ERF 31ST Annual Conference
YOUTH
DEMOGRAPHIC DIVIDEND & MIGRATION IN MENA:
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2025

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Shireen Alazzawi
and Vladimir Hlasny

ECONOMIC RESEARCH FORUM
منتدى البحوث الاقتصادية

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Abstract

Female labor force participation in Egypt remains dismally low, and labor-market wages consistently under-reward women for their work compared to men. The systematic channeling of women to lower-paying sectors, employers and occupation groups, and the associated downward pressure on wages in those positions this produces, may partially explain both phenomena. This chapter assesses the relevance of the occupational segregation hypothesis in Egypt over the long term, using a comprehensive set of labor market surveys for 1988-2023. Our results show that women are largely concentrated in agricultural occupations when non-market work is included and in a handful of professional professions mostly teaching and nursing, when examining only employment by the market definition, despite high rates of educational attainment in recent years. Our results confirm that occupational segregation has a strong impact on gender wage gaps, particularly at the top of the earnings distribution, and the existence of glass ceilings on women's wage growth. We conclude that the struggle to close the gender pay gap in Egypt is contingent on empowering women to attain the same opportunities as men when joining the labor force, to work in the same sectors, firms and occupation groups at large.

Keywords: Labor market segmentation; Occupational segregation; Gender wage gap.
JEL Classification: J2; J42; J7.

I. Introduction

Egypt has made significant strides in gender equality, particularly in education and political representation. Gender parity in primary and secondary school enrollment has been achieved (UNESCO, 2024), with women's educational attainment often surpassing that of men from similar socioeconomic backgrounds (Krafft et al., 2024). In the political sphere, women now occupy 28% of parliamentary seats (World Bank 2024) and have gained unprecedented representation in governmental and judicial positions. The country has implemented strategic national initiatives aimed at combating violence against women, promoting economic empowerment, and addressing social barriers, including literacy programs and targeted social protection programs that favor women (Zeitoun and Rawlings 2023).

Despite these advancements, significant challenges persist in the labor market. Women's labor force participation rate remains dismal by global standards and middling even by regional standards, while the gender pay gap remains substantial (Said et al., 2022). The explanations for

these disparities are multifaceted, encompassing both labor market factors and deeply ingrained social norms and preferences that affect both supply and demand of female labor. Demand-side gender discrimination, manifesting as sticky floors, occupational segregation, and glass ceilings (El-Haddad, 2016; Assaad et al., 2020; Said et al., 2022), along with declining employment opportunities in the public sector (Assaad et al., 2018), are primary explanations for these persistent inequalities.

Additionally, supply-side factors contribute to the gender gap in the labor market. Women's willingness to accept wage penalties for full-time jobs and familial preferences regarding women's workplace choices – often manifesting as 'motherhood penalties' – play a role in shaping labor market outcomes (Ehab, 2023; Majbouri, 2023). Furthermore, social norms continue to play a significant role in shaping women's labor market outcomes. Data from the Arab Barometer reveals a complex picture of evolving attitudes. While there is strong disagreement with the notion that university education is more important for males than females (87% of all respondents in 2021), a majority still believe in traditional gender roles within the household. For instance, 61% of all respondents in the most recent wave agreed that "a man should have final say in all decisions concerning the family," although this percentage has been declining over time (from 75% in 2016).

Additionally, women's unpaid care burden presents a significant barrier to their participation in the labor market, particularly in private sector jobs that often demand long hours. This care burden, combined with societal expectations, makes it challenging for women, especially those of childbearing age, to enter and remain in private-sector employment. Together with the declining availability of public sector jobs, these factors contribute to women's concentration in a small number of "female-friendly" occupations, leading to occupational segregation. This segregation, whether driven by supply or demand-side factors, significantly limits women's opportunities in the labor market. By concentrating a large share of the female labor force in a limited set of occupational categories – particularly those with lower earnings – this segregation further depresses wages in those segments and, consequently, lowers the average wages of women at large. This cycle of segregation and wage depression reinforces gender inequalities in the labor market, creating a persistent challenge for women's economic empowerment.

This chapter contributes to the literature on women in the Egyptian labor market by examining the extent of occupational segregation, analyzing its evolution over time and across multiple dimensions such as education, sector of employment, and age cohort. We investigate the relationship between occupational segregation and gender wage disparities over the past 35 years, distinguishing between within-occupation gender wage gaps and the broader impact of gender-based occupational segregation (Polachek 1987). Our analysis decomposes gender wage gaps into two components: one attributable to workers' observed market-valued characteristics, and another capturing differentials in returns to these characteristics, as well as other unobserved factors.

A key methodological approach in this study is the use of unconditional quantile regressions (UQR). Unlike traditional mean-based regressions, which only provide an average effect, UQR allows us to investigate the gender wage gap across different points along the wage distribution. This approach enables us to isolate the effects of occupational clustering at both the lower and upper ends of the wage spectrum. This is particularly valuable in the context of gender wage inequality because it reveals how wage disparities vary for workers at different wage levels. By distinguishing between observed characteristics (such as education and experience) and differentials in returns (i.e., the wage premium associated with these characteristics), we can isolate the unique contribution of gender-based occupational clustering to wage disparities at various points in the distribution.

