevalence of mental illness for women and improves men's depth and severity. This finding shows that women reap the benefits on the extensive margins of the sickness while men see it on the intensive margins. This aligns with the hypothesis that men will gain more from the transition to employment. When considering job stability and formality, formality is the critical feature that affects women's mental health. These results are in line with my hypotheses that women witness lower mental health rewards than men when transitioning to nonstandard employment (H4a), while the formality of the employment has a higher effect on women compared to men (H4b). This paper has contributed to the literature by understanding a critical segmentation of developing countries' labor markets and its effect on psychological health.

In Article 3, *"Chapter 4 – Family Formation and Occupational Status: Penalties for Women?"* I examined the effect of family formation on women's occupational status in Egypt. This paper moved beyond the premium and penalty research, focusing mainly on wages. Occupational mobility is an essential measure of women's performance in the labor market. In particular, I focused on the anticipation effect, the long-term impact of the first marriage, and motherhood.

Taking selection based on both level and experience growth into account, women do not witness a penalty in their occupational status levels but rather a premium, especially in the fourth and the seventh year after marriage. This result contradicts hypotheses 1 and 4, which state that getting married will negatively affect women's occupational status and that the marriage penalty to occupational status will be more pronounced over marriage. Dougherty (2006) found that the marriage earnings premium reaches its maximum after two years of marriage, starts declining afterward, and does not start increasing again.

The marriage results are sensitive to the method used and how to introduce the marriage variable. For example, using FEIS to account for selection based on levels and growth of occupational status results in different results than accounting only for selection based on levels using FE. In the former, the effect is only significant at specific years, while the latter is significant in anticipation of marriage and most years after marriage except for years 3 to 6. Furthermore, comparing the results from the dummy impact function and the single marriage event dummy in the case of the FE estimations, we find that using the latter underestimates the marriage premium (negative weighting bias).

Irrespective of the estimation method, no significant effect is found for motherhood across all parities on occupational status, contrary to findings of previous studies that show a penalty for women after childbirth (Abendroth et al., 2014; Aisenbrey et al., 2009). In addition, this result also contrasts with our hypotheses 2 and 3, where we expected that transitioning to motherhood would result in a decline in their occupational status and that the reduction in occupational status would be more pronounced with the increase in the number of children.

5.2. Conclusions

The central aim of this thesis was to examine the situation of women and young women in Egypt, particularly concerning their labor market situation. Understanding some labor market and health outcomes of women's position in the labor market can help in improving their LFP, an area where large efforts are needed. In addition to the main findings of the papers, this thesis presents two methodological and two general conclusions on the economic and health consequences of time use, transition to precarious employment, and main life course events.

Methodologically, two conclusions can be highlighted. First, building on the work of Dougherty (2006) and Ludwig and Brüderl (2018), I have shown the necessity of using the distributed impact function instead of the average effect in estimating the impact of marriage on occupational status. When we compare the results from the dummy impact function and the single marriage event dummy, we find that using the latter underestimates the marriage premium, similar to the findings of Dougherty (2006). Hence, it is necessary to use the dummy impact function in research that identifies the effect of marriage. The event time dummy variables measure the number of years since and to the first marriage, reflecting a yearly heterogeneous impact of marriage. The time relative to marriage dummy variables is used instead of a single marriage dummy variable. The latter assumes that the effect is constant over time once the woman gets married, averaging the impact overall on the marriage years. On the other hand, the dummy impact function shows the time path, accounting for marriage's short and long-term implications on women's occupational status (Dougherty, 2006).

Second, in the third paper, we accounted for self-selection through the use of Fixed Effects Individual Slopes, as recommended by Ludwig and Brüderl (2018). The occupational status results differ if we account for selection based on growth in our estimations. This result is similar to what Ludwig and Brüderl (2018) have found for the effect of marriage on wages for men in the United

States. Using the Fixed Effects Individual Slopes is necessary to address self-selection issues in the labor market. The selection must be accounted for in future marriage and motherhood penalties studies.

As indicated by this thesis, the choice of outcome variables can move beyond the norm of using wages to include other crucial outcomes. For example, the use of various mental health variables that account for the level of severity and intensity of the illness reveals differences in the impact of job characteristics and also differences across gender. Furthermore, the benefits or penalties women witness in the labor market might move beyond earnings to be witnessed in their occupational status. By the same token, women can see differences in their long-term outcomes if we consider their pensions, for example. This could be an area for future research where studies examine the effect of marriage and childbirth on long-term outcomes of women.

The results that temporary employment does not differ from non-employment in its effect on the mental health of youth and its similarity to the effect of seasonal and casual employment indicate that the job characteristics, particularly low insecurity and high demands are similar between these jobs, rendering them similar as stressors at work for youth. This finding is crucial for youth usually entrapped in low-quality jobs (Assaad & Krafft, 2021). Therefore, a lot of effort is needed from policymakers to improve the quality of these positions for youth, especially in light of the deregulation of the labor market introduced in 2003 (Wahba & Assaad, 2017). A step in this direction would be to encourage firms that formalize jobs through various incentives, especially for women. While it is necessary for employers to have flexible labor that is hired on limited durations, it is inevitable to ensure decent work for the employees that guarantees the expected balance between job resources and demands.

Differences in the results between men and women were seen in Article 1 and 2. For example, it was seen that women did not change their weekly labor supply in response to an increase in commuting time while men did. Regarding mental health, women who transition to permanent and formal employment witness improvement in the extensive margins of the mental illness compared to those who stayed in nonemployment. This could originate from women's preference for formal jobs given the benefits they need and the expected work interruptions that they witness to maternity leaves and care responsibilities (Assaad et al., 2022; Selwaness & Krafft, 2020). On the same token, women did not benefit on the extensive margins from transitioning to any form of nonstandard employment. This shows that the job conditions of these jobs might make

them similar to nonemployment on the distribution of women's mental illness. Since men are not expected to care for children or to witness any job interruptions, they did not benefit from the transition to formal employment compared to those who stayed in nonemployment. What men care about is the job security provided by permanent employment. This is due to their financial position in the household as responsible for the whole family (Moghadam, 2005). These dissimilarities imply that it is necessary to introduce policy measures tailored separately by gender.

A number of limitations need to be discussed, which sheds light on areas for future research. For Article 1, one limitation is the external validity of the results. The results are valid for using the instrument "number of accidents." This means that accidents might change commuting for some individuals which in turn affect their labor market outcomes through that instrument, what we referred to before as LATE. Results may change when another instrument is used, since different instruments affect different individuals in other ways, leading to a different estimate (Angrist & Pischke, 2008; Imbens & Angrist, 1994). This means that the effect captured through using an instrument has high internal validity but is questionable concerning its external validity (Angrist & Pischke, 2008). Discrepancies in the empirical evidence in Germany and the UK versus Egypt might be attributed to using different variables to reflect the commuting time. In the case of Germany and the UK, the researchers used the exogenous firm relocations, while my paper used the number of accidents. This shows that the results, in the case of Egypt, are valid for using the instrument "number of accidents." Furthermore, the effect of commuting time was estimated for wage workers. Future research could focus on the effect of commuting time on labor market outcomes for non-wage workers. It can also cover the mediating effect of a couple's working status and wages on the effect of a partner's commuting time on labor market outcomes.

In Article 2, the study was based on data in the years 2009 and 2014 which raises a limitation. Unfortunately, data is not available more frequently to better reflect the employment situation between these two years. Nevertheless, this paper offers a crucial contribution to research disentangling the effect of various employment statuses based on their level of stability and formality and their impact on multiple aspects of mental health. This study was done in a developing country context where such issues of informality and instability are widespread, especially across youth. Youths in this respect are considered in the literature an "Excluded generation" where they are unable to transition to good jobs (Assaad & Krafft, 2021).

Understandably, the differentiation used in this paper might underestimate the effect of jobs. Recent research has indicated that single dimensions of job insecurity provide underestimated results and do not capture the heterogeneity within these employment types (Vives, Benmarhnia, et al., 2020). However, it was necessary to identify these jobs' impact as a first step. Future research could build on this research to determine the heterogeneity of job insecurity within these jobs and its impact on mental health. There might be further aspects that differentiate between nonstandard jobs. In order to identify these aspects, it is necessary to create a precarity index that measures the level of the job's precarity. This might provide a better measurement of job security than the contractual agreement. Previous papers have created precarious indices. Two examples are Vives, Gonzalez Lopez, et al. (2020) in the Chilean context and Julià et al. (2017) in the Swedish context. These papers have shown the importance of adapting these indices to the national context where precarity might differ across nations. This calls for future research that focuses on the difference between objective and subjective insecurity on the wellbeing trajectories of youth. Furthermore, it is necessary to compare the impact of objective and subjective insecurity and a precarity index on the wellbeing trajectories of the working-age population. In order to further understand the relationship between nonstandard employment and reduced mental health, future research should examine the mediators that lead to the lower mental health rewards embedded in the nature of nonstandard employment.

This paper has studied the effect of job security on contemporaneous wellbeing. Future research can adopt a dynamic life course perspective rather than a static one. The effect can be estimated on the wellbeing trajectories of individuals, as recommended by Brüderl et al. (2019). This is particularly important given that current disadvantages based on job insecurity might impact the level of inequality later in life (long-term scarring effects), based on the cumulative disadvantage theory (Ferraro & Shippee, 2009). Another aspect that could be explored is the relationship not only for youth but rather for mid and late-career stages.

As for Article 3, the limitations are concerned with using birth parities in a simple estimation sample strategy (Ludwig & Brüderl, 2021). I have argued that the heterogeneous effects in various birth parities in Egypt are rather small, which as a result, does not bias the estimates for all parities (Ludwig & Brüderl, 2021). However, future research could address this issue by conducting a multiple sample approach as done by Hsu (2021). Moreover, further research is needed to understand the effect of asymmetric specialization and gender-neutral household

specialization in the household. These might explain the positive effect of marriage on occupational status. This could be done by using the couple's positions in the household and who is the primary breadwinner. Furthermore, future research can focus on mechanisms that explain the effect of birth parities on occupational status and estimate the long-term effect of childbirth. Finally, a comparative analysis could also highlight the differences between the Global South and the Global North contexts.

Despite the limitations, the thesis contributes to understanding the situation of women and young women in the labor market. Specifically, Article 3 on the effect of marriage and motherhood on occupational status is considered one of the first studies to provide evidence on the importance of considering self-selection in these estimates and provide a life-course perspective through estimating the long-term effects of marriage on occupational status. With respect to the first and second papers on the effect of commuting time and labor market outcomes, they provided insights on the impact of commuting time and nonstandard employment on the labor market and health outcomes, accounting for endogeneity and simultaneity using an instrumental variable approach in Article 1 and combining two methods in Article 2 to assess the impact of various forms of nonstandard employment that were under-studied in previous research. Overall, it can be concluded that women and young women suffer from labor market disadvantages concerning their labor supply and mental health. However, outcomes are positive when considering marriage and motherhood's effects on occupational status. These results show the importance of understanding the complete picture of women working in the labor market and accounting for their intrinsic characteristics when studying their outcomes.

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Chapter 2 – Commuting times: Effect on labor supply and wages (Article 1)

Abstract

In Egypt, the effect of the worker's commute on labor supply and wages by gender is examined. Previous research has identified the effect of commuting time on labor market outcomes. However, I propose using the number of accidents as an instrumental variable that tackles the potential endogeneity of commuting time in a developing country context. Using Egypt Labor Market Panel Survey, the effect is estimated using fixed effects and random effects in addition to using instrumental variables estimations. The results indicate that commuting time positively affects men's daily and weekly labor supply. At the same time, women experience an increase in their daily labor supply with no effect on their weekly labor supply measured by the number of working days and working hours per week. This shows that the commuting time is mainly a fixed cost with an effect on the daily working hours and is not a variable cost for women where it does not affect their choice of weekly labor supply. Furthermore, the increase in commuting time is not found to affect the hourly wages for men or women.

1. Introduction

Commuting to work is done every day by millions of workers, enabling and increasing access to jobs that are not necessarily proximate to the residential location of the individual. Nevertheless, long commute times can have adverse effects on workers' health and productivity, especially in countries with lots of traffic congestion. Women are also less likely to take longer commutes, particularly after getting married. Longer commutes make work more inconvenient for women, especially those with more household responsibilities. This is why the gender gap in commuting time is witnessed in most countries. Preference for short-distance commutes due to household responsibilities can affect the job search area and lead to reducing the time available for the labor market or accepting jobs with lower wages (Gimenez-Nadal & Molina, 2016).

In this paper, the research question is what is the impact of the commuting time on the earnings and working hours by gender? This is implemented using the Egypt Labor Market Panel Survey (ELMPS) for 2006 and 2012. Identifying this impact is particularly important since women suffer from limited geographic mobility compared to men, who are willing to take longer commutes. In 2012, females commuted 23 minutes on average while males commuted 35 minutes. This means that there is a gender gap in commuting where females commute less by 34 percent. In addition, this gap has increased compared to 2006. The limited mobility might negatively impact women since they prefer jobs with better working characteristics like a short travel time. This preference for short commutes can explain why women work 2 hours less than men in 2012 on average and earn 13 percent less than men in the same year (OAMDI, 2013).

This paper's contribution to the literature is two-fold. First, given the potential endogeneity of commuting time in relation to the various labor market outcomes, we propose the number of accidents as an instrumental variable. This instrument has not been used before in the literature. In addition, it satisfies the exclusion restriction where it is highly correlated with the commute time but is not causally affecting the labor market outcomes. Second, to the best of our knowledge, this topic has been under-researched in the context of the MENA region countries, particularly Egypt. Therefore, it is essential to study this topic from a developing country's perspective and understand the effect of government policies on women's labor market outcomes (for example, the impact of government's spending on infrastructure, providing public transportation, and building the new administrative city, etc.). This will help introduce better policies and measures that could be adopted to close

this gap and ease the pressure on women in the labor force. This is particularly important for married women since they have the lowest commuting time, unable to reconcile household responsibilities and work.

2. Background

2.1. Effect of commuting time on labor supply and wages

The impact of commuting time has been studied by labor economists and urban economists. However, there are divergent views on the direction of the effect on labor supply. This divergence stems from modeling the relationship between commuting costs and labor supply. Commuting time is seen as a fixed cost of lost time needed to travel to and from work. This fixed cost of entering the labor market increase as individuals live further away from work. In addition, these costs influence the individual's reservation wage (Cogan, 1981).

Commuting costs are considered a primary determinant for accepting a job offer. If the commuting costs are high, the individual may reject the job offer and prefer a closer job to his home (van den Berg & Gorter, 1997). Hence, travel time to work is seen as a dis-utility they need to minimize. However, Mitchelson and Fisher (1987) see commuting, contrary to migration, as a mechanism bringing wages and income to regional equilibrium (such as a utility). Since commuting allows people who do not have access to nearby jobs to accept further jobs that they can commute to. In addition, Bunting (1956) explains that commuting performs a crucial function in local labor markets, setting wages to an equilibrium. White (1986) finds that the more time spent commuting, the less time people have for leisure and work. This means that this loss of time has to be compensated by higher wages, given the diminishing marginal utility of leisure consumption. Ruppert et al. (2009) investigate the effect of commuting time on wages. They conclude that commuting time has a positive impact on wages.

Compensation for longer commutes can be seen in the housing and labor markets. Individuals residing in suburbs or rural areas are to some extent compensated for their longer commuting time because of the lower housing prices in these areas. Hence, workers are assumed to be compensated in the labor market by getting higher wages for longer commutes and in the housing market by having lower housing prices (White, 1986). It is argued that if workers with long commutes are not paying lower housing prices, they must be compensated

in the labor market with higher wages. Hence, it is necessary to control for either housing prices or at least the residence area.

Previous empirical studies on the effect of commuting time on wages have found positive effects, yet depending mainly on cross-sectional data. For example, using a cross-sectional setup and US data, French et al. (2020) found a positive impact of one-way commuting time on log hourly wages, with no difference in the magnitude of the effects by gender (French et al., 2020). The same positive result is found on monthly wages, using cross-sectional data (Bartus, 2011; Ruppert et al., 2009) or of commuting distance on wages (Mulalic et al., 2014).

On the contrary, other researchers have shown, employing Dutch Time Use data for the years 2000 and 2005, that the inability of women to take longer commutes is likely to affect the job search area, reduce the time available for market work or affect the wage level (Gimenez-Nadal & Molina, 2016). This result could be explained by the fact that women have the burden of the household and care responsibilities which might force them to prefer jobs with shorter commutes (van den Berg & Gorter, 1997). Such preference for proximate jobs might negatively affect their wages, contrary to men who are willing to take longer commutes.

The empirical literature provides divergent views on the impact of commuting time on labor supply, where the effect varies by gender and the used measure of labor supply. Using Dutch time use data and quasi-experimental methods, Gimenez-Nadal and Molina (2014) found a positive effect of commuting time on the time devoted to market work during the day. Using panel data, Gutiérrez-i-Puigarnau and van Ommeren (2010) find no negative relationship between commuting time and labor supply. On the contrary, commuting distance (used as a proxy for commuting time and cost) has a small positive effect on females' working hours in the short run. This suggests that when an increase in commuting costs occurs, women increase their daily working hours. Another study, which depends on British panel data, found a positive impact on the weekly working hours for women and a zero result for men (Gutiérrez-i-Puigarnau & van Ommeren, 2014).

The endogeneity of commuting time with respect to labor market outcomes has been a concern in part of the literature. This endogeneity could be present due to omitted variable bias, mainly due to the failure to control for confounders of the relationship between the two variables (Angrist & Krueger, 1999; Gangl, 2010). For instance, failing to control for some

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important individual characteristics or government-level variables that affect both commuting time and wages and labor supply. Another source of endogeneity is reverse causality (Wooldridge, 2010). In this case, the relation is bi-directional between the labor market outcomes and commuting time. In particular, wages could affect the travel time to work in two ways: (1) if individuals accept longer commutes in exchange for higher wages (French et al., 2020; Ross & Zenou, 2008). (2) If individuals choose to relocate near to their jobs when they are offered higher wages which as a result decreases the commuting time to work (Caliendo et al., 2017; Levinson, 1998).

The methods used in the analysis of the effect of commuting time and distance vary across papers. Most papers opted to use cross-sectional methods (Bartus, 2011; French et al., 2020; Ruppert et al., 2009). Fixed effects methods employing an exogenous source of change in commuting time have been used in several papers. For example, Mulalic et al. (2014) have used firms fixed effects and data from Denmark to calculate the effect of change in the commuting distance on wages. Another source of exogenous variation was using firm relocation as a source of changing commuting time to measure its effect on labor supply, employing individual fixed effects on German and British data (Gutiérrez-i-Puigarnau & van Ommeren, 2010; 2014). Given the difficulty in finding suitable instruments (Wooldridge, 2010), only a few studies depended on the instrumental variable approach, using instruments such as the mode of travel, kilometers of roads per capita in the governorate, and car density (Niebuhr et al., 2012; Russo et al., 2014). However, these variables might reflect the city's level of development or the individual's level of wealth. This means that these instruments affect both the commuting time and labor market outcomes and result in the same endogeneity bias as the commuting time.

As shown, results are mainly mixed depending on the context of the study and the method used. In addition, several studies have ignored the issue of endogeneity and opted to use cross-sectional data to tackle the effect of commuting time. I build on this literature in an effort to understand the causal effects of commuting time on wages and labor supply. In this direction, I use an instrumental variable approach in a panel setup. The IV literature did not use the instrumental variable suggested in this study (the number of accidents). My research contributes to this literature by estimating commuting time's effect on labor market outcomes using panel IV estimations to address the endogeneity bias. In particular, I will study the impact of commuting time on several outcomes, namely hourly wages, working days, and daily and weekly working hours. Given the gender differences in previous

empirical work and the differences in household responsibilities, I will estimate the models separately for men and women.

2.2. Choice of residential location and commuting time in Egypt

In Egypt, three housing market categories are available: renting, homeownership, and social or subsidized housing. Renting is not a popular option in Egypt, with only a 33% share of rentals in the housing tenure mix (Beidas-Strom et al., 2009). It is also not affordable and sometimes requires a large security payment to access the rented apartments contract (Assaad et al., 2017; Dhillon et al., 2009).

The alternatives to renting are either home ownership or social or subsidized housing representing 38% and 29%, respectively, of the housing tenure mix in Egypt. Unfortunately, opportunities to obtain subsidized housing are limited. On the other side, the costs of homeownership are high, with a ratio of seven of house price to annual income (Beidas-Strom et al., 2009). Although this cost can be lower than in other countries, it can be constraining given the limited and hard-to-obtain credit options like mortgages (Dhillon et al., 2009).

Hence, the Egyptian housing market suffers from high rental prices, limited availability of affordable housing options, and restricted financial options for homeownership. This constrained housing market explains the low relocation rate in Egypt. In response to the change of work location, workers do not change their residential location but rather take longer commutes to work (Assaad, 2002).

Women are at a disadvantage with respect to this commuting time instead of the relocation option. For example, Assaad and Arntz (2005) realized that women are disadvantaged over men regarding reaping the benefits of structural adjustment. There were improvements on the macro level due to the structural adjustment program. However, this macro-level improvement was not reflected on women's labor outcomes and did not catch up with men's outcomes. Assaad and Arntz render this inequality partially to women's inability to take long commutes while men realize jobs in the private sector by accepting longer travel times to work.

3. Data

3.1. Sample

In order to identify the impact of the commuting time, the study depends on data drawn from two waves of the Egypt Labor Market Panel Survey (ELMPS): 2006 and 2012 (OAMDI, 2013) and data from CAPMAS for the number of accidents on the governorate level. The ELMPS is carried out by the Economic Research Forum (ERF) in cooperation with Egypt's Central Agency for Public Mobilisation and Statistics (CAPMAS). ELMPS 2006 includes a total of 8,351 households comprising 37,140 individuals. While ELMPS 2012 consists of 12,060 households with 49,186 individuals. This makes both rounds a nationally representative sample. The sample of 2012 includes 28,770 individuals who were interviewed in 2006 (77 percent of the 2012 sample). In addition, the sample also includes 20,416 new individuals (Assaad and Krafft, 2013).

ELMPS survey asks respondents about their earnings, working hours, and commute time to work (my main variables) in addition to their level of job satisfaction in general and with respect to commuting time (Assaad and Krafft, 2013). Hence, it is the best dataset for the analysis in Egypt. The control variables measuring the household characteristics will be calculated from ELMPS data. Furthermore, the number of car accidents on the roads is a statistic obtained from CAPMAS annual report for the car and train accidents for the years 2012 and 2006 at the governorate level. Unfortunately, this statistic was last released in 2015, which does not allow us to use the recently available data for ELMPS 2018.

Since the main concern is the effect of commuting time on earnings and labor supply, the sample is restricted by removing the non-wage workers, confining the sample only to those employed with market definition (reference of one week), and then restricted to wage workers only. This means that the following employment statuses are excluded: employer, self-employed, unpaid family worker, and unpaid worker for others. Hence, the number of observations used is 17,658 (The number of wage workers is 10,147 in 2012 and 7,570 in 2006). [10]

Table 1 provides an overview of the descriptive statistics of all variables used in the empirical analysis for the overall sample, men and women. Females comprise 20 percent of

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[10] Out of 80,390 individuals surveyed in 2006 and 2012. In 2012, the self-employed represent 10 per cent of individuals surveyed; the unpaid family workers represent 8 per cent while the employers represent 11 per cent.

the sample. The mean age is 36 years, with an average of 11 years of schooling. In addition, 46 percent work in the public sector, and 54 percent live in urban areas with an average household size of 5 individuals.

Table 1: Descriptive statistics

	Overall Sample		Men		Women	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Commuting time	29.31	28.33	31.03	30.05	22.32	18.31
Daily working hours	8.32	2.12	8.57	2.16	7.3	1.55
Weekly working hours	47.26	14.53	48.79	14.91	41.02	10.85
Working days	5.67	0.94	5.69	0.99	5.59	0.72
Log hourly wage	1.18	0.83	1.2	0.81	1.14	0.89
Female	0.2	0.4				
Age	35.86	11.3	35.46	11.38	37.47	10.85
Education: No school	0.18	0.38	0.21	0.4	0.07	0.26
Basic education	0.15	0.36	0.18	0.38	0.04	0.19
Secondary education	0.38	0.48	0.37	0.48	0.4	0.49
Post-secondary education	0.29	0.45	0.24	0.43	0.49	0.5
Marital status: Single	0.27	0.44	0.28	0.45	0.22	0.42
Married	0.71	0.45	0.72	0.45	0.68	0.47
Widowed or divorced	0.03	0.16	0.01	0.09	0.09	0.29
HH size	4.99	2.22	5.12	2.31	4.49	1.7
Urban	0.54	0.5	0.5	0.5	0.69	0.46
Public sector	0.46	0.5	0.39	0.49	0.76	0.42
Governorate level variables:						
IV: Number of accidents	616.04	561.74				
Public sector employment, %	8.25	8.78				
Population, millions	4.16	2.13				
N		12209		9797		2412

Source: Author's calculations based on ELMPS 2006 and 2012.

3.2. The main concepts

3.2.1. Commuting time

Commuting time is measured as the time taken one way to travel from home to work in minutes.[11] The costs of commuting consist of monetary costs and time. Commuting time is said to be a better measure of the commuting costs than the commuting distance. This is based on the assumption that the time lost in commuting is the main component of travel cost (Gutiérrez-i-Puigarnau & van Ommeren, 2014). Furthermore, commuting time is mainly a function of the mode of transportation and distance (Laird, 2006).

In Egypt, the mean commuting time for all wage workers is 29 minutes, irrespective of gender. This suggests that the commuting cost is substantial because only a small number of workers accept a relatively long commuting time. If the cost of commuting was small, more workers would be willing to take longer commutes (van Ommeren & Fosgerau, 2009).

There is a gender difference in commuting time in Egypt, where males commute for 34.8 minutes on average compared with 23.4 minutes for females in 2012, a gap of 11.4 minutes This is in line with the literature (for example, Neto et al., 2015). Furthermore, these differences are present by marital status. Married women have lower commute times than single and widowed/divorced women. Single and widowed/divorced women have similar commuting times. However, married men have the highest commute times, followed by single men, while widowed/divorced men have the lowest commute time.

3.2.2. Number of car accidents

One of the main problems in the estimation of the effect of the commute time on labor supply and earnings is the endogeneity problem. This problem arises from the fact that unobservables might affect both commuting time and labor market outcomes. Hence, it is necessary to use an instrumental variable that satisfies the exclusion restriction. This instrument should be related to the main independent variable (i.e., commuting time) but not to the outcome variables (i.e., wages or labor supply).

The instruments suggested in the literature are the mode of travel, Km of roads per capita in the governorate, and car density (Niebuhr et al., 2012; Russo et al., 2014). However,

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[11] Commuting time is a recall question. In general, recall questions are perceived as not precise compared to time-use diaries. However, individuals usually remember perfectly how much time on average they spend every day travelling from home to work. Hence, the commuting time data is not affected by recall bias (Ruppert et al., 2009).

we believe that all these instruments might feature strength but not goodness in satisfying the exclusion restriction. These factors affect both the commute time and our dependent variables.

To tackle this problem, this study uses the number of accidents on the road as an instrumental variable that is meant to proxy for the commuting time. The number of accidents is defined as accidents resulting from an unintentional collision of any vehicle that results in at least one of these: death, injury, or ruin in the car. This data is on the Governorate level and retrieved from CAPMAS. Out of 27 governorates, 22 are represented in the ELMPS (Assaad and Krafft, 2013). Administratively, the governorate is the second unit after the national level (Assaad, 2002). The number of car accidents in 2012 is 15,516 compared to 18,061 in 2006, a decline of 14 percent.

3.2.3. Labor market outcomes

The labor market outcomes studied in this paper are earnings and labor supply. Earnings are measured by hourly wage in a log format. The average hourly wage is 5 Egyptian pounds. The wages vary according to marital status, where single women earn an hourly wage of almost 3 Egyptian pounds while married women earn 6 Egyptian pounds. Wages in urban areas are, on average, higher than those in rural areas. However, monthly wages are lower for women than men in both areas.

Labor supply is measured by actual daily working hours, weekly working hours, and the number of working days. Working hours in ELMPS is measured as the number of hours per day spent on market work. On average, wage workers work about 8 hours per day and an average of 47 hours per week. There is a gender difference in working hours where females work 41 hours per week on average, compared to males who work 49 hours. However, there are no clear-cut differences in the number of working days.

3.2.4. Control variables

A number of control variables are included in the estimation. Controlling for individual, household, and work characteristics in addition to governorate level variables helps improve the estimates' efficiency. In addition, including control variables helps verify that the instrument provides exogenous variation by comparing the estimates before and after controlling. At the governorate level, we include the percentage of individuals employed in the public sector in addition to the population size in millions.

We control for the level of educational attainment since education is a determinant of wages, and it is expected to have a positive effect on commuting time. Age is also a determinant of wages in the sense that it is considered a proxy for experience. It is expected to have a positive association with commuting time (Turner & Niemeier, 1997). The residence area controls for differences of individuals between urban and rural areas. The marital status and number of the individuals in the household are also controlled for. Household characteristics are important control variables as they might influence the working decision.

4. Empirical Strategy

The main question investigated is how commuting time affects the labor market outcomes of wage workers, especially their wages and labor supply in Egypt, using panel data for the years 2006 and 2012. As mentioned in the previous section, the four outcome variables considered are the log of hourly wage, daily working hours, weekly working hours, and working days. The main independent variable is the commuting time to work. One of the main issues in estimating such a model is that commuting time may be endogenous with respect to labor supply and wages, mainly suffering from reverse causality.

Our relationships are estimated using four different methods: FE, RE, FEIV, and REIV, where the variable commuting time is treated as an endogenous variable in the FEIV and the REIV estimation, specifically employing an instrumental variable for commute time using a two-stage least squares regression. In the first stage regression, the endogenous explanatory variable is regressed on a separate variable known as the instrument. In order to satisfy the exclusion restriction, the instrument should be correlated with the causal variable of interest (commuting time) but uncorrelated with any other determinants of the dependent variable (i.e., the instrument is uncorrelated with the error term). In the second stage regression, the predicted values of the endogenous variable are used in place of the endogenous variable. This method solves the endogeneity problems and allows for unbiased estimation of the impact of the endogenous variable on the dependent variable (Angrist & Pischke, 2008).

The IV used for the commuting time is the number of accidents on the governorate level, which satisfies the exclusion restriction. The number of accidents is a source of exogenous variation in commuting and does not directly affect wages or unemployment. The accidents should affect the length of the travel time to work not related to economic

performance and regional labor market conditions. The number of accidents is considered a valid instrument for commuting time since accidents are frequent on the roads and result in traffic jams that increase the travel time to work. To increase the satisfaction of the exclusion restriction, we controlled for variables on the governorate level. The other explanatory variables are treated as exogenous controls in the REIV and FEIV estimation. In both the first and second stage, the standard errors are clustered on the governorate level to account for the fact that the instrument is measured at the regional level.

One of the benefits of using the statistics on the accidents at the governorate level is that it is not related to the individual labor supply and wages. If the number of accidents was on the individual level, an increase in the number of working hours would increase the likelihood of tiredness and hence increase the probability of having a car accident. Another argument could be that workers with a higher risk of individual accidents can ask for hazard pay to increase their wages. However, the labor market situation in Egypt suffers from informality where individuals usually work without a contract or medical insurance (Assaad and Krafft, 2020; Barsoum, 2015; Wahba and Assaad, 2017). Therefore, it would be unlikely to get hazard pay from accidents outside the occupation.

Another argument against using the instrument could be that individuals choose their residential and work locations. However, as explained in the background on the housing market in Egypt, the choice of these locations is not flexible. The housing market choices are based on financial abilities rather than proximity to work (Beidas-Strom et al., 2009).

One could argue that the wages are related to the number of accidents where firms compensate for commuting costs via higher wages. Commuting costs include monetary and non-monetary costs, with the latter including psychological costs (i.e., stress and traffic jams) originating from car accidents. Thus, the number of car accidents may be related to higher wages. However, Tansel et al. (2020) have provided evidence that supports that the segmentation theory is more prevalent in the Egyptian labor market, where there is a wage gap between informal and formal employment, as indicated previously. Based on this evidence, we argue that the exclusion restriction is fulfilled. The number of car accidents is expected to affect the commuting time but does not affect the labor market outcomes. To increase the strength of the instrument, we control for other covariates.

When using the instrumental variable approach, one crucial issue is the local average treatment effect (LATE). LATE is the average treatment effect for the target population of

the instrument (i.e., individuals who get treated due to changes in the instrument) (Angrist & Pischke, 2008; Imbens & Angrist, 1994). In the case of using another instrument, the LATE will be different for each instrument due to differences in the targeted populations (Imbens & Angrist, 1994).

The first-stage estimates of the commuting time and the strength and endogeneity test results are presented (Table A.1). As expected, the number of accidents positively affects commuting time (the endogenous variable). The instrument's strength is conducted through an f-test of the instrument's significance. The f-statistic of the accidents' significance for the overall sample and sub-samples of men and women is shown. The F-statistic is significant. In addition, the test statistics are higher than the critical values of Stock and Yogo (2002) and higher than the rule of thumb of 10 provided by Staiger and Stock (1997). Hence, the number of accidents is a strong instrument.

The RE and REIV are reported since they allow for controlling for the individual fixed characteristics such as gender. Random-effects models also allow controlling for the variables that change over time within persons, such as age. A central and strong assumption of random-effects models is that the variation between persons is assumed to be random and uncorrelated with the independent variables included in the model. Given that this strong assumption might be violated where there might be unobserved factors that affect both the time devoted to commuting and work hours/wages, we also include the FE estimations to assess the change in the magnitude of the results if we relax this assumption.