The rest of the chapter is organized as follows. The next section reviews the existing literature examining the most prominent theoretical explanation for gender based occupation segregation and the available literature on occupational segregation and gender wage gaps in Egypt. We then introduce our analytical approach, detailing our estimation methods and data preparation. Section IV presents our main findings, linking them back to the social and economic factors discussed earlier. Finally, Section V concludes with key policy takeaways, offering recommendations that address both the structural and normative barriers to gender equality in Egypt's labor market.

II. Related Literature

Occupational segregation by gender, where men and women are disproportionately concentrated in different occupations, represents a particularly consequential form of labor market inequality. Despite significant progress in women's educational attainment and decades of rising participation in labor markets globally, this form of inequality persists, profoundly shaping individuals' work experiences and significantly impacting wages, job quality, career mobility prospects, and social status. Moreover, it results in a substantial loss of income for working women and their families, with profound policy implications given the potential positive effects of lifting women's wages on poverty, unemployment, and overall social inequality(Carranza et. Al. 2023, McGrew 2016, Zheng and Weeden 2023).

Traditional economic theory once attributed gender-based occupational segregation to “intrinsic differences in comparative advantage” between men and women (Becker 1985). This conventional view implied that segregation patterns would remain stable over time, reflecting gender-specific skills, productivity levels and preferences. However, contemporary economic research has challenged these long-held assumptions, revealing a more complex and dynamic landscape.

Recent studies have shifted the focus away from biological determinism towards an examination of discriminatory practices and social dynamics. This new perspective suggests that occupational

segregation is not a natural or inevitable outcome, but rather the result of various societal and economic factors. Evidence suggests that men often exit professions where female participation reaches certain thresholds dubbed “tipping points”, especially in regions where men hold more gender-prejudiced attitudes, consistent with Schelling’s1971 tipping model (Pan 2015). Others have emphasized the persistence of gender-based stereotypes in hiring and promotion practices as a key factor reinforcing occupational segregation. According to Goldin’s "pollution theory of discrimination", men tend to underestimate women's capabilities in occupations where women are currently underrepresented (Goldin, 2002). This misperception creates a self-perpetuating cycle: the low representation of women in certain fields fuels discriminatory practices, as men erroneously assume that increasing female representation would negatively impact overall productivity. Consequently, these biased attitudes create barriers to entry and advancement for women, further entrenching occupational segregation.

Others have argued that discrimination in male-dominated fields stems from men's efforts to preserve the “male identity” associated with their professions (Akerlof and Kranton 2000), or to perpetuate biases against others to maintain their economic, political, and social privileges (Darity, Hamilton, and Stewart 2015). In other words, men discriminate not due to doubts about women's qualifications, but to maintain the social power and exclusivity of their "boys' club".

Occupational segregation by gender may impact wages and contribute to the gender wage gap if higher-paying occupations are predominantly male, while lower-paying ones are predominantly female. In the United States studies have found that about half of the gender wage gap since 1980 is attributed to women working in different occupations and industries than men (Blau and Kahn). Segregation not only keeps women out of the highest-paying occupations but also excludes them from well-paying middle-skills jobs in sectors like IT, logistics, and advanced manufacturing, despite having similar skill requirements (Hartmann, Gault, Hegewisch, and Bendick).

Conversely, successful occupational integration can have a profound impact on both overall economic productivity and individual economic outcomes. Hsieh et al. (2019) found that between 1960 and 2010, the convergence in occupational distribution across gender and racial lines in the United states accounted for 20% to 40% of growth in aggregate market output per person, demonstrating the significant potential of improved talent allocation.

The literature on gender-based wage differentials in Egypt reveals complex dynamics influenced by labor market structures, public sector policies, and societal norms. A stark contrast exists between the public and private sectors. The public sector has been increasingly feminized, offering more egalitarian wage policies and better opportunities for educated women (Assaad and Barsoum 2019; Said 2009, 2015). However, the declining share of public sector jobs has

created new challenges for women seeking employment (Assaad 2014; Assaad and Barsoum 2019). In contrast, the private sector exhibits substantial gender wage gaps, with some studies reporting differentials of over 40% (Said 2015).

These disparities are attributed to various factors, including limited geographic mobility (Assaad and Arntz 2005), industry concentration and lack of competition (AlAzzawi 2014), as well as discriminatory practices (Said, Majbouri, and Barsoum 2022; Biltagy 2019) and structural barriers such as the high share of informal jobs (Adair, AlAzzawi and Hlasny 2024). The decline in women's participation rates in recent years is an important consideration, as it may lead to underestimation of the true wage gap if not accounted for in analyses (Assaad and Krafft 2015; Picchio and Mussida 2011).

Methodologically, the literature has evolved from simple mean decompositions to more sophisticated approaches. Recent studies employ quantile regression techniques to examine wage disparities across the distribution (Firpo, Fortin, and Lemieux 2009 and 2019), with applications for Egypt revealing both glass ceiling effects in the public sector and sticky floor effects in the private sector (Said, Majbouri, and Barsoum 2022). These distribution-wide analyses, along with corrections for selection bias and consideration of factors such as education levels, provide a more nuanced understanding of the gender wage gap (Picchio and Mussida 2011).

Occupational segregation plays a crucial role in wage inequality, yet existing research on this aspect is limited and dated. Studies from the early 2000s indicate that women's employment in Egypt is concentrated in a few fields, primarily education, healthcare, and certain blue-collar sectors, with data suggesting that between 1988 and 1998 these few limited employment fields for women were being further defeminized (Assaad and Arntz 2005). Increasing occupational segregation was also documented as an increasingly important factor in gender pay differences during the early stages of privatization and public sector downsizing between 2000 and 2004, particularly for professional and blue-collar workers, while white-collar workers faced less severe pay discrimination (El-Hamidi and Said 2014). To our knowledge, more recent comprehensive studies on occupational segregation in Egypt are lacking, highlighting a significant gap in the current literature.

Our study aims to address this gap by examining occupational segregation in Egypt over a 35-year period, encompassing far-reaching social, economic, and political changes. We first document the extent and evolution of occupational segregation across multiple dimensions, extending the work of Assaad and Arntz (2005) and El-Hamidi and Said (2014). Building on recent methodological advancements (Firpo, Fortin, and Lemieux 2009 and 2019), we decompose the underlying reasons behind the wage gap along the entire distribution, not just at the mean. By doing so, we provide a more comprehensive and up-to-date understanding of the extent of gender-based occupational segregation in Egypt and its impact on gender wage

inequalities, contributing valuable insights to inform policy decisions aimed at reducing these disparities.

III. Analytical approach

Gender-based employment segregation involves the unequal distribution of male and female workers across different job types and sectors. This segregation can occur both horizontally, where men and women tend to concentrate in different industries, occupations, and businesses of different ownership and size, and vertically across positions of various statuses, resulting in gender disparities in managerial roles, in contract types, and in prospects for career advancement (Anker 1997). Such occupational segregation is often closely related to gender wage gaps (Barón and Cobb-Clark 2010).

The distributional differences between women and men across occupational categories can also be evaluated using a widely recognized segregation index. Among the various indices available, the measure formulated by Duncan and Duncan (1955) stands as the most commonly utilized. For consistency with prior research, we adopt this index in our analysis.

The Duncan Index of Dissimilarity (ID) quantifies the dissimilarity between the occupational distributions of women (F_i) and men (M_i) across occupations i, relative to their respective overall employment distributions (F and M). The index ranges from 0 to 1.

Mathematically, the index is expressed as:

$$ID = \frac{1}{2}\sum \left|\frac{F_i}{F} - \frac{M_i}{M}\right| \quad (1)$$

where the summation is over all occupation categories i.

If the share of women in all occupations is the same as their share of all employment, then the segregation index is 0. Therefore, a value of 0 indicates complete integration while a value of 100 indicates complete segregation. The resulting value can be interpreted as the percentage of one group (e.g., women) that would need to change occupations to achieve an equal distribution across occupations as the other group (e.g., men). Note that the extent of occupational segregation is influenced not only by the distribution of genders across occupations but also by the relative size of segregated and integrated occupations within the economy. Consequently, temporal changes in the degree of occupational segregation may result from shifts in the overall occupational composition of the economy, rather than solely from changes in gender distribution within occupations. This is especially relevant for the current study given the changes in

occupational definitions over time within the 6 surveys under study. We elaborate further on this issue in the Data section.

We compute the Dissimilarity Index using various levels of occupational disaggregation available in the ELMPS 1988-2023 dataset. This multi-level analysis is useful for understanding the nuanced patterns of gender segregation that may be obscured at more aggregated levels. Comparisons within the same year, from least to highest degree of disaggregation, provide insight into the most granular level of segregation available, allowing us to identify specific occupations or sectors where gender imbalances are most pronounced. While comparison over time is only possible at the most aggregated level of occupational categories (one-digit level) due to the lack of harmonization across all years (except for 2018-2023), this longitudinal perspective remains valuable for tracking broad trends in occupational gender segregation.

To provide a comprehensive understanding of gender segregation dynamics, we examine variations across multiple dimensions. Education levels are analyzed as they play a crucial role in occupational choices and opportunities, potentially mitigating or exacerbating gender segregation(Zheng and Weeden 2023). We distinguish between public and private sectors, as these often exhibit different gender dynamics due to varying policies and cultural norms (McGrew 2016). Main economic activities are considered to identify industry-specific patterns of segregation. The formality status of workers is examined, as informal work often has different gender implications and can contribute to hidden forms of segregation. Marital status is included in our analysis because it often intersects with gender roles and labor market participation, potentially influencing occupational choices and segregation patterns(Zhu and Grusky 2022, Blau, Brummond and Liu 2012; Becker 1985). Age cohorts (looking at those aged 25-34,35-44;45-54 and 55 to 64) are analyzed to capture generational shifts in gender segregation and to account for life-cycle effects on occupational choices (Blau, Brummond and Liu 2012). Finally, we consider the region of residence to account for geographical variations in labor markets and cultural norms that may affect gender segregation.