The fixed effects method captures within-individual differences and control for time-constant observable and unobservable characteristics. The unit of analysis is person-year observations, so in our case, following individuals between 2006 and 2012. These observations are used to calculate within estimates of labor market outcomes for each individual. It demeans the equation for all variables within individuals. This strategy eliminates time-constant unobserved heterogeneity (α_i in $equation$ 1). Hence, the fixed-effects model controls for unobservable individual characteristics that do not change over time, such as ability, preferences, and aspirations. Given this demeaning nature, the estimation includes time-varying variables and drops time-constant variables (Brüderl and Ludwig, 2015).

$$y_{it} = X_{it}\beta + \alpha_i + \varepsilon_{it} \tag{1}$$

5. Results: Labor market outcomes by gender

Due to the potential endogeneity of the commuting time, we present the endogeneity-corrected results by using the number of accidents as an instrumental variable in the REIV and FEIV models and the uncorrected estimates obtained from the RE and FE models (Table 2). In light of the reviewed literature and the differences in household responsibilities, the effect of commuting time may vary according to gender; hence it is helpful to differentiate between male and female workers.

The FE and RE show a positive relationship but small in magnitude between commuting time and wages for the overall sample and men (yet insignificant). However, the effect is mostly negative for women with or without the endogeneity correction (also insignificant). This shows that commuting time does not significantly affect hourly wages for both men and women. The result is still the same after correcting for the endogeneity and the reverse causality problem through using the instrumental variable approach coupled with FE and RE. This is in line with the results of Wang et al. (2020) in Urban China, where they found no effects of commuting time on wages for the whole sample using FE and FEIV.

In an effort to understand the effect of commuting time on labor supply, I studied the effect on daily working hours, weekly working hours, and the number of working days. Looking at the labor supply, contrary to the impact on wages, the results are robust to the estimation method whether FE, RE, or REIV is used. It is found that the time devoted to commuting has a positive and statistically significant relationship with the daily working hours of the overall sample and men. This result is in line with the results of Wang et al. (2020) for the whole sample. The magnitude of the effect is the same for men and women, but there are differences in the results' significance. This result shows that men devote more time to work in relation to the increase in commuting time. It can explain why men prefer to stay longer at work to avoid commuting during the rush hours, as demonstrated by previous literature.

For women, the RE model shows that commuting time has a small positive and significant effect on the daily working hours. Although this effect is insignificant for women when estimated using FE, REIV, or FEIV, the magnitude and the sign of the effect are similar. This shows that women can increase their daily working hours slightly so as not to take from the time devoted to their household responsibilities, in line with the Household Responsibility Theory. This result is in line with the results of Gutiérrez-i-Puigarnau and

van Ommeren (2010), who found a positive impact of commuting distance on women's daily working hours in Germany.

Comparing the effect on the daily working hours, the weekly working hours, and the number of working days, we do not see an effect of commuting time on women's working hours and the number of working days over the whole week as a result of an increase in their commuting time. This shows that women might increase their daily working hours in response to a rise in the commuting time but are with no effect on the weekly labor supply. This is contrary to the results of Gutiérrez-i-Puigarnau and van Ommeren (2010) and Gutiérrez-i-Puigarnau and van Ommeren (2014). The former found small positive effects on the weekly labor supply in Germany. The later found positive and significant effects of commuting time on the weekly working hours for women in the UK.

On the contrary, men increase their daily (FE, RE, and REIV estimates) and weekly labor supply (RE and REIV estimates) in response to increased commuting time. It confirms that men are more likely to work longer hours (on a daily and weekly basis) when the commutes are long, while women might work longer on a specific working day but not for the whole week. Furthermore, this effect for women can result from a trade-off between longer working hours per day and fewer working days. This result is at odds with the result found by Wang et al. (2020), which showed that the effects of commuting time on labor supply are unaffected by gender.

Table 2: Effect of commuting time

	FE	RE	FEIV	REIV
Overall sample				
Log hourly wage	0	0.001	0.125	-0.056
	(0.000)	(0.000)	(0.709)	(0.048)
Daily working hours	0.003**	0.007****	0.672	0.067**
	(0.002)	(0.001)	(3.683)	(0.028)
Weekly working hours	0.009	0.027****	4.961	0.463*
	(0.010)	(0.006)	(26.981)	(0.250)
Working days	-0.001	-0.001***	0.177	0.009
	(0.001)	(0.000)	(0.970)	(0.016)
Men				
Log hourly wage	0	0.001	0.05	-0.055

	(0.000)	(0.000)	(0.209)	(0.046)
Daily working hours	0.004**	0.008****	0.401	0.067**
	(0.001)	(0.001)	(1.128)	(0.027)
Weekly working hours	0.01	0.027****	2.57	0.481*
	(0.009)	(0.006)	(7.321)	(0.248)
Working days	-0.001	-0.001**	0.027	0.011
	(0.001)	(0.000)	(0.138)	(0.014)
Women				
Log hourly wage	-0.001	0.002	-0.033	-0.053
	(0.002)	(0.001)	(0.068)	(0.068)
Daily working hours	-0.002	0.005***	0.065	0.053
	(0.004)	(0.002)	(0.348)	(0.072)
Weekly working hours	-0.013	0.015	-0.959	0.199
	(0.024)	(0.011)	(3.496)	(0.498)
Working days	0	-0.001	-0.289	-0.01
	(0.002)	(0.001)	(1.112)	(0.041)

* p<0.10, ** p<0.05, *** p<0.010, **** p<0.001. Clustered standard errors on the governorate level in parentheses. Total sample size is 12209, women: 2412 and men: 9797
Source: Author's calculations based on ELMPS 2006 and 2012.

6. Discussion

Women in Egypt suffer from a commuting gender gap where they have limited geographical mobility compared to men. In this research, we identify the impact of the commuting time by gender using Egypt's labor market panel survey for the years 2006 and 2012. In the empirical analysis of the effect of the travel time to work, we take into consideration that the commuting time, the working hours, and the accepted wage level are selections that the individual makes. Hence, a 2SLS model using the number of accidents as an instrument for commuting time is used to address the potential endogeneity. In addition, the panel data used in this paper allows for identifying the effect of commuting time on labor market outcomes taking into account individuals' heterogeneity.

One of the main findings of this paper is that commuting time does not have a significant effect on hourly wages. The impact of the commuting time on the daily and weekly labor supply is generally positive for men. The effect is only positive for women on daily working hours. However, the effect is negative but statistically insignificant on

women's working days and positive on working hours per week. This shows that they respond to an increase in commuting time by working more hours per day and fewer days per week, given their household responsibility. In addition, it shows that the commuting time is mainly a fixed cost with an effect on the daily working hours and is not a variable cost for women where it does not affect their choice of weekly labor supply (Black et al., 2014; Cogan, 1981).

In contrast with empirical evidence in Germany and the UK, commuting time does not have an impact on women's weekly labor supply in Egypt. The differences in the results might be due to using the exogenous firm relocations in the case of the UK and Germany, while this paper uses the number of accidents. This shows that the results, in the case of Egypt, are valid for using the instrument "number of accidents." This means that accidents might change commuting for some individuals, affecting their labor market outcomes through that instrument, the local average treatment effect (Angrist & Pischke, 2008; Imbens & Angrist, 1994).

Policy Implications derived from our results regarding the impact of the length of travel time to work are as follows. On the individual level, changes in residential patterns might be necessary; individuals can decrease their commuting time by changing their residential location. The negative effect on women's weekly labor supply present in decline in the number of days can be overcome by inducing employers to have more flexible working conditions and family-friendly policies for women like working from home. This can make it easier for women to accommodate their work and household responsibilities and overcome the time disadvantage. In addition, companies can provide employees with transportation options that can help save on commuting time and costs. Therefore, policies that allocate land for businesses next to residential locations are needed. In addition, there is a need to increase the availability, coverage, and safety of public transportation coupled with improving the road infrastructure and their safety level to avoid traffic congestion. These policies can help decrease the commute time in general and increase women's labor supply.

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Appendix

Table A.1: First stage results

	Overall Sample	Men	Women
IV: Accidents number	0.003	0.002	0.003*
	(0.002)	(0.001)	(0.002)
Age	0.452**	-0.113	0.486*
	(0.209)	(0.226)	(0.243)
Age squared	-0.006**	0.001	-0.007**
	(0.002)	(0.003)	(0.003)
Education: No school			
Basic education	3.131**	2.478	2.730**
	(1.156)	(2.758)	(1.210)
Secondary education	4.903****	0.591	5.856****
	(1.043)	(2.595)	(1.198)
Post secondary education	6.032****	1.403	7.866****
	(0.982)	(2.697)	(1.143)
Marital status: Single			
Married	0.747	-1.716	1.33
	(0.877)	(1.508)	(0.981)
Widowed or divorced	-1.469	0.351	3.219
	(1.792)	(1.855)	(3.719)
HH size	-0.157	-0.141	-0.247
	(0.265)	(0.250)	(0.299)
Urban	-6.443***	-0.74	-6.900****
	(1.720)	(1.219)	(1.765)
Public sector	-3.716***	-3.114*	-1.134
	(1.246)	(1.629)	(1.240)
Governorate level variables:			
Public sector employment, %	0.089	0.265****	0.051
	(0.105)	(0.067)	(0.118)

population, millions	1.222**	0.428	1.389**
	(0.548)	(0.335)	(0.633)
Constant	15.212****	23.512****	14.812***
	(3.759)	(4.334)	(4.139)
N	12209	2412	9797
F-statistic on the excluded instrument	42.657	102.177	36.498
P-value	0	0	0

* p<0.10, ** p<0.05, *** p<0.010, **** p<0.001

The instrument used for the commuting time to work is the number of accidents on the governorate level in Egypt. Clustered standard errors on the governorate level in parentheses.

Source: Author's calculations based on ELMPS 2006 and 2012.

Chapter 3 – Standard or Not? The Effect of Different Types of Employment Transitions on Mental Illness's Prevalence, Depth, and Severity for Youth (Article 2)

Abstract

Youth face compounded difficulties from the widespread use of nonstandard employment. This paper investigates the effect of transitioning from nonemployment into employment on the psychological health of youth younger than 30 years old. The novelty of this research lies in differentiating between various types of nonstandard jobs by estimating the impact on the extensive margins of the prevalence of the illness and the intensive mental illness margins, precisely, depth and severity. Using panel data, the impact of various employment transitions on mental illness is estimated by matched difference-in-differences design. The mental health rewards for standard employment are larger on the illness's severity than prevalence and depth. Transitioning to temporary, seasonal, and casual jobs has the same effect on mental health as staying in nonemployment. The psychological benefits are gendered. The gain for women is on the prevalence of mental illness, while men see an improvement in the depth and severity. For women, job formality is considered more important for mental health outcomes, while for men, transitioning to a permanent job yields mental health rewards. More consideration for the various types of employment and mental illness is required when studying nonstandard employment.

1. Introduction

(Un-)employment is considered a determinant of wellbeing. The negative impacts of unemployment and becoming unemployed on wellbeing and health are well-documented (Kivijärvi et al., 2020; Liu et al., 2017; Rokicka et al., 2018; Voßemer, Gebel, Nizalova, et al., 2018). Some researchers have focused on the moderating role of specific policies such as social inequality and education policies (Högberg et al., 2019; Taht et al., 2020). Other papers show positive effects of obtaining employment or reemployment on general and mental health status (Carlier et al., 2013; Gebel & Voßemer, 2014). However, few papers investigated the role of nonstandard employment (NSE) on mental health, particularly for youth.

The rise of NSE raises concerns about its impact on the wellbeing of individuals. These jobs lack stability and security (Sverke et al., 2006) and are more prone to poor working conditions (Benach et al., 2004; Fabiano et al., 2008). As a result, job insecurity is increasingly widespread in labor markets (Kalleberg, 2018).

Youth are highly vulnerable to engaging in and accepting nonstandard employment. In most EU countries, youth witnessed a rise in their share of temporary employment (Chung et al., 2012). The problem is exacerbated by their entrapment in these positions, suffering from an inability to transition to good jobs (Stuth & Jahn, 2020). Focusing on the whole working-age population can hide differences across various age groups. Given that employment and career stability perceptions (Morgenroth et al., 2021), fear of the consequences of job loss (Glavin, 2015), and the chances of reemployment (de Witte, 1999) differ when comparing early working age with older workers. Hence, it is crucial to study how the transition from nonemployment (unemployed and inactive individuals) to NSE affects young people's mental health.

Mental health is a crucial dimension of youth wellbeing but mainly ignored consequence of employment transitions. The existing literature concentrates on life satisfaction and general health outcomes for the working-age population and differentiates between temporary versus permanent employment as the primary labor market segmentation (de Cuyper & de Witte, 2007). An exception is Karabchuk and Soboleva (2020), covering the differentiation between permanent, temporary, and informal employment. They investigate the impact on wellbeing across European countries for the working-age population. However, studies on the mental health effect of NSE are limited and cross-

sectional. For example, Pirani (2017) considers the impact of some types of NSE, mainly temporary, casual, and involuntary part-time, on mental health outcomes in Italy for the working-age population using cross-sectional data. Hence, the literature is scant in differentiating between standard and NSE types and their effect on young people's mental health.

Against this background, our contribution to this literature is fourfold: 1) identifying the impact of permanent, temporary, and seasonal/casual work and formal versus informal employment compared to staying in nonemployment for youth younger than 30 years old. 2) using new variables that capture the intensive margins of mental health to account for the distribution of the mental illness (MI) beyond the cutoff point utilizing depth and severity variables. This is crucial to show the prevalence of MI and the distribution of the illness among those who are sick. Previous literature on mental health and wellbeing focused on the prevalence of MI through using dichotomized variables (Pirani, 2017) or the number of symptoms available of psychological distress (Sharaf & Rashad, 2020; Strandh et al., 2013) or the use of a life satisfaction scale (Gebel & Voßemer, 2014; Voßemer, Gebel, Täht, et al., 2018) or self-reported health (Tattarini & Grotti, 2022; Voßemer, Gebel, Täht, et al., 2018). This study complements these previous studies by examining the effect of employment transitions on the extensive margins of MI, precisely the number of symptoms and prevalence, and on the intensive margins of MI, namely depth and severity. 3) examining the gendered effect of job characteristics. We estimate the heterogeneous effects by gender to highlight the differences in the impact of employment transitions for men and women. For example, previous research has shown that women are concentrated in precarious jobs (García-Pérez et al., 2017), which might render them more vulnerable to job insecurities than men and impact their mental health outcomes differently. Finally, 4) depending on panel data, we use matched difference-in-differences to obtain an estimate of the causal impact of employment transitions on mental health. The matching allows us to account for a rich set of confounders. The difference-in-differences (DiD) estimates are based on individual differences in outcomes over time and eliminate the time-constant unobservables.

Egypt is an excellent case to study the effect of NSE, given that mental illness is under-researched in this context and the widespread use of various forms of employment, especially across youth. In particular, informal employment is rampant due to the sizeable informal sector; temporary work has risen due to the introduced flexibility in the labor market; furthermore, casual and seasonal work is common due to the considerable

agriculture and construction sectors) (Assaad, 1993; Roushdy & Sieverding, 2015; Wahba & Assaad, 2017).

Three main questions guided the research for this paper: 1) what is the effect of transitioning from nonemployment to various employment statuses on youth's mental health, differentiating between permanent, temporary, and seasonal/casual employment and formal and informal employment? 2) are there differences in the effects of MI prevalence, depth, and severity? Finally, 3) what are the differences in the impact between men and women?

2. Background and hypotheses

2.1. Youth and NSE in Egypt

Before delving into the status of NSE for youth in Egypt, concepts of NSE are introduced. Temporary employment (fixed-term employment) is a regular job with a predetermined duration. Permanent employment is an indefinite work agreement (Assaad & Krafft, 2020; Roushdy & Sieverding, 2015; Wahba & Assaad, 2017). Both employment types are considered regular jobs but can be formal or informal (Assaad & Krafft, 2020). Casual and seasonal jobs are available on a daily basis or in a particular season (highest level of instability and irregularity) and are mainly informal (Assaad & Krafft, 2020; ILO, 2016; Roushdy & Sieverding, 2015; Wahba & Assaad, 2017). Informal work is employment without a contract or social security (Roushdy & Sieverding, 2015). In this paper, informal, temporary, seasonal, and casual employment are considered NSE.

Youths in Egypt are concentrated in NSE (Assaad & Krafft, 2020; Roushdy & Sieverding, 2015). In 2014, youth witnessed a decline in permanent employment from 54 percent in 2009 to 46 percent. More than half of the youth are concentrated in temporary, seasonal, and casual employment (Roushdy & Sieverding, 2015), rendering them vulnerable to insecurities and uncertainties. Informal employment is still the primary source of employment for youth. In 2014, almost 80 percent of youth were working in informal employment (Roushdy & Sieverding, 2015).