To isolate the effects of occupational segregation from other drivers of wage gaps, and to assess the drivers at different quantiles of the wage distribution, we turn to appropriate regression models. Gender differentials at various wage quantiles are decomposed into portions due to differentials in various endowments and those due to differentials in returns to those endowments (plus a non-attributable residual). The endowment differential is the “explained” part of the wage gaps at various quantiles of the wage distribution, that is associated with the typical differences in the market-valued endowments between the two groups, such as work experience, education, revealed preferred employment type, and residence near employers and markets. The “unexplained” part of the wage gap is related to some latent circumstances which may or may not interact with the respective groups’ stocks of endowments. This decomposition is performed by the means of

unconditional quantile regressions (UQR) that have become popular in wage-gap studies for the fact that they relax some restrictive assumptions on the wage impacts. The UQR technique has previously been successfully applied to studying the wage effects of occupational segregation (Barón and Cobb-Clark 2010), and to pay gaps in Egypt (Ramadan et al. 2018; Said et al. 2022).

In this study, men and women are viewed as facing differential economic conditions in regard to their access to resources or attrition of their market-valued endowments (the "explained" part), as well as differential returns on their endowments due to, for example, discrimination and, in relation to our central hypothesis, occupational segmentation in labor markets (the "unexplained" part). Endowments of four types are evaluated: potential work experience; education; proximity to markets; choice of employer including the owner, main economic activity and firm size. Potential experience, education, and proximity to markets in the administrative regions and rural/urban areas proxy for workers' human capital endowments. These characteristics are thought to affect wages directly if human-capital markets value them or offer allowances for them. Workers' sector of employment, economic activity, and firm size are controlled for under the assumption that these reflect workers' specific skills, choices or luck.[1] In this specification, wage effects of the segregation of workers into distinct occupational groups and institutional job types are subsumed in the unexplained residual (and to some extent confound the endowment and returns effects of correlated endowments). Alternatively, in a separate specification, the occupational group and institutional job type are explicitly included to isolate their effects from the wage differentials within occupation types. The difference between the two specifications – explicitly controlling or not for the positions that men and women are hired into – can be viewed as providing bounds on the wage effects of gender-based job segregation and of the returns differentials on other endowments (Arulampalam et al. 2007; Barón and Cobb-Clark 2010).

Data

The analysis is based on up-to-date harmonized data from five waves of the LMPS data (1998, 2006, 2012, 2018, 2023), using all pooled cross-sectional observations, as well as a subset of longitudinally-related observations, to assess individual workers' occupational and pay trajectories (OAMDI 2024).

[1] In particular, the regressions control for workers' gender, age, age squared, and binary indicators for: 7 levels of education, 4 economic activities (agriculture/forestry/fishing, manufacturing, mining/utility/construction, service/trade, transport/storage, education, social service, defense/extraterritorial, household), public/private sector of employment, 6 employer sizes (1–4, 5–9, 10–24, 25–99, 100+ workers; unknown), 6 administrative regions, and an urban/rural indicator. An alternative specification also controls for 9 1-digit occupation categories (manager/professional, technician and associated professional, clerical/service/sales, skilled agriculture/forestry/fishery, craft and trades, plant and machine operator/assembler, and elementary occupations) and 7 institutional job types (self-employed, employer, unpaid, irregular wage, informal private, formal private, public).

An important issue that arises with the use of the occupation data in ELMPS surveys over time is that the coding scheme used by CAPMAS and ERF has changed over time and there is no straight forward consistent way to harmonize these classifications over this 35 year period. The harmonized occupational classification is only available at the most aggregated 1 digit level, which encompasses only 9 occupational categories (excluding Armed Forces). This broad categorization provides only a limited perspective on the degree of occupational segregation, potentially masking finer patterns of gender-based occupational segregation that occur at more detailed levels. Significant differences exist between jobs within these categories, obscuring important distinctions in tasks, skills, and working conditions. Individuals can move between jobs within these broad categories while engaging in vastly different activities, requiring different skill levels and warranting different wages. Consequently, while the 1-digit classification provides a starting point for analysis, it may underestimate the true extent of occupational segregation and limit our ability to detect subtle changes in gender-based occupational patterns over time. To address this limitation, we will use more disaggregated occupational categories to compare across multiple dimensions within the same year, and over time for 2018 and 2023 - the only harmonized pair of surveys. However, caution should be exercised when drawing strong conclusions about changes over time from the very early period due to potential inconsistencies in the size and distribution of workers within the finer occupational classification levels.

The 1988 and 1998 surveys used the January1985 Arab Unified Coding Book for Occupations, 2006 survey used the January 1996 CAPMAS occupations codebook; the 2012 survey used a CAPMAS classification based on International Standard Classification of Occupations (ISCO) 1988[2]; while the 2018 and 2023 surveys used the CAPMAS classification based on ISCO-2008. To provide some level of consistency in the code descriptions used over time before 2012 we followed the following steps: for 1988 and 1998, we manually checked the Arabic descriptions in the Arab Unified Coding Book for Occupations, and translated them into English. To ensure consistency with standard descriptions, we then matched them to their closest English translation in ISCO-88 . There were some occupations that did not match well and for these we used the literal translation of the descriptions from the Arab Unified Coding Book for Occupations to avoid making unwarranted assumptions. For 2006, the CAPMAS occupation codebook provides a concordance to ISCO-88 for most occupations. However, some CAPMAS occupations mapped to multiple ISCO-88 codes, or vice versa. We again relied on the closest translation and sometimes had to combine ISCO-88 code descriptions to match with the original CAPMAS

[2] The 2012, and 2018, 2023 CAPMAS classifications are similar but not identical to the ISCO counterparts, particularly at the most detailed 6 digit levels, since CAPMAS sometimes split codes at finer levels of disaggregation or added new ones to match Egyptian occupations that were not necessarily present in the international versions. Most of these categories were at the 4 or 6 levels of disaggregation, and resulted in some missing/unknown descriptions of occupations, but these affected only a very small number of observations that were removed from the descriptive analysis.

codebook. 2012 data at the 4 digit level and below matches exactly with ISCO-88 and we just matched those to their English version of the descriptions. 2018 and 2023 data at the 4 digit level and below also match exactly to ISCO-08 classifications.

IV. Results

Descriptive Analysis

We begin by examining labor force status by gender over time to better understand women's position in the labor market. Figure 1 shows that men's participation rose from 74% in 1998 to 81% in 2012, but then declined to 73% in 2023, an all-time low over this period. The trend for women however is more stagnant with the vast majority of women remaining out of the labor force all together. There was a short-lived increase in participation between 1998 and 2006, but this trend was reversed since then reaching just 18% participation in 2023. This very low rate of participation (which includes the employed as well as those actively seeking jobs) underscores the remainder of the analysis in this chapter.

Figure 2 presents the gender composition of broad occupational categories over time, by the relative size of each occupational category by the extended (which includes market plus subsistence work) as well as market definitions[3]. Skilled Agriculture, forestry and Fishery was the most prevalent broad occupational category in the economy until 2012 by both extended and market definitions, and in 2018 and 2023 the most prevalent occupational category was Service and Sales occupations. Women made up a minority of workers in all occupations in all years, regardless of definition, except in 1988 when they made up a slight majority of skilled agricultural workers[4].

In 1998 (by the market definition) women made up 39%, 38% and 27% of the Clerical Support, Professional, and Technicians and Associate Professionals categories respectively and these three

[3] For a detailed discussion of the differences and implications of using the market vs. extended definitions, especially for rural women's labor force participation comparing 1988 to subsequent rounds see Assaad and Krafft (2024b).

[4] This may in fact be an artifact of the way work was defined in 1988. The October 1988 Labor Force Survey had adopted an extended definition of employment based on the 13th ICLS resolution, which in practice meant including all production and processing of primary commodities for purposes of own household consumption as part of employment, not just that which constituted "an important. Contribution to total consumption" as stated in the resolution (Assaad and Krafft 2024b). This change resulted in a significant increase in the measured female labor force participation rate, particularly in rural areas and hence may affect the analysis by the extended definition in the current paper.

categories continued to have the largest concentrations of women (in varying degrees) since then by both definitions[5].

Figures 3a and 3b show the share of all men's and women's employment in each occupation by extended and market definitions. Men's distribution among occupations by the extended definition (Figure 3a) has witnessed major changes over time with men initially concentrated in skilled agricultural jobs, and this share falling steadily over time from 33% in 1988 to 13% in 2023. Men have moved away from agriculture towards other lower skill jobs such as plant and machine operators; crafts and related trades, and elementary occupations, but also to service and sales jobs. Limiting our analysis to market definition (Figure 3b), men's employment in agriculture is about one third lower in 1988, with the difference distributed largely equally among the remaining occupations, but hardly changes in the following years, reflecting the less important role of subsistence work for men, as expected.

For women, their occupational distribution changes significantly depending on which definition is used. Agriculture was the predominant category in terms of women's employment throughout the period by the extended definition (Figure 3a) with the share declining over time, albeit at a slower pace than men, falling from 63% in 1988 to 46% in 2023. By the market definition (Figure 3b) the largest groups of women were employed in Professional occupations in all years except 2006 when Agriculture was again largest and the proportion of women in Professional occupations declined from 33% in 1988 to 19% in 1998. This likely reflects the impact of the privatization and public sector downsizing over this period, which disproportionately affected women professionals. By 2012 the proportion of women in Professional occupations had increase again to 31%, and has been at around this level since then. The proportion of women Technicians and Associate Professionals, and those in Clerical Support occupations have also witnessed several changes over this period. The proportion of Technicians and Associate Professionals increased from 8% in 1998 to 19% in 2012, but then fell in 2018 to give rise to an expanding Clerical Support category. By 2023 these trends had reversed again with Technicians and Associate Professionals rising again to 14% and Clerical support dwindling sharply to 3%. Recall that these categories had high concentrations of women within the occupation (Figures A1a and A1b in the appendix), but their share of overall women's employment is quite minor.