2.2. NSE and mental health

From a theoretical perspective, job security (or the lack of it) and poor working conditions explain the relationship between work and mental health. According to the job strain model (Karasek, 1979) and the job demands-resources model (JD-R) (Bakker & Demerouti, 2007),

job insecurity means that individuals are falling under the threat that their employment might be terminated against their will. According to the job strain model, this low level of job security is named low job control. This insecurity gives a sense of powerlessness and inability to continue in a job (Greenhalgh & Rosenblatt, 1984). The low job control comes from a higher risk of job loss, lack of income, and a necessity to secure a job afterward, increasing individual stress levels (Clarke et al., 2007; Ferrie et al., 2008). According to the job demands-resources model, the job resources cover the rewards that the individual receives from a job, including the wage, the opportunities to be promoted and supported by colleagues, and the level of job security, among others. The lack of these resources leads to disengagement and stress, increasing mental distress. These various factors of job strains and lack of job resources affect the wellbeing of individuals and are expected to increase the mental distress that they witness. As Siegrist (1996) suggests, if there is an imbalance between effort and reward, the individual might suffer from psychiatric disorders.

Heightened levels of job insecurity in NSE can be due to the absence of the contract in the informal jobs or the fixed-term nature of employment (employment that runs for a short and predetermined term) (Benach et al., 2004). Hence, individuals working in these jobs are subjected to low levels of job control with a high expectation of job loss. The anticipation of job loss is higher for informal employment since they work without a contract. Temporary workers are expected to see higher mental health benefits than seasonal and casual workers, given the longer duration of employment for temporary workers. On the other hand, individuals working in permanent or formal employment have a high level of job security. This means that they are not at risk of losing their jobs and have better expectations for the future. Hence, they have higher job control and resources, which is reflected in fewer stressors at work and thus better mental health.

Poor working conditions can further explain the effect of NSE on mental health. Job demands are what is required in the job and how that puts pressure on the individual and leads to exhaustion. One can understand the job requirements as the workload, the number of working hours, or working in a hazardous environment (Bakker & Demerouti, 2007; Karasek, 1979). The varying working conditions between standard and NSE can be seen as stressors for individuals working in the latter. The nature of nonstandard jobs lends itself to poorer job characteristics than permanent employment (Warr, 2017). The lack of stability and security is a prominent feature of these jobs (Sverke et al., 2006). They are also more prone to poor working conditions, including high working hours, hazardous work situations,

and a higher risk of occupational injuries (Benach et al., 2004; Fabiano et al., 2008). Informal employment is not protected by the labor law nor insured by health or social insurance. This can be reflected in poorer working conditions and higher job demands than formal employment. This combination of low job control and high job demands is considered a source of stress in employment (Karasek, 1979). Hence, transitioning to NSE is expected to affect workers' mental health negatively.

The mental health effect is identified by comparing those in different employment situations to those who stay in nonemployment. On a scale of job security, NSE is between nonemployment and permanent employment (de Cuyper et al., 2008; Taht et al., 2020). Nonemployment represents the highest job insecurity, and permanent employment represents the most secure job. Temporary employment is supposed to provide a higher security level than seasonal and casual employment. Seasonal and casual jobs are irregular, so they are inferior to temporary jobs (Assaad & Krafft, 2020; Roushdy & Sieverding, 2015). Suppose the outcomes of those in NSE are compared to permanent employment. In that case, this is an upward comparison. If NSE is compared to nonemployment, this is considered a downward comparison (Gebel, 2013). We consider only the downward comparison since nonemployment is the most prevalent state for young workers (Barsoum et al., 2014). Against this background, I expect:

Hypothesis 1: On average, becoming employed compared to remaining non-employed increases the mental health of the young workers.

Hypothesis 2: The transition from non-employment to non-standard employment results in lower mental health rewards from finding a job where those in informal employment are expected to have the lowest level of mental health rewards compared to the formally employed, and those who have seasonal, casual employment are expected to have worse mental health than temporary employment, while the three are expected to be inferior to permanent employment regarding the mental health rewards.

2.3. Gender and mental health

When inequality in the labor market and housework exists, a gendered effect of employment on mental health is expected (Strandh et al., 2013). Varying gender roles across countries in particular and their evolution over time will result in a different impact of employment on the wellbeing of men and women (Hammarström et al., 2011; Reneflot & Evensen, 2014; Strandh et al., 2013). The traditional gender roles indicate that men are the breadwinners

while women are the housemakers. These gender roles result in unemployment negatively affecting men more than women (Jahoda, 1982). Men are expected to have the highest benefit from the transition to employment, given their role as primary breadwinners. This means that women are the primary housemakers regardless of their employment status. The fear of losing a job and the consequences of insecurity due to this loss is less pronounced for women than men. Men would value their transition to employment compared to women, given their situation in the household as the source of economic security (Morgenroth et al., 2021). Based on this, I expect gender differences in the impact of transitioning to employment. In particular,

Hypothesis 3 On average, the transition from nonemployment to employment has a larger positive mental health effect for men than women.

Women might be forced into NSE, namely involuntary part-time work or temporary employment (Menéndez et al., 2007). Given their status as primary housemakers, women are pressured to reconcile work and family, putting extra pressure on them. If women are working in NSE, they will be under further stress of irregular working hours and worsening working conditions which is expected to affect their mental health compared to men negatively. In addition, they will have a heightened fear of losing their nonstandard jobs when they become mothers—continually fearing that their employment will not be renewed after the maternal leave (Morgenroth et al., 2021) or due to the repeated career breaks and interruptions (Hipp, 2020). Working in informal employment will worsen the situation for women because they are not entitled to health insurance, social security, or maternity leave. This means that their risks are higher, putting a further negative burden on their wellbeing in such insecure jobs.

As a result, gender differences are expected in the effect of transitioning to NSE on wellbeing. Therefore it is expected:

Hypothesis 4a The transition from nonemployment to NSE results in less mental health reward for women compared to men.

Hypothesis 4b The transition from nonemployment to formal employment is expected to have the highest mental health reward for women compared to men.

3. Data and methods

3.1. Data and sample

Research for the paper is based on the nationally representative panel data of the *Survey of Young People in Egypt* (SYPE) for the years 2009 and 2014 (OAMDI, 2017). For our analysis, this data set was optimal. It covers essential areas about youth in Egypt, notably their transition to employment and health status. I chose this data set over *Egypt Labor Market Panel Survey* (ELMPS) since the latter does not have detailed mental health questions. The 2018 wave of ELMPS introduced new questions about MI. However, their unavailability in previous waves does not allow us to conduct panel data analysis.

The SYPE sampled 15,029 and 10,916 individuals, respectively, the latter comprising 72.6 percent of the former number. The reason behind the attrition was household unit non-response (9 percent) and the inability to track respondents who had relocated (14 percent). I accounted for attrition in the descriptive statistics and the estimations using weights (Roushdy & Sieverding, 2015).

Several restrictions are implemented to reach the analytical sample. The sample in 2014 starts with youth who are under 30 years old. I first dropped those who were not interviewed in 2009 but interviewed in 2014 to measure the transitions. Next, individuals who are enrolled in education are excluded, accounting for 3,860 individuals. Given our main transition and control group definitions, the individuals needed to be non-employed in 2009. In other words, the individuals who were employed in 2009 are excluded from the analysis. The final analytical sample represents 2,561 individuals younger than 30 years old, not enrolled in education in 2014, or was non-employed in 2009.

3.2. Outcome and treatment variables

3.2.1. Outcome variables: MI prevalence, depth, and severity

The self-reporting questionnaire (SRQ-20) is used to calculate the outcome variables. It consists of 20 questions with a yes and no answer, designed by the WHO to count the number of MI symptoms that the individual endures. The questionnaire captures and identifies mental disorders as a screening test in developing countries (Beusenberg & Orley, 1994). The number of 'yes' answers reflects the respondents' score, with a higher score indicating a mental disorder and ranges between zero (no symptoms of MI) and 20 (the individual suffers from all symptoms of MI).

Three main MI variables (*Y*) measure the wellbeing of youth, namely, prevalence, depth, and severity, following the methodology implemented by Bilger et al. (2017). The MI prevalence is mainly a psychological health index of whether the person is ill or not, measured using the SRQ-20, capturing the extensive margins. A positive screen of MI prevails at the cutoff score of eight (*c*). Many studies have used this threshold in Egypt and Syria (Roushdy & Sieverding, 2015). Accordingly, the mental health dummy variable is zero for those with no MI (less than eight symptoms) and one to show the prevalence of mental distress (eight or more symptoms). In the equation below, *Y* is the outcome variable, *c* is the MI cutoff point, and *a* is a parameter that sets the sensitivity of the MI measure to deviations above the cutoff point. When *a = 0, Y* measures the MI prevalence of whether the individual is sick or not. For example, in this case, a person with seven or fewer symptoms is less below the threshold, and *Y* will take the value of zero, while *Y* will take the value of one for a person with eight or more symptoms.

$$Y = \begin{cases} (ns - c)^a \ if \ ns \ \geq \ c \,, \\ 0 \ otherwise \end{cases}$$

The outcome variable is used as a metric for the primary robustness check. In this case, the outcome variable captures the number of symptoms (*ns*, ranging from zero to 20). The choice of the cutoff point is a core criticism in this prevalence measure of MI. Although, several studies validated the selection of eight as a cutoff point in Egypt and other countries (Roushdy & Sieverding, 2015). The number of symptoms is used as an outcome variable to conduct sensitivity analysis regarding the cutoff point.

The prevalence measure is insensitive to the uneven distribution of illness beyond the threshold. For example, a person who suffers from nine symptoms is treated evenly as a person who suffers from twenty symptoms. The prevalence measure is not indicative of how ill the individual may be. Therefore, it is necessary to account for MI distribution above the MI threshold. The depth and severity of the illness are used as outcome variables to account for this caveat.

The depth of the MI variable is zero for those who are healthy (have less than eight symptoms) and continuous for the ill people, which measures the level of illness relative to the threshold (one or more symptoms). In this case, *a = 1, Y* measures how far the *ns* of ill individuals lie above the threshold. For example, *Y* takes the value of one for a person with eight symptoms and a value of 13 for a person with 20 symptoms and takes zero for all

individuals with seven or fewer symptoms. In other words, the depth variable captures the distance from the MI threshold.

The severity of MI takes zero for those with less than eight symptoms (i.e., healthy). It squares the difference between the number of symptoms and the threshold for those with eight or more symptoms (i.e., squaring the depth index of MI). In this case, $a = 2$, Y increases quadratically above the threshold. For example, a person with nine symptoms will get a depth score of two and a severity score of four. The severity variable shows how severe is the mental health burden for the youth. Both the depth and the severity measures capture the intensive margins of psychological illness.

3.2.2. Treatment variables: Employment transitions from nonemployment

This paper focuses on the type of employment and contractual agreement to assess the effect of objective job security on mental health. Using the two waves of panel data, the treatment variable concerns the transition from nonemployment to employment, particularly between 2009 and 2014. Therefore, I start with non-employed in 2009 and observe those who transition to various jobs. The comparison is made relative to those who remained in nonemployment status in 2009 and 2014, the control group. The control for all instances is remaining in nonemployment. The treatment is transitioning to a job, differentiating between permanent, temporary, seasonal/casual, formal, or informal.

3.3.   Method

I conducted a matched DiD analysis between the treatment and the control group. This semi-parametric method has been used in previous literature to estimate the effect of employment transitions and unemployment on wellbeing outcomes (Gebel & Voßemer, 2014; Unger et al., 2018). This identification strategy tackles both observables and fixed unobservables. Furthermore, since panel data is used, the estimator is based on individual differences in outcomes over time, differencing results that remove time-constant confounding factors (Lechner, 2010).

The implementation of this method starts with conducting the propensity score matching (PSM) based on observed baseline characteristics, the confounders. The treated observation is defined as an initially non-employed individual who will witness an employment transition in the following period. Hence, the treatment is witnessing an employment transition from nonemployment to permanent, temporary, or seasonal/casual jobs and formal or informal contracts. Each treated observation is matched to the control

observation. This control group consists of those who start as non-employed and remain so during the whole period.

The PSM is conducted before differencing to choose the initial control group with statistical similarity to the treated group (Gangl, 2015). One of the main assumptions of DiD is the common trend assumption. This assumes no potential differences between the treatment and control group in their outcomes if both groups were not subject to treatment. The matching guarantees that the treatment and control groups are statistically similar concerning confounders. It makes the common trend assumption more plausible. In other words, matching results in creating statistical twins who are similar regarding the confounders but differ in their mental health outcomes (Gangl, 2015).

The propensity scores are estimated using a logit model. The probability of being treated conditioning on a function of individual observables in the base period before finding a job is calculated. These observables are pre-treatment confounders (i.e., the determinants of employment transitions and health outcomes). Several algorithms were tried to choose the best one that reaches the finest balancing across the covariates. The chosen algorithm is the 10th nearest neighbor with replacement. Standard errors were bootstrapped with 200 repetitions.

After matching and achieving balance across the covariates, I apply the DiD to treatment and control observations on the common support (S). This ensures an intersection in the propensity scores' range among individuals who stayed in nonemployment and those who transitioned to a job. I estimate the counterfactual for the change in outcomes between the treatment and control groups, then identify the effect of employment transitions on the treatment group's mental health outcomes over time, comparing it to the counterfactual trend, using the weights from the nearest neighbor matching (w_{ij}). This effect would show the change in health outcomes if they remained non-employed, approximated by the control group's health outcomes. The matching ensures the control group has results like the treatment group in the absence of the treatment used as a counterfactual in calculating the differences. Finally, the average treatment effect on the treated (ATT) is calculated as shown in the below equation (Lechner, 2010), which is the mental health effect of employment transition for the treated group—those who transitioned.

$$ATT = \frac{1}{N_{D_1}} \sum_{i \in D_1 \cap S} \left[\left(Y^1_{i,2014} - Y^0_{i,2009} \right) - \sum_{j \in D_0 \cap S} w_{ij} \left(Y^0_{j,2014} - Y^0_{j,2009} \right) \right]$$

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3.4. Control variables

A rich set of control variables is used to ensure the comparability of the comparison groups. The control variables are captured in the baseline year (2009) prior to the treatment to prevent overcontrol bias (Elwert & Winship, 2014). I condition only on variables that affect employment transitions and health outcomes to tackle the confounding bias (Elwert & Winship, 2014). As shown in Table 1, the included control variables are individual characteristics, the relation to the household head, frequently used transportation, and previous saving behavior. For the sub-sample of women, the motherhood status is added. Unfortunately, the number of children is only asked to women in the questionnaire. Since local labor market conditions might impact employment dynamics, the model controls for the residence region and the governorate's unemployment rate.

Table 1: Summary statistics for the outcome, treatment, and baseline covariates

Variable	Mean	Std. Dev.	Min	Max
Outcome variable: MI				
- Prevalence	0.228	0.419	0	1
- Depth	0.931	2.109	0	13
- Severity	5.314	16.886	0	169
Treatment: Employment transitions				
- Permanent	0.277	0.448	0	1
- Temporary	0.12	0.325	0	1
- Seasonal/casual	0.147	0.354	0	1
- Formal	0.139	0.347	0	1
- Informal	0.346	0.476	0	1
Baseline covariates				
Female	0.839	0.367	0	1
Age	22.631	4.195	15	29
Ever married	0.572	0.495	0	1
Have children	0.592	0.492	0	1
Area of residence				
- Rural	0.606	0.489	0	1
- Urban	0.28	0.449	0	1

- Informal/slum	0.115	0.319	0	1
Own education				
- No education	0.242	0.428	0	1
- Primary and preparatory	0.223	0.417	0	1
- Secondary and post-secondary	0.424	0.494	0	1
- University and post-graduate	0.111	0.315	0	1
Years of education	8.87	5.196	0	17
Relation to the head of household				
- Head of household	0.02	0.14	0	1
- Spouse	0.46	0.499	0	1
- Other	0.52	0.5	0	1
Mode of transportation				
- Public transportation	0.682	0.466	0	1
- Private car/Taxi	0.036	0.187	0	1
- On foot	0.195	0.396	0	1
- Truck	0.08	0.271	0	1
- Other modes of transportation	0.007	0.086	0	1
Saving	0.358	0.479	0	1
Unemployment rate	0.063	0.023	0.02	0.14

Source: Author's calculations based on SYPE 2009 and 2014.

4. Results

4.1. Descriptive analysis and balancing of control variables

Figure 1 shows the differences between the treatment and control groups in their MI prevalence before and after the treatment, without making any covariate adjustment. When considering treatment of becoming employed compared to staying in nonemployment, in 2009, the treatment group's mental health is worse than that of the control group. Both groups saw an improvement in their mental health in 2014; however, the gain is higher for the treated group than the control group (panel a, figure 1).

The same trend is seen for all the conditional transitions to employment, except for obtaining a seasonal or casual job. Nevertheless, the magnitude of the improvement differs. For example, those who transition to formal employment experience better mental health

improvement than the non-employed. Magnitude is higher than those who get an informal job compared to those remaining in nonemployment (panel e and panel f, figure 1). The baseline difference is .037 indicating a worse-off situation for the treated group in the baseline period. From these mental health trajectories of treatment and control groups, it is seen that treatment groups have better mental health outcomes than control groups in 2014. However, there are substantial differences when considering different types of NSE.

The PSM is conducted to ensure that the treated and control groups are similar concerning baseline covariates. After trying some algorithms, the matching algorithm chosen is the 10th nearest neighbor with replacement as it provides the best balancing properties. Table 2 shows the mean bias is below five for all treatments except for transition to a formal job.

The standardized bias is assessed across the covariates for each treatment and divides the sample into treated and control groups to show how the two groups are comparable in terms of characteristics. Table 3 presents the mean of characteristics before and after matching and the percent of standardized bias. A bias reduction is evident for most covariates after the matching; hence, it is best to adjust for covariates and make the two groups comparable using matching. This reduction shows comparability of the treatment and control group characteristics after the matching.

Figure 1: MI prevalence in 2009 and 2014 of treatment and control groups
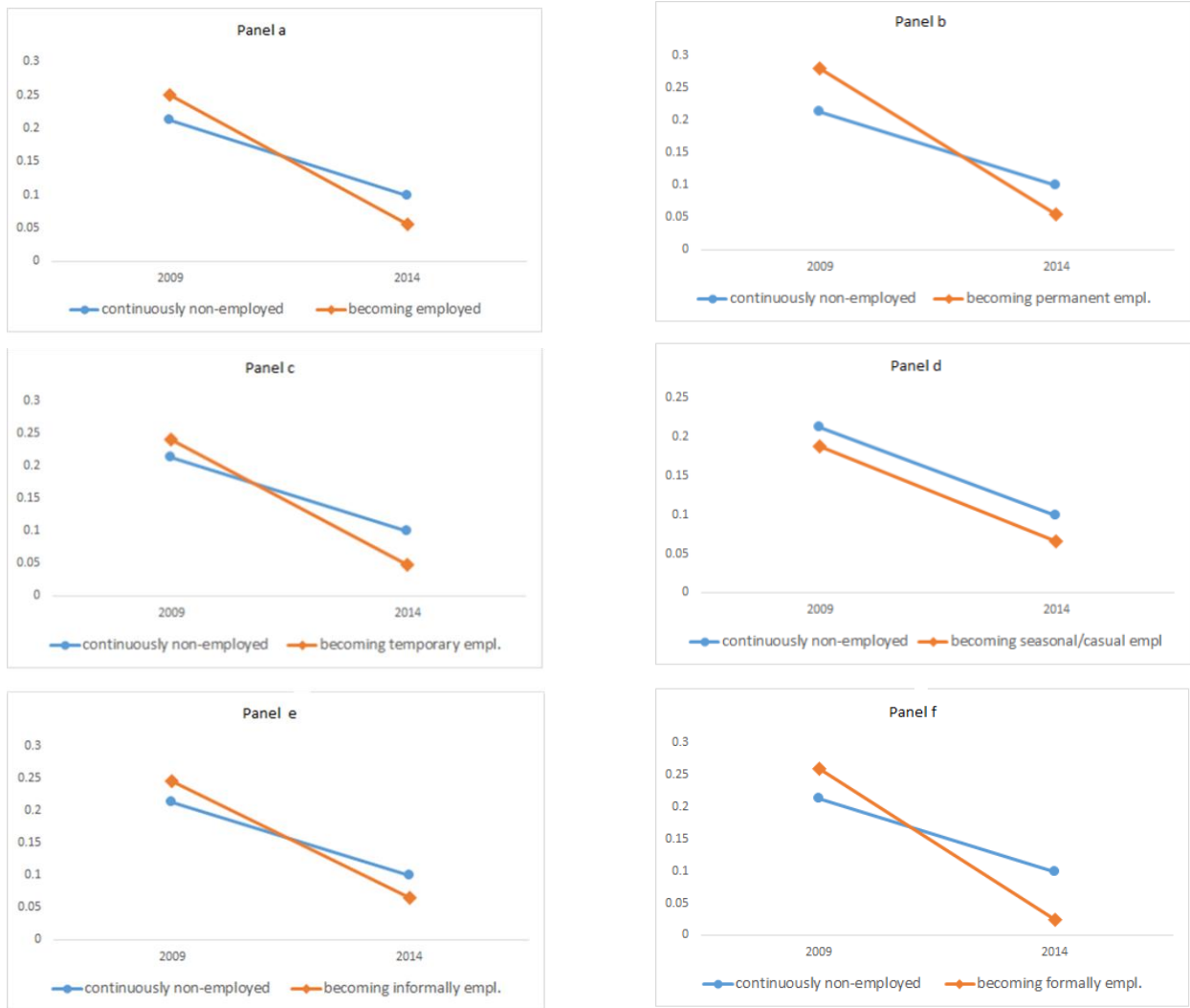
Source: Author's calculations based on SYPE 2009 and 2014.

Table 2: Standardised mean and median bias for the whole sample

Transition out of nonemployment to:	Mean bias	Median bias
Any employment	2.9	2.1
Job stability		
Permanent	4.7	5.5
Temporary	4.2	2.2
Seasonal or casual	3.4	2.3
Job formality		
Formal	6.4	6.6
Informal	4.3	3.5

The matching algorithm for all treatment variables is the 10th nearest neighbor with replacement.
Source: Author's calculations based on SYPE 2009 and 2014.

Table 3: Balance of covariates for the transition to employment: Averages before and after the matching

	Unmatched			Matched		
	Treated	Control	% bias	Treated	Control	% bias
Female	0.849	0.833	4.4	0.849	0.845	1.0
Age	22.580	22.666	-2.1	22.580	22.668	-2.1
Age sq.	526.880	531.710	-2.7	526.880	530.840	-2.2
Ever married	0.569	0.573	-0.8	0.569	0.581	-2.3
Area of residence						
Rural	0.600	0.610	-2.0	0.600	0.604	-0.8
Informal/slum	0.109	0.119	-3.1	0.109	0.104	1.5
Own education						
Primary and preparatory	0.242	0.211	7.4	0.242	0.235	1.6
Secondary and post-secondary	0.415	0.429	-2.8	0.415	0.442	-5.4
University and post-graduate	0.110	0.112	-0.8	0.110	0.102	2.4
Years of education	8.849	8.884	-0.7	8.849	9.056	-4.0
Relation to the head of household						
Head of household	0.023	0.018	3.6	0.023	0.015	5.4

Other	0.518	0.521	-0.7	0.518	0.487	6.1
Mode of transportation						
Private car/Taxi	0.044	0.031	6.8	0.044	0.052	-4.0
On foot	0.194	0.196	-0.4	0.194	0.187	1.7
Other transportation	0.010	0.006	4.1	0.010	0.011	-1.1
Truck	0.074	0.084	-3.8	0.074	0.072	0.7
Saving	0.360	0.422	-3.3	0.360	0.360	0.0
Unemployment rate	0.062	0.063	-7.0	0.062	0.061	2.9

Source: Author's calculations based on SYPE 2009.

4.2. Empirical results

4.2.1. Extensive margins: Prevalence of MI

The average treatment effect is estimated on the treated, considering several treatment variables on the prevalence of MI (Table 4). The prevalence of illness improved for those who transitioned to employment compared to those staying in nonemployment (ATT=-0.073). This result aligns with the descriptive analysis of the mental health trajectories. It also supports our first hypothesis, where becoming employed improves youth's mental health.

There are remarkable differences when the effect according to the type of employment is compared. The mental health of those who transitioned to a permanent job improves with a higher magnitude (ATT=-0.113) than those who obtained a temporary position (ATT=-0.059). The effect of transitioning to a seasonal or casual job is close to zero (ATT=-0.033). The impact of temporary employment and seasonal or casual employment are both statistically insignificant, showing that obtaining such jobs is close to remaining in nonemployment regarding their effect on the individual's mental health. As expected, and in line with previous research, permanent jobs are superior to temporary, seasonal, and casual jobs. This supports hypothesis 2, where the highest mental health reward is expected from transitioning to a permanent job. However, the results of temporary, seasonal, and casual employment were unexpected. We anticipated in hypothesis 2 that the transition to seasonal and casual employment is expected to have worse mental health benefits than the transition to temporary employment. What is found here is that there is no difference between temporary and seasonal and casual jobs in their effect on the prevalence of MI. These jobs are similar to nonemployment in their effect on the prevalence indices.

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Regarding the formality of the job, the transition to formal job results in improved mental health (ATT=-0.111), while transitioning to an informal job also enhances the individual's mental health but at a lower rate (ATT=-0.060). This is in line with hypothesis 2, where transitioning to an informal job is expected to have lower mental health rewards than transitioning to a formal job.

The analysis is conducted using the actual number of symptoms to address criticism about eight symptoms being a cutoff point. The robustness checks show results have larger magnitudes for the number of symptoms. Similarities between the use of the two outcome variables lie in the significance and the relative size of the effect when comparing the various employment transitions. Therefore, our results are qualitatively comparable to whether the cutoff point is used or the number of symptoms.

4.2.2. Intensive margins: Depth and severity of MI

The depth and severity measures are used as outcome variables to identify the effect of various employment transitions on the intensive margins of MI (Table 4). Obtaining any job does not affect the severity of MI. The improvement is only seen if the job is formal or permanent, in other words, more stable and secure. In addition, the impact of transitioning from nonemployment to permanent or formal jobs has a larger effect on the severity than the prevalence and the depth of illness, providing further support for H2a and H2c. Transitioning to permanent contracts presented the largest effect on depth and severity than other employment types. This shows that job quality matters the most for the intensity of youth psychological wellbeing.

The job characteristics affect the intensive margins of the individual's psychological health. For both outcomes, the transition to a standard job, whether formal or permanent results in better mental health estimates for both the depth and the severity. Transitioning to a nonstandard job, particularly temporary, seasonal, or casual, has the same effect on the individual's psychological health as staying in nonemployment. These findings provide further evidence against hypothesis 2, showing the similarity between temporary and seasonal and casual jobs in their impact on the depth and severity of the MI.

In the category of NSE, only the transition to informal employment positively impacted the depth of the MI. This statistically significant effect is smaller in magnitude (ATT=-0.271) than the effect of transitioning to formal employment (ATT=-0.492). This provides evidence for

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hypothesis 2, showing that transitioning to informal employment has lower health rewards than transitioning to a formal job.

Table 4: ATT (Whole sample)

	(1)	(2)	(3)	(4)	(5)	(6)
Employment transitions	Any employment	Permanent job	Temporary job	Seasonal/ casual job	Formal job	Informal job
MI measures:						
Prevalence	-.0733**	-.113***	-.059	-.033	-.111**	-.061*
	(.023)	(.029)	(.045)	(.038)	(.039)	(.025)
Number of symptoms	-.772**	-1.020***	-.624	-.424	-1.210**	-.705*
	(.255)	(.307)	(.448)	(.411)	(.431)	(.276)
Depth	-.276*	-.422**	-.206	-.158	-.492*	-.271*
	(.109)	(.147)	(.186)	(.196)	(.193)	(.109)
Severity	-1.660	-2.460*	-.908	-1.130	-3.250*	-1.930
	(.946)	(1.170)	(1.400)	(1.470)	(1.530)	(1.060)
N	2561	2094	1721	1774	1760	2315
Nc	1513	1430	1076	1234	1194	1489

Bootstrapped standard errors in parentheses (200 repetitions).
N: number of observations.
Nc: number of control individuals.
Source: Author's calculations based on SYPE 2009 and 2014.

4.2.3. Gendered effect on the mental health

The transition to unconditional employment affects outcome variables differently for men than women (Table 5). The depth and severity are improved for men when they transition to any employment, while women witness improved prevalence and number of MI symptoms. Transitioning to employment for women improves their general mental health status by decreasing the number of symptoms they suffer from; thus, women witness benefits on the extensive margins. On the contrary, men see a statistically significant effect for transitioning to employment only on the intensive margins of the illness. In addition, the impact on severity has a larger magnitude (ATT=-4.580) than the impact on the depth (ATT=-0.544). These results support our third

hypothesis that transitioning to employment has a larger positive effect on men's mental health than women's.

Men witness a higher level of mental health improvement than women when transitioning to permanent employment (significant effects). Other aspects of the job, such as formality, do not significantly affect men's mental health. The job's formality seems to be the characteristic that most improves the prevalence and number of MI symptoms for women, followed by temporary and permanent employment. However, having permanent employment results in an improvement in the depth of MI for women. Having a temporary job also leads to improved MI prevalence and score with similar magnitudes, albeit with no effect on the depth of the MI. The severity of women's MI is not affected by any job characteristics.

To summarise, transitioning to permanent and formal employment improved the prevalence of MI for women. On the depth and severity of the illness, women do not benefit from transitioning to NSE. This result is in line with hypothesis 4a that women witness lower mental health rewards than men when transitioning to NSE. As expected, the formality of employment affects only women but not men as expected in hypothesis 4b. Transitioning to permanent employment seems to affect both the intensive and extensive margins of mental health with a higher magnitude for men, given that they are the family's main breadwinner.

Table 5: ATT by gender

Employment transitions		(1) Any employment	(2) Permanent job	(3) Temporary job	(4) Seasonal/ casual job	(5) Formal job	(6) Informa l job
MI measures:							
Prevalence	Women	-.065*	-.095**	-.092*	-.005	-.105**	-.057*
		(.026)	(.033)	(.042)	(.039)	(.040)	(.029)
	Men	-.087	-.127*	-.026	-.102	-.150	-.060
		(.048)	(.059)	(.077)	(.070)	(.093)	(.052)
Number of symptoms	Women	-.725*	-.989**	-1.150*	-.280	-1.190**	-.578
		(.285)	(.325)	(.463)	(.45)	(.456)	(.299)
	Men	-.619	-1.33*	.812	-.613	-.846	-.449
		(.567)	(.592)	(.946)	(.898)	(1)	(.599)
Depth	Women	-.225	-.370*	-.304	.0178	-.377	-.186
		(.132)	(.153)	(.211)	(.204)	(.214)	(.138)
	Men	-.544*	-.640*	-.271	-.613	-.833	-.384
		(.216)	(.279)	(.289)	(.382)	(.430)	(.218)
Severity	Women	-1.220	-2.250	-1.460	.312	-2.090	-.993
		(1.02)	(1.35)	(1.64)	(1.66)	(1.63)	(1.09)
	Men	-4.580**	-4.800*	-2.130	-5.700	-6.350	-3.050
		(1.670)	(1.920)	(1.970)	(3.250)	(3.550)	(1.770)
N	Women	2150	1754	1437	1481	1466	1945
	Men	411	340	284	293	294	370

Bootstrapped standard errors in parentheses (200 repetitions).
N: number of observations.
* p<0.05 ** p<0.01 *** p<0.001
Source: Author's calculations based on SYPE 2009 and 2014.

5. Conclusion

This paper extends the literature on NSE by looking at the effect of other low-quality jobs such as informal, casual, and seasonal jobs and comparing it to the traditional segmentation of temporary and permanent employment on youth's mental wellbeing. Drawing on nationally representative

panel data, we found that transitioning to NSE (informal or temporary or seasonal or casual) has the same effect on the individual's psychological health as staying in nonemployment. This result shows the negative impact of such jobs. It further indicates that temporary employment is not superior to nonemployment.

New insights are provided on the gendered effect of employment transitions. The size of the improvement is more prominent for men than women. Moving beyond the literature's traditional wellbeing measures, we introduced different understandings of other measures, particularly MI depth and severity. Women witness the main benefit on the extensive margins of MI prevalence compared to men. In contrast, men's transition to employment affects their intensive margins of the MI's depth and severity. The most influential job characteristic for women is the effect of job formality on their mental health.

From a policy perspective, this topic is crucial given the high unemployment and inactivity rates among youth suffering from work inequalities and the widespread use of NSE. With the increase in labor market flexibility, it is vital to see the effect of NSE on young people's health status. Furthermore, understanding the impact of job quality will help provide youth with decent employment opportunities and decrease their vulnerability to job characteristics. It is necessary to encourage the private sector to create more permanent and formal jobs to meet the youth labor supply.

Hence further measures and policies are needed to increase the stability and security of the available employment arrangements. These measures could be implementing active and passive labor market policies. Other measures could be taken at the firm level to mitigate the insecurity and instability of these employment arrangements. Examples are increasing the communication channels between employers and employees, higher involvement in making decisions, and achieving justice in the firms (see de Witte (2005) for more information on these measures). These measures need to be implemented with caution not to increase employers' burden or costs of hiring employees. Future research can explore these factors in detail to identify their effect on job insecurity and provide recommendations on the most effective measure to increase employees' sense of job security.

This paper has contributed to the literature through understanding the impact of certain forms of NSE that are widespread, particularly for youth in developing countries. After

understanding the differences in the impact of NSE on the various measures of MI, future research could focus on the effect of subjective insecurity on both the extensive and intensive margins of MI. Although youth in their early career stages is the focus of our paper, future research could cover differences across mid and late-career stages.