[5] These gender composition details are not shown here to save on space since these shares can be calculated from Figures 2a and 2b. We have included detailed gender composition by occupation graphs are in Figures A1a and A1b in the appendix

Focusing only on the market definition[6] for the remainder of this section, Figure 4[7] presents the proportion of female (male) employment in the 3-digit occupation categories that employed more than 1% of all women (men) to illustrate their occupational distribution at a finer level of disaggregation. For women, these top categories accounted for 77% to 88% of women's total employment in all years. For men, however, the top occupational categories accounted for lower proportions of their employment ranging from 48% to 56%. This reflects the persistently high degree of concentration of women in a handful of occupations even at this finer level of disaggregation, while men's occupational distribution became steadily more diverse over time. In most years, and aside from agricultural occupations, women were mostly employed as primary school teachers, salespersons, administrative associates and to a lesser extent nursing and midwifery associate professionals as well as other types of school and nursery teachers. Large proportions of men were employed in construction related occupations, as salespersons or drivers, aside from agriculture.

Index of Dissimilarity of Occupations by Gender

Figure 5 presents the ID values by varying levels of disaggregation of the occupational categories. At the 1-digit of occupational disaggregation (the broadest measure, which is harmonized and therefore comparable over time) occupational segregation stayed roughly the same over the whole period. It declined between 1998 and 2006, rose back in 2012, fell in 2018 and then rose again to its initial level in 2023. The index suggests that in 2023, 33% of women (men) would have to move sectors to eliminate their segregation vis a vis men (women). This is quite low compared to other countries. For example, in the United States, gender occupational segregation was still above 50% by 2011 (Hegewisch and Hartmann 2014), except for those with a four year college degree. However, analyses for other countries is typically performed at much higher levels of disaggregation-3 or 4 digit occupations[8] and it is thus important to examine how looking at finer occupational categories may change the results.

Comparing the indices by degree of occupational disaggregation within a single year provides insight into the change in occupational segregation when finer levels of disaggregation are used. Indeed, within each year, the ID rises sharply as the degree of disaggregation rises reflecting the separation of men and women at highly disaggregated occupational categories. For example, using

[6] Figure A2 in the appendix and the related discussion present these 3 digit employment proportions by the extended definition for completeness.
[7] Note the discussion in the data section above about lack of compatibility of occupational categories at this high degree of disaggregation across years. The figures can only be compared over time for 2018 and 2023.
[8] However a well known limitation of the ID is that the smaller the number of observations in each occupation-gender category the higher level of disaggregation regardless of actual segregation. We acknowledge that this is an issue that requires further investigation.

the 4 digit occupational categories, the ID ranges between 56% and 64% implying almost double the degree of segregation.

As noted above, only 2018 and 2023 are comparable temporally, and the results suggest that segregation has been rising over this short period by the 2 and 3 digit classifications, but not the but the 4 digit one. This may be due to the smaller the number of observations in each occupation-gender category the higher level of disaggregation.

Index of Dissimilarity of Occupations by Gender, across multiple dimensions

We next present ID results by education (Figure 6) at the 1 digit (top panel) and the 4 digit (bottom panel). Occupational segregation is lowest for those with university and above education, and highest for those with secondary or vocational education. Interestingly it is also low among those who are illiterate or can only read and write, likely reflecting high degree of integration in agricultural occupations.

Figure 7 presents the ID by sector of employment, distinguishing between public and private sector employees. The results show a wide gap between segregation by sector using both the lowest and highest degrees of disaggregation of occupational categories, with segregation in the private sector being consistently higher than that in the public sector by the 4-digit classification since 2012, although this gap is declining over time. To put these changes in perspective, Figure 8 presents the share of men and women in public employment over time. While men's share has declined steadily since 1998, that of women increased between 2006 and 2012, and has been falling since then. The proportion of women in public employment in what can be considered "white collar" jobs (Professionals and Technicians and associate Professionals) has been declining steadily over this period (Figure 9), reflecting the dwindling opportunities for women in these higher skilled job categories in the public sector.

Figure 10 presents the ID by formality status. Using the broad occupational classification, informal employment appears to have far less segregation than formal in all years. Using the more detailed classification exhibits the opposite trend between 2006 and 2018, with informal being more segregated than formal employment, except in the last few years when that of informal employment declined while segregation remained the same in formal jobs. The trend between 2018 and 2023 (which are comparable over time at the 4 digit level) suggest that more women(men) are entering jobs that were traditionally men's (women's) informal occupations, with little change in the formal sector's gender components.

Figure 11 presents segregation by marital status. The results by the broad occupation categories suggest that occupational segregation is highest among those who are married until 2006, and

among divorced afterwards, and lowest for the widowed. By contrast the more detailed categories implies that those who were divorced were most segregated in all years.