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Chapter 4 – Family Formation and Occupational Status: Penalties for Women? (Article 3)

Abstract

This paper evaluates the effect of family formation on women's occupational status, which identifies their social mobility in a developing country context. This study extends research by studying the long-term impact of marriage and the anticipation effect before marriage. We estimate fixed-effects and fixed-effects individual slopes panel models to identify the impact of marriage and childbearing on the International Socio-Economic Index of occupational status (ISEI-08) using retrospective data from Egypt's Labor Market Panel Survey (ELMPS) for 2018. After accounting for selection based on levels and growth of occupational status, this study found that women witness a marriage premium in years 4 and 7 after marriage. This result shows that the premium witnessed by married women in the other years is due to selection into marriage based on both status levels and growth. Hence, accounting for various types of selection and estimating a yearly heterogeneous impact of marriage is crucial in estimating the marriage premium. Two possible mechanisms that might result in changes in occupational status are examined. Changes in work experience or the employment sector explain to a certain extent the occupational adjustment that happens during the years of marriage. The results do not point to an effect of child-birth parities on occupational status.

1. Introduction

Life transitions can affect women's social mobility in society. Previous literature has focused on the wage premium and penalty following marriage and motherhood. Some literature found a marriage premium for women (Budig & England, 2001; Budig & Lim, 2016; Killewald & Gough, 2013), while Loughran and Zissimopoulos (2009) find a marriage penalty for women. There is almost a consensus about the existence of a motherhood wage penalty (Budig & England, 2001; Ejrnæs & Kunze, 2013; Gangl & Ziefle, 2009; Livermore et al., 2011; Molina & Montuenga, 2009). After motherhood, the wage differential persists (Avellar & Smock, 2003) and is found to be stable over time (Jee et al., 2019). The penalty can be seen with a delay when the child is an infant rather than immediately after birth (Livermore et al., 2011). The penalty worsens over time for mothers of one child, but the gap is narrowed for higher-order births (Jee et al., 2019). Despite this agreement about the existence of the penalty, there are differences in explaining factors across the literature. Jee et al. (2019) argued that investments in human capital are not enough to close the gap in wages between mothers and non-mothers. Kühhirt and Ludwig (2012) argued that the increased time spent on childcare and household work could explain the wage gap. Other literature has indicated that discrimination plays a more prominent role in explaining this gap (Budig & England, 2001; Livermore et al., 2011).

Contrary to the previous literature on wage penalties, this paper focuses on the change in women's occupational mobility, reflecting their socioeconomic status after major life transitions, including engagement and marriage anticipation as introductory events to the transition to adulthood. To the best of our knowledge, studies tackling major life transitions, especially getting engaged in women's occupational status in a developing country context, are non-existent. Few papers covered the effect in developed countries' contexts. Abendroth et al. (2014) considered the impact of family expansion on women's socioeconomic status covering 13 European countries. Other papers have evaluated the effect of career interruption in the US, Sweden, and Germany (Aisenbrey et al., 2009) and the timing and spacing of children on the occupational prestige in Germany (Brehm & Buchholz, 2014). Focusing on the effect of family formation and expansion, our paper fills this research gap by disentangling the effect of engagement, marriage, and childbearing on women's occupational status in Egypt.

Family formation is an essential milestone in the transition to adulthood in Egypt (Assaad & Krafft, 2020; Gebel & Heyne, 2014). Critical differences between Egypt and other developed

countries are the younger age at marriage and childbirth, higher fertility rates, and motherhood's prevalence (Gebel & Heyne, 2014; Krafft, 2020; Radovich et al., 2018). Furthermore, marriage is considered a prerequisite for leaving the parent's house and childbearing (Hoodfar, 1997).

In Egypt, gender norms oblige men to be the primary breadwinners, while the household's work responsibility falls mainly on women regardless of their employment status. Bianchi et al. (2000) show that married women conduct the traditional female household activities while husbands focus on occasional tasks. This setup can explain why women spend more of their time on domestic work following marriage and childbirth. This traditional gender attitude clarifies the hike in the time allocated to housework after marriage (Dovis et al., 2019; Nazier & Ezzat, 2021).

Following these life events, women react differently in the labor market to their increased household responsibilities based on their economic vulnerabilities (Barsoum, 2019). One of their adaptations is choosing jobs that allow them to reconcile their work and family responsibilities. These job characteristics are usually found in the public sector, which renders itself the preferred employer of highly educated women. However, these flexible jobs are scarce, given the oversized public sector and the unattractive working conditions in the private sector (Assaad & Barsoum, 2019).

Against this background, three main research questions will be addressed. 1) How do women's careers develop before and after marriage and childbearing? 2) How does the effect of motherhood differ by the number of children (parity-wise effects)? 3) What is the effect of certain mechanisms that explain the relationship between these life events and occupational status? We mainly study the effect of the experience years on the women's occupational mobility (human capital depreciation hypothesis) and the effect of specific job characteristics, namely the employment sector (compensating differentials).

We implement a fixed-effects and fixed-effects individual slopes estimation models to assess the occupational status penalty while controlling for the selection of women in marriage and the labor market. Our analysis depends on the richest and nationally representative data for Egypt, Egypt Labor Market Panel Survey (ELMPS 2018). The survey includes extensive retrospective information on occupation, work history, and life course transitions. Hence, this data allows us to examine the long-run effect of marriage on occupational status.

The focus is on the objective evaluation of occupation using the International Socio-Economic Index of occupational status (ISEI) as a reflection of the individual's socioeconomic

status. This paper measures the interlinkages between family formation and expansion on women's occupational status using the ISEI rather than occupational prestige (Aisenbrey et al., 2009; Brehm & Buchholz, 2014) or wages (Budig & England, 2001; Ejrnæs & Kunze, 2013; Gangl & Ziefle, 2009; Livermore et al., 2011; Molina & Montuenga, 2009).

Our contribution to the existing research is threefold. First, the analysis is conducted in a developing country context with various welfare regimes, fertility, and cohabitation roles, primarily where marriage represents the main transition to adulthood for females and a prerequisite for having children. This is particularly important given that previous literature indicates tremendous differences between countries concerning the effect of childbearing on women's employment (Steiber & Haas, 2012) and the effect of child-related interruptions on occupational mobility depending on the welfare regime (Aisenbrey et al., 2009).

Second, the analysis considers that women could change their careers in expectation of marriage. It is argued that single women can adapt their occupational trajectories based on their anticipation of marriage. We hypothesize that this adjustment can happen in the years before marriage, whether in the engagement year (i.e., one year before marriage) or earlier than that (two, three, or more years before marriage).

Third, this study focuses on the effect of higher birth parities contrary to other research that covered two or three parities. Previous research has focused in their analysis on two births (Brehm & Buchholz, 2014) or three births (Abendroth et al., 2014) or aggregated three or higher-order births with two births (Waldfogel et al., 1997). This can be justifiable given the fertility rates in developed countries. However, in a developing country context with high fertility rates, it is necessary to measure the impact of these higher birth orders considering not only one, two, and three parities but also four or more birth parities.

2. Theoretical Background

Various theoretical arguments explain the penalties or premiums women face in the labor market after major life-course transitions and can be used to explain the effect on occupational status. We classify some of these theories into four main categories: 1) the household specialization, 2) the fixed endowment of effort, 3) the accumulation of human capital, and 4) compensating differentials. The specialization theory by Becker (1981) explains that each member of the household will specialize in the task that they have a comparative advantage in. This distribution

of responsibilities means that the man will focus on wage work while the woman will dedicate her time to the housework. This theory implies that we will see a marriage penalty for women in the labor market. However, previous research has shown a marriage wage premium for women (Budig & England, 2001; Budig & Lim, 2016; Killewald & Gough, 2013). This finding is in line with the criticism of this theory by Berk (1985). She has criticized this theory since it ignores the individual employment interests and decisions in reaching this specialization decision. Budig and Lim (2016) built on Becker's specialization theory and suggested that specialization is asymmetric. They argue that although men will focus on wage work with minimum or no participation in housework, women will do what they call a double shift. This concept indicates that women will specialize in housework next to their labor market participation.

The work effort theory assumes that all individuals have a fixed endowment of effort to spend on various activities (Becker, 1985). Since married women have more responsibility for housework than single women, theoretically, they spend more of their effort at home and thus have less effort for work. This depleted energy and effort levels will translate into lower productivity at work, which leads to less career mobility and promotion, all else constant. This lends itself to our first hypothesis, H1: getting married will negatively affect women's occupational status. Furthermore, as the woman becomes a mother, the exerted effort at home increases to account for the childcare responsibilities. This effort compounds if the woman has more than one child. Hence, we expect the second hypothesis (H2) that transitioning to motherhood will result in a decline in their occupational status and the third hypothesis (H3) that the reduction in occupational status will be more pronounced with the increase in the number of children.

As the years of marriage unfold, previous research has shown that husbands are more prone to a traditional gender division of household work (Grunow et al., 2012). This is evident in the decline in the housework hours by husbands, especially after childbirth. This change in the contribution of hours to housework over the marriage years is expected to put an extra burden on working women. This burden would be reflected in their depleted energy levels and minimal leisure time, which might negatively affect their work performance and career mobility. This leads to the fourth hypothesis (H4): the marriage penalty to occupational status will be more pronounced over the years of marriage.

According to compensating differentials theory (Filer, 1985), mothers accept lower wages and occupational status in return for more flexible, accommodating, and less demanding jobs.

Accordingly, women would choose jobs that allow them to reconcile work and household responsibilities regardless of their pay or return. Women in Egypt prefer to work in the public sector, which provides the necessary flexibility. However, public sector employers offer a sound hierarchal system, occupational status, and prestige. This is also evident in the Egyptian context, where flexibility in the working conditions is provided in the public sector employment (Assaad & Barsoum, 2019; Barsoum, 2020). In particular, employment in the public sector is characterized by formality and permanent jobs, with a sound hierarchal system, allowing a chance for career advancement which best fits married women and working mothers (Barsoum, 2020). Hence, H5a: Employment in the public sector compared to the private sector is considered one of the mechanisms that explain the negative effect of marriage and motherhood on occupational status; women employed in the public sector can easily reconcile family and work, and hence have better occupational status after motherhood.

The human capital theory has two main explanations for the motherhood penalty. The first is that mothers have lower levels of work experience due to spending time out of the labor force raising children (Becker, 1985). Hence, short maternity leave encourages mothers' post-birth return to the labor market and employer continuity, thus positively affecting general and firm-specific work experience. On the contrary, extended maternity leave could result in more prolonged work interruptions and lower work experience levels. This reduction in human capital accumulation leads to the final hypothesis (H5b): the stagnation in the years of accumulated work experience is one of the mechanisms that explain the negative effect of motherhood on occupational status.

3. Methodology

3.1. Data

This study examines the relationship between family formation and occupational status using ELMPS 2018, the nationally representative labor market panel survey for Egypt, covering 61,231 individuals (Krafft et al., 2021; OAMDI, 2019). ELMPS is the best-fitting data set since it includes questions on work history, individual, work, and family characteristics, particularly marriage and childbirth. We depend on these retrospective questions to create data on an annual basis.

Since we follow women over time, we restrict our sample to women who have worked (whether wage or non-wage work) at least for two years. Hence, we drop women who worked only

for one year. We also dropped women who were constantly unemployed or inactive. These restrictions are necessary given that we conduct longitudinal analysis using fixed effects methods. The sample covers 417 women with 5,542 person-year observations.

3.2. Method

This paper estimates the marriage effect by fitting fixed effects (FE) and fixed effects individual slopes (FEIS) panel models. Previous literature on penalties and premiums for women has used mainly FE (Abendroth et al., 2014; Budig & England, 2001; Kahn et al., 2014). This estimation method allows measuring the exact ISEI changes. It shows the effect at various moments after marriage and childbirth, capturing further changes in our outcome variables over time.

The fixed effects method captures within-individual differences. The unit of analysis is person-year observations. These observations are used to calculate within estimates of occupational status for each individual with her status in earlier years. It demeans the equation for all variables within individuals. A basic explanation of the within comparison is to explain it through a marriage event dummy. The occupational status difference is calculated for a woman by differencing the average occupational status after and before marriage. This measures the occupational penalty for each woman. Afterward, the weighted average of these individual occupational penalties is calculated to measure the fixed effects estimator. This strategy eliminates time-constant unobserved heterogeneity. Hence, the fixed-effects model controls for unobservable individual characteristics that do not change over time such as ability, preferences, and aspirations.

Equation 1[12] shows that the occupational status Y_{it} for person i and time t is determined by the independent variable X_{it}. The occupational status level α_i is an individual intercept that does not change over time. The ε_{it} is an idiosyncratic error that changes over individuals and periods. Demeaning equation 1, the estimation would include time-varying variables and drop any time-constant variables and the intercept α_i (Brüderl & Ludwig, 2015).

$$y_{it} = X_{it}\beta + \alpha_i + \varepsilon_{it} \tag{1}$$

In the fixed-effects model, the demeaning accounts for heterogeneity that is stable over time, observed or unobserved. However, it results in biased estimates if strict exogeneity assumption is not satisfied. Violation of this assumption means that the parallel trends assumption

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[12] Error component model in matrix notation.

is not satisfied. This assumption ensures that the occupational status of married and single women has the same growth rate but might have different levels. The violation of this assumption means that there is selection based on the occupational status growth of women. As shown in equation 2, the steepness of the occupational status trajectories (δ_i) would differ among individuals. z_{it} represents a vector of variables with individual-specific slopes. In this case, using FEIS models is recommended to account for the presence of growth curves or individual slopes.

$$y_{it} = \alpha_i + X_{it}\beta + z_{it}\delta_i + \varepsilon_{it} \tag{2}$$

Unlike FE, FEIS does not require the assumption of parallel trends between treatment and control groups. Hence, on top of controlling for time-constant heterogeneity, it controls for heterogeneous slopes. FEIS is basically detrending our outcome and independent variables. This is done through estimating the individual growth curve for each variable, predicting the value and then subtracting the predicted values from the original values. This subtraction results in the detrended variables. Then, these detrended variables are used in the final estimation, which is done using POLS (Brüderl, 2015).

It is possible to control for more variables in the growth curve. Estimations can control for as many slopes as theoretically needed. Some papers control for age to account for heterogeneous growth, while others include more slopes. However, the estimation will need j+1 person-years per individual where j is equal to the number of intercept and the slope parameters. For example, Ludwig and Brüderl (2018) used experience and its square rather than age to calculate the individual slopes. In this case, they need at least 4 year-person observations to conduct the analysis.

The reason for choosing experience and its square as the slope variables is that it mimics the labor market theory which is a time-varying variable that captures the growth potential of wages (Ludwig & Brüderl, 2018). In the FE models, experience has a constant effect among women, while in the FEIS, it varies.

One assumption that still needs to be satisfied is the temporal homogeneity, which assumes that no other time-varying covariates exist that affect the outcome except the treatment variable (marriage in our case). This time-varying heterogeneity can be a source of bias in the estimations. To control for this bias, we include a control group and several control variables. The control group is those who are not subject to the treatment (i.e., the non-treated). In our case, the non-treated are those who did not get married and remained single. The model also controls for a set of covariates,

particularly age, number of children, work characteristics, labor market experience, and period-specific variables. In our estimated models, we report the cluster-robust standard errors at the individual level.

3.3. Outcome variable

There are various measures used to calculate occupational status from the occupational classifications. One study considered the effect of child parities on ISEI (Abendroth et al., 2014), while other studies assessed the effect of motherhood on occupational prestige, namely Treiman's Standard International Occupational Prestige Scale, SIOPS (Aisenbrey et al., 2009; Brehm & Buchholz, 2014). Even though there is a high correlation between occupational socioeconomic status and prestige, they measure different things, produce different results, and are not substitutes (Treiman, 1977). The SIOPS measures the individual's evaluation of the occupational relative prestige.

In this study, the International Socio-Economic Index of occupational status (ISEI-08) is used to measure socioeconomic status and is calculated depending on (ISCO-08). We chose ISEI-08 instead of ISEI-88 since the latter uses a sample of men only. On the contrary, ISEI-08 compromises a sample of 198,500 individuals, including both men and women. This index measures the social and economic means necessary to achieve social status change (Ganzeboom et al., 1992; Ganzeboom & Treiman, 2010).

ELMPS 2018 has retrospective data on the occupations classification ISCO-88. We used the ISCOGEN command to translate the ISCO into occupational status indices (Jann, 2019). We start with translating from ISCO-88 (4 digits codes) to ISCO-08 and afterward from ISCO-08 to ISEI-08. The ISEI-08 is considered a continuous variable and ranges hypothetically between 10 and 90 (Ganzeboom & Treiman, 2010). In our data, the ISEI-08 ranges between 15 and 89. This discrepancy is mainly attributed to dissimilarities between ISCO-08 and ISCO-88, where the former introduces new occupations that were not present in the latter, such as food preparation assistants (Ganzeboom & Treiman, 2010).

3.4. Independent variables

This research uses event time dummies for the time relative to first marriage as the treatment variable. The occupational status can vary over the individual's life course, depending on their

family transition trajectories. The effect for women expecting to be married compared to those who recently married compared to women who got married a couple of years ago might differ. After getting married, the most demanding phase is in the early years of marriage, when women are childbearing and rearing babies. After a couple of years, women will have older kids and more life experience, so the effect in these years can be different from the effect in the earlier years of marriage. Hence, the impact of marriage is not constant over the years.

The event time dummy variables measure the number of years since and to first marriage, reflecting a heterogeneous yearly effect of marriage in addition to the anticipation effect of marriage (Jee et al., 2019). The time relative to marriage is a series of dummy variables that reflect where the woman is located in her life course trajectory and family formation transitions. It reflects whether she is expecting to get married or in the engagement years before marriage. If she is in the years following marriage, this will be reflected in the years after marriage dummies, i.e., one year after marriage, two years up until ten or more years after marriage. The reference group includes all year-person observations for women at least three years before marriage and includes single women who did not eventually marry.

The time relative to marriage dummy variables are used instead of using a single marriage dummy variable. The latter assumes that the effect is constant over time once the woman gets married, averaging the effect over all the marriage years. On the other hand, the dummy impact function shows the time path, accounting for both the short and long-term impact of marriage on women's occupational status (Dougherty, 2006).

In case of staggered treatment design and time-varying treatment effect, it is necessary to use a dummy impact function (Ludwig & Brüderl, 2021). For example, in our case, marriage could occur at various times and not necessarily at the same time for each woman. In addition, assuming a time-constant effect (using a step impact function such as a marriage dummy) would result in biasing the fixed effect estimate towards the effect of the early post-treatment periods. Hence, using a step impact function would result in a negative weighting bias (Ludwig & Brüderl, 2021).

After women are married, we can observe motherhood status represented by parity-specific births as a time-varying covariate. The parity-specific births capture the number of children by five dummy variables. These dummies are no children, first birth, second birth, third birth, and fourth or more births. Hence, we add a dummy variable for having four or more kids, unlike Abendroth et al. (2014), who stopped at measuring the effect of three children. The reference group is women

with no children. The parity-specific dummies are used instead of a continuous measure of motherhood like the number of children since the occupational effect of childbearing to be non-linear in the number of children (Jee et al., 2019).

The interpretation of the parity-specific births estimates needs to be done with caution. In this approach, for sequential life events, a single estimation sample strategy was employed (Ludwig & Brüderl, 2021). This strategy starts with a sample of women without children and introduces dummies for parity-specific births. However, these events might have heterogeneous effects. If the size of the bias created due to the heterogeneous effects is small, then one can use the single estimation sample strategy. Another concern for biased estimates is the selection into later treatments based on outcomes from earlier treatments (Ludwig & Brüderl, 2021). In particular, when the size of the earlier birth parities effect can result in selection into later birth parities, which could bias the results for all parities. One robustness check could be done to test for the presence of heterogeneous effects by estimating the effect of the first birth parity independently and afterward comparing the magnitude of the effect for both models with only first-birth parity and with all four parities. If there is no difference between the estimates, then the comparison ensures that there are no heterogeneous effects that bias the estimates.

A set of control variables is added to ensure that women are similar in time-varying characteristics and test some explaining mechanisms. Age (continuous variable) and period dummies (1974 is the reference year) are controlled for. To test the human capital depreciation hypothesis, we measure the human capital accumulation using the cumulative labor market experience in years and its squared value. To study the effect of the job characteristics and compensating differentials, we control for working in the public sector. The public sector dummy variable takes one if the woman works in the public sector and zero otherwise.

4. Results

4.1. Descriptive Findings

Table 1 presents the descriptive statistics for the outcome, treatment variables, and control variables for the overall sample, single women, and married women without and with kids. These statistics show the differences between women based on their main life course transitions. Single women have the highest occupational status (28.84), followed by married women without kids (26.46), and the lowest occupational status is seen for mothers (24.49). This observed pattern is

consistent with the results of previous studies.

Table 1: Descriptive Statistics

	Overall Sample		Single Women		Married Women With no children		Mothers	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
ISEI-08	26.24	15.98	28.84	16.56	26.46	16.82	24.49	15.21
Married (1=yes , 0=no)	0.63	0.48	0	0	1	0	1	0
Number of children: 0 (1=yes, 0=no)	0.45	0.5	1	0	1	0	0	0
1 (1=yes, 0=no)	0.09	0.29	0	0	0	0	0.17	0.37
2 (1=yes, 0=no)	0.12	0.32	0	0	0	0	0.21	0.41
3 (1=yes, 0=no)	0.12	0.33	0	0	0	0	0.22	0.41
4 or more (1=yes, 0=no)	0.22	0.42	0	0	0	0	0.41	0.49
Accumulated experience (in years)	9.86	8.49	4.55	3.94	7.24	7.27	13.78	8.79
Public sector (1=yes, 0=no)	0.12	0.32	0.11	0.31	0.14	0.34	0.12	0.33
Age (in years)	27.62	9.41	20.54	4.82	26.17	8.73	32.52	8.73
Age categories:								
15-19 (1=yes, 0=no)	0.23	0.42	0.51	0.5	0.25	0.43	0.04	0.19
20s (1=yes, 0=no)	0.41	0.49	0.43	0.5	0.46	0.5	0.38	0.49
30s (1=yes, 0=no)	0.23	0.42	0.05	0.22	0.19	0.39	0.36	0.48
40s (1=yes, 0=no)	0.11	0.32	0	0.05	0.08	0.27	0.19	0.39
50s (1=yes, 0=no)	0.02	0.14	0	0	0.02	0.13	0.04	0.18
Person-year observations	5542		2025		458		3059	
N	417		324		131		177	

Source: Authors' calculations based on ELMPS 2018.

4.2. Marriage Effect on Occupational Status

Figure 1 graphically illustrates how the occupational status changes over time relative to marriage. It mainly shows the results from four models using the FE and the FEIS (Table A1), namely: the gross effect from the model that only includes the marriage year dummies (Models 1 and 5), and after controlling for all covariates without the inclusion of the mechanisms (Models 3 and 7). These results present the FE and FEIS model estimates of the time relative to marriage dummy variables, starting from two years before marriage until nine or more years after marriage. These within-model coefficients show the change in occupational status due to a change in the treatment (i.e., marriage). The magnitude of the effect is small similar to effect sizes found by Abendroth et al. (2014). As explained in their paper, this small size effect is due to the fact that such fixed effects models capture only changes within individuals over time.

In the FE estimates, for the ISEI-08, women witness an occupational premium during all years before and after marriage. The results show that, relative to three or more years before the wedding, women witness an increase in their occupational status in the following years, which is also statistically significant with the exception of years 3 to 6 after marriage. The steady growth in occupational status reaches its first peak around the second year after marriage. It starts declining to reach the trough at the third year after marriage, then increases steadily from the fourth year onwards. Dougherty (2006) found that the marriage earnings premium also reaches its maximum after two years of marriage and starts declining afterward. However, in their analysis, the premium does not start increasing again. The time path of the causal effect on ISEI-08 of marriage and the expectation effects show an increase in women's occupational status before, at, and after marriage. This increase lowers during the second and third years after marriage before it starts increasing again. We can conclude that the positive effect is persistent over time. This result is contrary to hypotheses 1 and 4, which state that getting married will negatively affect women's occupational status and that the marriage penalty to occupational status will be more pronounced over the years of marriage.

This result differs when selection based on growth levels is taken into consideration, specifically when FEIS is used. The positive trend of the effect of marriage on occupational status is still witnessed in the years after marriage. However, the effect is only statistically significant for years 4 and 7 after marriage. Again, this is contrary to our expectations that women witness an occupational status penalty after marriage. It can be concluded that taking selection based on both level and experience growth into account, women do not witness a penalty in their ISEI levels but rather a premium, especially in the fourth and the seventh year after marriage.

When we compare the results from the dummy impact function and the single marriage event dummy in the case of the FE estimations, we find that using the latter underestimates the marriage premium (negative weighting bias). Table A2 shows the estimation results using a single event dummy variable that captures whether the woman is married or single. The gross effect of marriage is 0.283 and after we control for all covariates is 0.303. When the dummy impact function is used, the size of the effect at the marriage year is larger in both cases, 0.376 and 0.458, respectively. This difference is because the single marriage dummy variable averages the effect for all the years after the marriage.

Figure 1: The time path of the marriage effect on ISEI-08
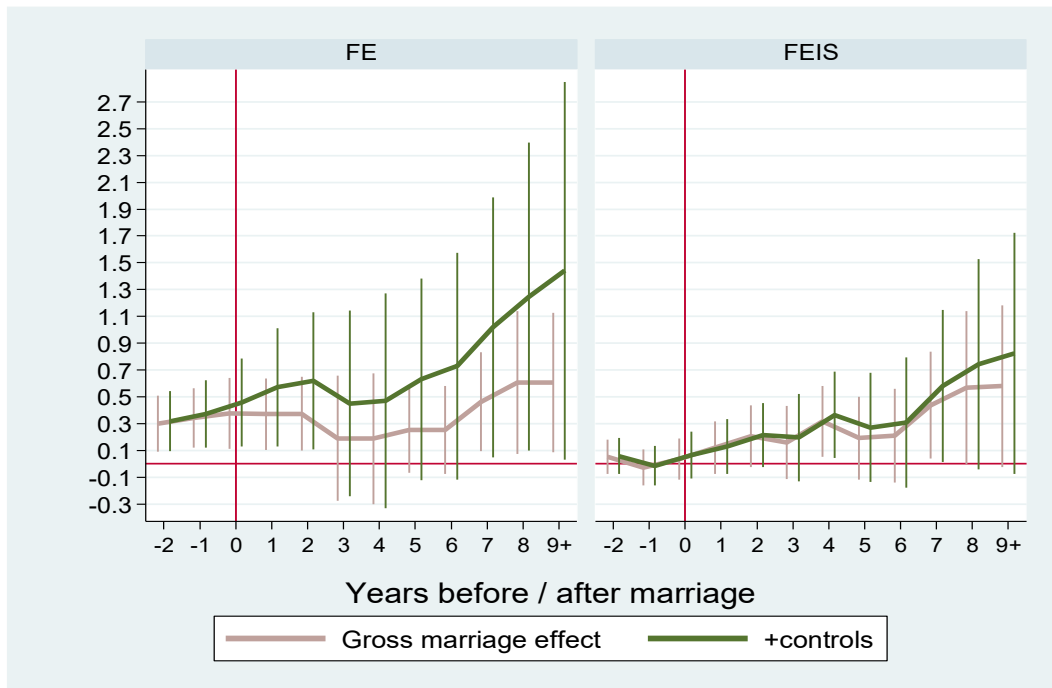
Notes: Gross marriage effect reflects model 1 for the FE and model 5 for the FEIS in Table A1. While "+controls" represent model 3 for the FE and model 7 for the FEIS, in particular the model that includes all control variables with the exception of the mechanisms.
Source: Author's calculations based on ELMPS 2018.

4.3.   Motherhood Effect on Occupational Status

Figure 2 graphically illustrates how the occupational status changes for each parity-specific births, with no children as the reference category, for models 3 and 7 for FE and FEIS, respectively. These models include all control variables (i.e., period and age effects). The presented results show that taking the selection based on levels into consideration, motherhood across all parities does not have a significant effect on occupational status. When considering the FEIS estimates, the magnitude of the effect changes for the first and second-birth parities, yet is still insignificant. This is contrary to findings of previous studies that show a penalty for women after childbirth (Abendroth et al., 2014; Aisenbrey et al., 2009). This also is in contrast with our hypotheses 2 and 3 where we expected that transitioning to motherhood would result in a decline in their occupational status and that the reduction in occupational status would be more pronounced with the increase in the number of children.

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Figure 2: Occupational status changes relative to birth parities
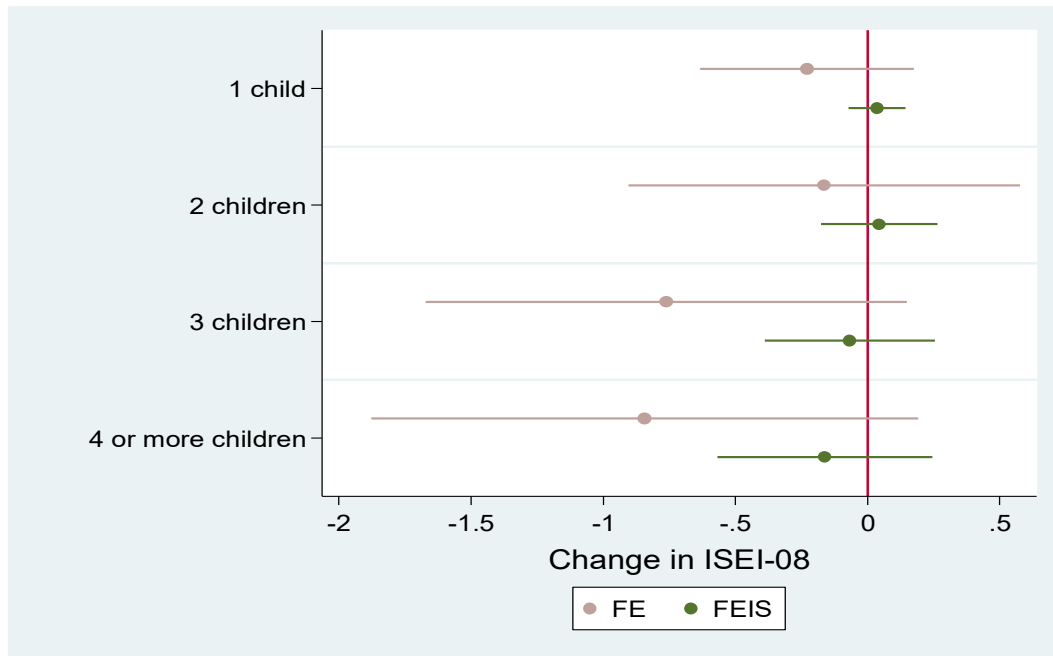
Note: The FE reflects model 3 results, and the FEIS reflects model 7 results in table A1.
Source: Author's calculations based on ELMPS 2018.

As indicated before, this strategy of using a single estimation sample for all birth parities was criticized by Ludwig and Brüderl (2021), as this might introduce heterogeneous effects bias. However, if the size of the bias created due to the heterogeneous effects is small, then one can use the single estimation sample strategy. In order to ensure that there is no heterogeneous effect bias, the effect of the first birth parity is estimated independently, and the magnitude of the effect for both models with only first-birth parity and with all four parities are compared. The difference in magnitude between the estimates might show that there are heterogeneous effects that bias the estimates. As shown in Table A3, the estimates for both first-child parity are very close in magnitude, whether we include only first birth parities or all parities, in both FE and FEIS models. This shows that there is no heterogeneous effect bias.

4.4. Experience effect or job characteristics

To understand the explaining mechanisms, two mediating variables are included in our models, namely the accumulated years of experience and the sector of employment. It has to be noted that the effect of both mechanisms can be explained through the FE model, while in the FEIS model,

the effect of the sector of employment can only be explained since the experience variables are used as the slope in the latter.

Figure 3 shows that including these variables does not change the significance of the marriage results for women before and at marriage. However, the magnitude changes slightly after including these variables. In particular, in the FE models, the magnitude of the effect decreases from the fourth year onwards after controlling for the mechanisms. In the FEIS models, only a small divergence is seen in the size of the effect later over the life course of marriage, particularly from the sixth year onwards; the effect becomes smaller after we control for the sector of employment. This suggests that changes in work experience or employment sector explain to a certain extent the occupational adjustment that happens during the years of marriage. This provides evidence to hypothesis 5a that the employment in the public sector compared to the private sector is considered one of the mechanisms that explain the negative effect of marriage on occupational status; women employed in the public sector can easily reconcile family and work and hence have better occupational status after motherhood.

Figure 4 shows the change in the motherhood effect by birth parities after including the mechanisms. Regarding both FE and FEIS models, the results did not change after including the job experience and the employment sector variables. The human capital accumulation or the job characteristics are not considered to explain the relationship between motherhood and occupational adjustment, which leads us to reject the 5a and 5b hypotheses with respect to the motherhood effect. The results can not provide evidence to support that employment in the public sector compared to the private sector is considered one of the mechanisms that explain the negative effect of motherhood on occupational status; in other words, it can not be shown that mothers employed in the public sector can easily reconcile family and work and hence have better occupational status after motherhood. In addition, no evidence is provided that the stagnation in the years of accumulated work experience is one of the mechanisms that explain the negative effect of motherhood on occupational status.