Figure 12 presents ID by age cohort dividing the sample into 4 age groups: 25-34; 35-44; 45-54 and 55-64. Segregation was highest for the younger age groups in each year, those 25-34 and 35-44. For these two groups, segregation has also been rising between 2018 and 2023 contrary to expectation given women's rapid educational attainment over the last two decades. Notably, the oldest age group (55-64) is becoming increasingly segregated over time: in the late 1990s and early 2000s. However it has declined with age in the most recent few years, rising from 20% in 2006 to 31 % in 2023.

Figures 13 presents the ID by region of residence. Initially, segregation was lowest in rural regions and highest in Urban Upper Alexandria and the Suez Canal cities. Over time, segregation appears to be falling over time in the major cities, Greater Cairo and Alexandria and the Suez Canal cities, while it has been steadily rising in rural regions, although Urban Upper still has the highest levels today.

Figures 14 and 15 plot the mean hourly and monthly wage at the 3-digit occupation level in the private sector against the female share of employment in that sector over time, by the extended and market definitions respectively[9]. Using the extended definition confirms the highly polarized distribution where women are concentrated in agricultural occupations and most other occupations have very low female employment shares. A weak negative relationship between female employment and wages is still apparent, lending support to the segregation hypothesis. In figure 15, limiting the sample to employment by the market definition, reveals a more diversified employment profile by occupation for women and especially using the monthly wage exhibits a stronger downward sloping wage -employment share relationship in most years, and in 2023 in particular.

Finally, the distribution of hourly wages (in real 2023-CPI adjusted logarithmic terms) by workers' education level and by gender is presented in Figure 16a. Across all years, we see that men's wage distribution starts at a higher wage level than women's and is narrower and smoother than women's, in part due to the larger sample size of working men. Among both genders, those with higher education carry the highest wages, followed by those with secondary and primary education. Among women, the wage gap between those holding higher education and those holding secondary education has diminished over time, while among men this gap has remained large. Figure 16b shows the distribution of hourly wages (in real 2023-CPI adjusted logarithmic terms) by workers' occupation group and by gender. Between both genders, managerial positions carry the highest wages, followed by professionals, clerical support, and technicians and

[9] Figure A3 and A4 in the appendix present the real mean and median hourly wages over time by 1-digit occupational category for reference.

associated professionals. Occupation groups offering the lowest wages are, for women, craft and related trades, and services and sales, while for men it is skilled agriculture jobs, elementary occupations, and services and sales. The gap between managers' wages and the rest of occupations has decreased over time.

Wage Gap Decomposition Using Quantile Regressions

The following figures illustrate the size and composition of gender wage gaps across the entire range of Egyptian wages, for the cases that occupational segregation is included among the 'explained' endowments as reflecting workers' skills, choices or luck (Figure 17), or subsumed in the unexplained residual (Figure 18).[10] Across Figures 17 and 18, the endowment and returns effects taken in tandem clearly show that female workers typically receive lower wages than men in the upper half of the wage distribution, but outperform men at the bottom of the distribution. These gaps favoring men at the top, and those favoring women at the bottom have been statistically significant. The endowment effects-including occupations- have systematically favored men across the wage distribution, and have been particularly large in the top two wage deciles. The returns on endowments have favored women in the lower half of the wage distribution up to the 6th or 7th decile, and (except in 1988) particularly so in the bottom quintiles. These returns effects then sharply turn highly negative at the top of the wage distribution.

Comparing Figures 17 and 18, as we remove occupational differences from among workers' endowments and choices, and move their effect to the unexplained component (in Figure 18), we find that the part of the wage gap due to those unexplained factors becomes smaller or turns negative, while the men-favoring endowment effect becomes substantially weakened, particularly in the top 2–3 wage deciles. In 1988, 2012 and 2023, the endowment effects essentially disappear across all but the highest quantiles.

These observations mean that occupational segregation favors men very strongly, and more so higher up the wage scale. Depending on whether this is down to workers' unmeasured qualities and choice (Figure 17), or some systemic and discriminatory factors (Figure 18), this becomes reflected in the estimated endowment effects or the returns and unexplained effects. Figure 19

[10] Tables A1a–A2b in the annex report the regression coefficients for the first, fifth (median) and ninth wage deciles (results for other quantiles are available from the authors on request). The first two rows in Tables A1a–A1b report the predicted values of log monthly wages for the two genders. Because these statistics are not of central interest here, their discussion will be omitted to spare space. The third row reports on the composite income differential between the two genders, and rows 4–6 report the parts of the gap attributable to the observed systematic differences in women's and men's marketable endowments, and the (unexplained) portion attributable to the differential returns to these endowments. Row 6 reports on the portion of the income differential that cannot be explained by systematic differences between the genders, and is thus attributed to the differential returns to the various characteristics, assuming that no important characteristics were omitted from the analysis, in agreement with the tradition in the literature using this technique. The effects of these groups of characteristics on the wage differential are shown in rows 7–11. The last large block of rows, rows 12–16 at the bottom of Tables A1a–A1b, show the effects of the differential returns to workers' characteristics on the wage gaps.

illustrates the premiums that men on average receive because of the more privileged occupations they occupy (or 'occupation endowment effect'), particularly at the top of the wage scale, but it also shows the lack of consistent gaps between men and women who succeed at being hired into the same occupations ('occupation returns effect'; refer to the coefficients on 'occupation and institutional sector' in rows 11 and 16 of table A1). Across 1988–2023, the occupational wage premiums have been marginally on the rise till 2012–2018, but have slightly declined according to the latest survey wave.