Figure 3: The explaining mechanisms for the effect of the time path of marriage
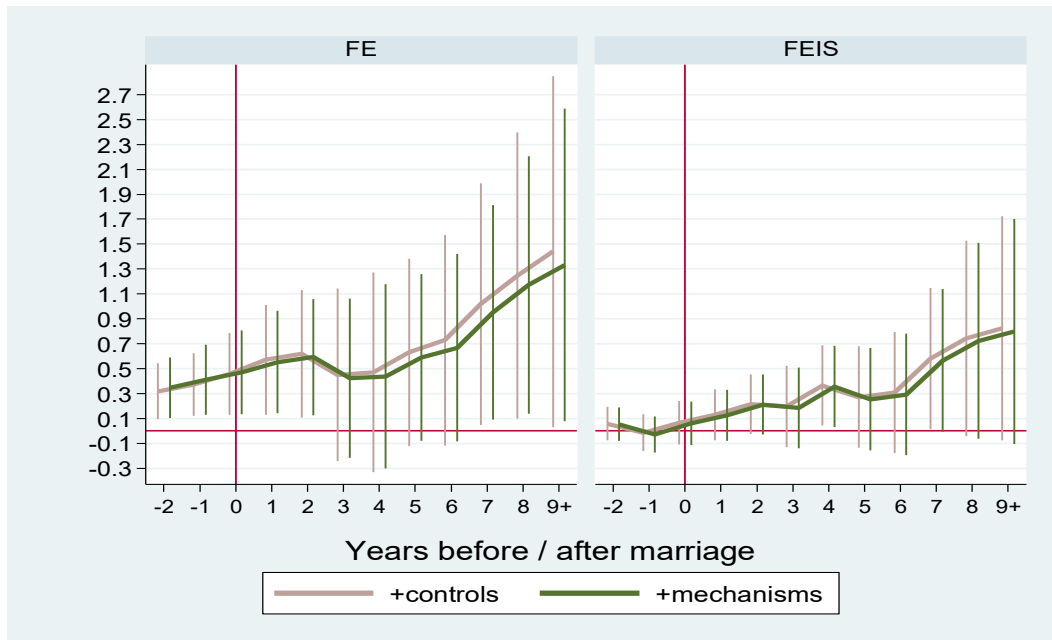
Notes: In table A1, "+controls" models represent model 3 for the FE and model 7 for the FEIS, in particular the model that includes all control variables with the exception of the mechanisms. "+mechanisms" models represent model 4 for the FE and model 8 for the FEIS, in particular the model that includes the mechanisms.
Source: Author's calculations based on ELMPS 2018.

Figure 4: The explaining mechanisms for the effect of birth parities
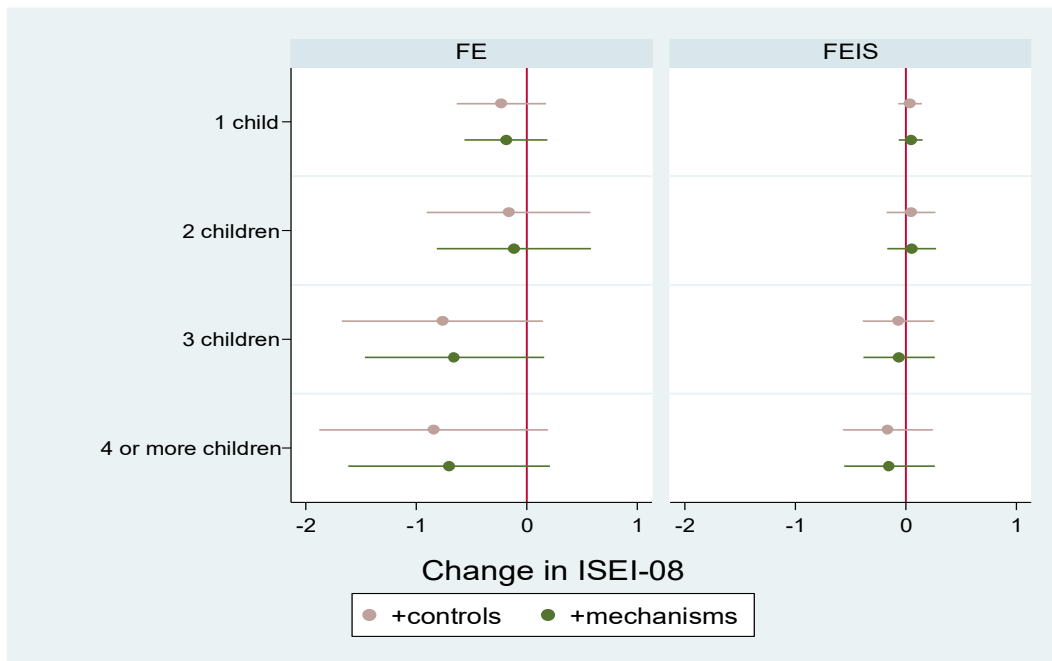
Notes: In table A1, "+controls" models represent model 3 for the FE and model 7 for the FEIS, in particular the model that includes all control variables with the exception of the mechanisms. "+mechanisms" models represent model 4 for the FE and model 8 for the FEIS, in particular the model that includes the mechanisms.
Source: Author's calculations based on ELMPS 2018.

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5. Conclusion

In this study, the effect of family formation on women's occupational status (ISEI-08) in Egypt is examined. In particular, we focused on the anticipation effect, the long-term effect of the first marriage, and the motherhood effect. Whereas previous studies focused on the short-term effect of marriage on occupational status, our study investigates the long-term effect of marriage, providing insights over the life course of marriage. Data from the nationally representative ELMPS is used to investigate this effect. To this end, I employed FE and FEIS to correct for selection based on level and growth in both marriage and employment status.

Our findings contribute to the understanding of the effect of family formation on the occupational mobility of women, which is crucial in understanding how marriage and having children affect women's careers compared to other women. This understanding can help tailor policies that address women's performance in the labor market and reap the benefit of the investment in increasing women's educational attainment. These policies could address the issues related to offering a conducive working environment for women, especially mothers. These enabling jobs will encourage them to choose the work that best suits their careers, expertise, and education rather than just settling for a job - which could be of lower occupational status - to accommodate their increasing family responsibilities.

The results reveal that selection is an important factor in understanding the effect of marriage and motherhood on women. Although negative impacts of motherhood on occupational status are theoretically substantiated, the paper does not point to any statistically significant negative effects of child-birth parities on the occupational status. This result could be explained by the fact that women in the labor market, particularly in Egypt, are a very select group (Assaad et al., 2022; Selwaness & Krafft, 2020). However, the results of this paper show statistically significant positive effects of marriage at some points in time. Specifically, the marriage premium is only statistically significant for years 4 and 7 after marriage in the FEIS models. This is contrary to our expectations that women witness an occupational status penalty after marriage.

The results show the importance of using the distributed impact function, as has been indicated in previous research by Dougherty (2006) and Ludwig and Brüderl (2018). It has been revealed that the single marriage event dummy underestimates the marriage premium, similar to the findings of Dougherty (2006). In addition, the results are only statistically significant for

certain years after marriage and not for all the years included in the dummy impact function. Hence, it is necessary to estimate a yearly heterogeneous impact of marriage to show both short and long-term implications on women's occupational status (Dougherty, 2006) and to avoid averaging this effect which might result in a negative weighting bias (Brüderl & Ludwig, 2015; Ludwig & Brüderl, 2018).

Self-selection has been accounted for through the use of FE and FEIS, as recommended by Ludwig and Brüderl (2018). As shown, the magnitude and the significance of the occupational status results differ if we account for selection based on growth in our estimations. This result is comparable to the findings of Ludwig and Brüderl (2018) on the effect of marriage on wages for men in the United States. Hence, it can be concluded that the use of FEIS is necessary to address self-selection issues in the labor market.

The limitations of this paper are concerned with the use of birth parities in a simple estimation sample strategy (Ludwig & Brüderl, 2021). As shown in the sensitivity analysis, the heterogeneous effects in various birth parities in Egypt are rather small, which as a result does not bias the estimates for all parities (Ludwig & Brüderl, 2021). Future research could further address this issue further by implementing a multiple sample approach as performed by Hsu (2021).

This study has measured women's premiums or penalties in the labor market through occupational status. In this respect, the paper considered an important aspect of women's labor market outcomes other than earnings (i.e., the commonly used outcome in the literature). Future research could focus on the effect of marriage and motherhood on women's long-term outcomes, such as pensions.

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Appendix

Table A1: FE and FEIS Models for Occupational Status (ISEI-08) with the time path

	FE				FEIS (slope: exper. & exper. sq.)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Marriage effect	Marriage and children	Age and period dummies	Mechanisms	Marriage effect	Marriage and children	Age and period dummies	Mechanisms
Time relative to marriage: 3 or more years before marriage								
2 years before marriage	0.299**	0.291**	0.318**	0.346**	0.052	0.048	0.057	0.054
	(0.126)	(0.125)	(0.137)	(0.147)	(0.077)	(0.079)	(0.081)	(0.081)
1 year before marriage	0.342**	0.334**	0.372**	0.411**	-0.027	-0.035	-0.014	-0.027
	(0.136)	(0.135)	(0.151)	(0.172)	(0.081)	(0.084)	(0.089)	(0.088)
Marriage year	0.376**	0.383**	0.458**	0.470**	0.037	0.018	0.066	0.063
	(0.160)	(0.161)	(0.199)	(0.205)	(0.093)	(0.092)	(0.106)	(0.106)
Years after marriage: 1	0.370**	0.496**	0.571**	0.552**	0.120	0.066	0.129	0.126
	(0.162)	(0.235)	(0.268)	(0.249)	(0.118)	(0.105)	(0.124)	(0.124)
2 years	0.372**	0.541*	0.620**	0.592**	0.206	0.137	0.213	0.211
	(0.167)	(0.278)	(0.310)	(0.284)	(0.139)	(0.118)	(0.144)	(0.146)
3 years	0.190	0.369	0.450	0.423	0.159	0.081	0.195	0.185
	(0.284)	(0.384)	(0.420)	(0.389)	(0.166)	(0.169)	(0.197)	(0.196)
4 years	0.187	0.397	0.470	0.438	0.316**	0.232	0.366*	0.356*
	(0.295)	(0.458)	(0.487)	(0.448)	(0.161)	(0.156)	(0.196)	(0.198)
5 years	0.253	0.535	0.631	0.588	0.191	0.113	0.271	0.254
	(0.194)	(0.422)	(0.456)	(0.406)	(0.187)	(0.195)	(0.247)	(0.249)
6 years	0.254	0.630	0.728	0.668	0.209	0.145	0.307	0.293
	(0.199)	(0.468)	(0.514)	(0.456)	(0.212)	(0.233)	(0.294)	(0.296)
7 years	0.464**	0.910*	1.018*	0.950*	0.438*	0.390	0.582*	0.566
	(0.223)	(0.534)	(0.589)	(0.522)	(0.242)	(0.274)	(0.344)	(0.347)
8 years	0.606*	1.130*	1.247*	1.172*	0.570	0.536	0.743	0.723
	(0.323)	(0.625)	(0.698)	(0.626)	(0.346)	(0.378)	(0.475)	(0.478)
9+ years	0.607*	1.302*	1.440*	1.333*	0.579	0.566	0.824	0.798

	(0.317)	(0.768)	(0.854)	(0.761)	(0.366)	(0.426)	(0.545)	(0.549)
Number of children: 0 ref.								
1		-0.233	-0.229	-0.187		0.064	0.036	0.045
		(0.252)	(0.246)	(0.228)		(0.063)	(0.065)	(0.065)
2		-0.206	-0.164	-0.116		0.083	0.044	0.054
		(0.454)	(0.449)	(0.422)		(0.131)	(0.134)	(0.134)
3		-0.815	-0.762	-0.654		-0.028	-0.067	-0.062
		(0.585)	(0.552)	(0.491)		(0.188)	(0.196)	(0.196)
4+		-0.942	-0.843	-0.702		-0.116	-0.162	-0.149
		(0.691)	(0.628)	(0.552)		(0.229)	(0.247)	(0.248)
Age			-0.020	0.038			-0.028	-0.027
			(0.013)	(0.041)			(0.020)	(0.020)
Period dummies (1974 ref. year)			Yes	Yes			Yes	Yes
Mechanisms:								
Work experience (yrs)				-0.071				
				(0.054)				
Exper. Sq.				0.000				
				(0.001)				
Public sector				0.840				-1.263
				(2.425)				(1.814)
Constant	26.378****	26.399****	27.137****	26.136****				
	(0.167)	(0.154)	(0.311)	(0.761)				
N	417	417	417	417	417	417	417	417
Person-year observations	5542	5542	5542	5542	5542	5542	5542	5542
Within-R2	.0088679	.0160259	.0220925	.0275076	.0068043	.0074952	.0194273	.0232566

* p<0.10, ** p<0.05, *** p<0.010, **** p<0.001. Clustered standard errors at the individual level in parentheses.

Source: Author's calculations based on ELMPS 2018.

Table A2: FE and FEIS Models for Occupational Status (ISEI-08) with single marriage event dummy

	FE				FEIS (slope: exper. & exper. sq.)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Marriage effect	Marriage and children	Age and period dummies	Mechanisms	Marriage effect	Marriage and children	Age and period dummies	Mechanisms
Getting married	0.283	0.356*	0.303*	0.239	0.063	0.024	0.014	0.022
	(0.197)	(0.202)	(0.183)	(0.150)	(0.074)	(0.061)	(0.068)	(0.070)
Number of children: 0 ref.								
1		-0.223	-0.248	-0.241		0.097*	0.067	0.077
		(0.200)	(0.201)	(0.199)		(0.053)	(0.055)	(0.052)
2		0.072	-0.004	-0.042		0.207	0.159	0.166
		(0.261)	(0.279)	(0.283)		(0.135)	(0.128)	(0.127)
3		-0.150	-0.298	-0.328		0.239**	0.187	0.187
		(0.160)	(0.214)	(0.231)		(0.119)	(0.125)	(0.125)
4+		-0.074	-0.333	-0.325		0.238*	0.157	0.164
		(0.164)	(0.258)	(0.269)		(0.135)	(0.152)	(0.151)
Age			0.004	0.066			-0.000	-0.000
			(0.005)	(0.051)			(0.009)	(0.009)
Period dummies (1974 ref.)			Yes	Yes			Yes	Yes
Mechanisms:								
Work experience (yrs)				-0.055				
				(0.052)				
Exper. Sq.				-0.000				
				(0.001)				
Public sector				0.891				-1.285
				(2.448)				(1.807)
Constant	26.536****	26.536****	26.629****	25.559****				
	(0.123)	(0.127)	(0.094)	(0.895)				
N	417	417	417	417	417	417	417	417
Person-year observations	5542	5542	5542	5542	5542	5542	5542	5542
Within-R2	.0021943	.003888	.0115794	.0185472	.0001295	.0012063	.0125808	.0165515

* $p<0.10$, ** $p<0.05$, *** $p<0.010$, **** $p<0.001$. Clustered standard errors at the individual level in parentheses.

Source: Author's calculations based on ELMPS 2018.

Table A3: FE and FEIS Models for Occupational Status (ISEI-08) - Robustness of full model with regards to birth parities

	FE		FEIS (slope: exper. & exper. sq.)	
	(1)	(2)	(3)	(4)
	with all parities	with first child parity	with all parities	with first child parity
Time relative to marriage: 3 or more years before marriage				
2 years before marriage	0.346**	0.373**	0.054	0.058
	(0.147)	(0.153)	(0.081)	(0.080)
1 year before marriage	0.411**	0.443**	-0.027	-0.020
	(0.172)	(0.179)	(0.088)	(0.087)
Marriage year	0.470**	0.516**	0.063	0.073
	(0.205)	(0.219)	(0.106)	(0.107)
Years after marriage: 1	0.552**	0.629**	0.126	0.137
	(0.249)	(0.283)	(0.124)	(0.128)
2 years	0.592**	0.683**	0.211	0.224
	(0.284)	(0.325)	(0.146)	(0.153)
3 years	0.423	0.536	0.185	0.202
	(0.389)	(0.408)	(0.196)	(0.205)
4 years	0.438	0.551	0.356*	0.373*
	(0.448)	(0.428)	(0.198)	(0.210)
5 years	0.588	0.654*	0.254	0.262
	(0.406)	(0.391)	(0.249)	(0.255)
6 years	0.668	0.666	0.293	0.285
	(0.456)	(0.414)	(0.296)	(0.289)
7 years	0.950*	0.901**	0.566	0.542*
	(0.522)	(0.454)	(0.347)	(0.327)
8 years	1.172*	1.064*	0.723	0.686
	(0.626)	(0.546)	(0.478)	(0.454)
9+ years	1.333*	1.133*	0.798	0.742
	(0.761)	(0.632)	(0.549)	(0.506)
Number of children: 0 ref.	0.000		0.000	
1	-0.187	-0.228	0.045	0.048
	(0.228)	(0.271)	(0.065)	(0.067)
2	-0.116		0.054	
	(0.422)		(0.134)	
3	-0.654		-0.062	
	(0.491)		(0.196)	
4+	-0.702		-0.149	
	(0.552)		(0.248)	
Age	0.038	0.040	-0.027	-0.026
	(0.041)	(0.041)	(0.020)	(0.019)
Period dummies				
(1974 ref. year)	Yes	Yes	Yes	Yes
Mechanisms:				
Work experience (yrs)	-0.071	-0.083		

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	(0.054)	(0.058)		
Exper. Sq.	0.000	0.000		
	(0.001)	(0.001)		
Public sector	0.840	0.857	-1.263	-1.264
	(2.425)	(2.429)	(1.814)	(1.812)
Constant	26.136****	26.086****		
	(0.761)	(0.760)		
N	417	417	417	417
Person-year observations	5542	5542	5542	5542
Within-R2	.0275076	.0233509	.0232566	.0226444

* p<0.10, ** p<0.05, *** p<0.010, **** p<0.001. Clustered standard errors at the individual level in parentheses.

Source: Author's calculations based on ELMPS 2018.

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