Which worker characteristics are most responsible for the endowment- and returns-effects gaps between genders? Tables A1–A2 suggest that, first, women are significantly more educated,[11] but have lower (potential) work experience than men. By contrast, women receive higher returns on their years of work experience than men. Second, women are typically less likely to be affiliated with the types of employers offering higher wages – specifically large manufacturers. Men's association with such employer types leads to a substantial endowment effect. Moreover, those women who succeed at being retained by such employers appear to receive as high returns on their work there as men, possibly an indication of their exertion of great effort to protect their coveted jobs.

These results point to the importance of occupation and employer effects at driving workers' wages. To the extent that they reflect workers' latent skills or preferences, we can consider them as valid endowments that workers can aspire to hold. However, if gender segregation and the channeling of women to only specific employers and sectors is driven by discriminatory motives – such as by the desire of formal private-sector employers to avoid providing maternity leave and allowances for dependent care – these effects should be classified among the 'returns effects' on valid worker endowments.

These observations jointly point to the pervasiveness of gender-based occupational segregation across many market segments, especially the segments exhibiting higher wages, and corroborate the existence of glass ceilings to women's career and earnings growth, as identified by Said et al. (2022).

V. Conclusion and Policy Implications

Our analysis provides insights into long-term trends in labor market conditions, pay gaps, and gender composition of occupations in Egypt over a 35-year period characterized by far-reaching social, economic, and political changes. Despite significant progress in empowering women and other vulnerable workers through human capital accumulation, this study reveals that women

[11] A possible explanation could be that women have more years of education but that they do not study the "right" subjects (e.g. STEM). For instance, women may self-select into fields of study that prepare for careers in the public sector rather than in the private one. This warrants further investigation.

remain heavily concentrated in a small number of low-paying occupations, primarily in agriculture, and once subsistence work is eliminated, to a small number of occupations such as school teachers, salespersons and clerical workers, and are effectively excluded from opportunities for career advancement.

The analysis of gender wage gaps in Egypt reveals a complex picture across the wage distribution. Women tend to outperform men at the lower end of the wage scale, but face significant disadvantages at the upper end, indicating the presence of a glass ceiling effect. Occupational segregation plays a crucial role in these disparities, favoring men particularly in higher-paying positions. The study finds that women are generally more educated but have less work experience than men, and receive higher returns on their experience. However, women are less likely to be employed in high-wage sectors, particularly large manufacturing firms. These findings suggest that while progress has been made in some areas, significant barriers to gender equality in the Egyptian labor market persist, especially in terms of occupational segregation and access to high-paying jobs.

To address the persistent gender wage disparities and occupational segregation in Egypt, a comprehensive set of policy interventions is necessary. Promoting occupational diversity should be a primary focus, involving the implementation of targeted training programs, mentorship initiatives, and anti-discrimination policies. These efforts aim to enhance women's access to a wider range of occupations, particularly in high-paying sectors and large firms. Simultaneously, addressing work experience gaps is crucial. This can be achieved by developing policies that support work-life balance, including improved maternity leave provisions and childcare support, enabling women to maintain continuous employment.

Combating workplace bias is another critical area for intervention. Launching initiatives to raise awareness about gender biases and promoting equal opportunity practices among employers can help create a more equitable work environment. Continued investment in education and skills development for women, particularly in fields leading to high-paying occupations, is essential for long-term progress. This should include bolstering merit-based admission to elite schools and guiding more women to science, technology, engineering, and mathematics (STEM) disciplines through scholarships and incentives for lifelong learning. For higher-end jobs, programs developing advanced soft skills to prepare women for leadership positions could help them attain compensation on par with men's.

Implementing labor market reforms to increase women's economic participation, encourage workforce formalization, and enable women to engage in higher-paying leadership positions is crucial for systemic change. Promoting flexible working arrangements that are responsive to women's caretaker roles at home can help break down "glass walls" and "glass ceilings." This should be complemented by enhancing technology infrastructure, improving internet connectivity,

and promoting the digitalization of tasks, including through e-government reforms, to increase work flexibility.

Expanding and improving the affordability of childcare services in both public and private sectors is vital to reduce the burden on employers and support working mothers. Retaining public-sector employment in education services, despite overall trends in public-sector downsizing, can help preserve decent work opportunities for women. Finally, improving mobility through investments in transport infrastructure can alleviate women's constraints and increase their availability and flexibility in the labor market.

Our long-terms analysis of occupational segregation and wage disparities in Egypt underscores the complexity of achieving gender equality in the workforce. While progress has been made, persistent barriers continue to limit women's access to diverse and higher-paying employment opportunities. These findings underscore the need for continued policy interventions and societal changes to address occupational segregation, enhance women's economic participation, and promote fair compensation across all sectors. By addressing these issues, Egypt can work towards a more equitable and inclusive labor market, which is essential for sustainable economic development and social progress.

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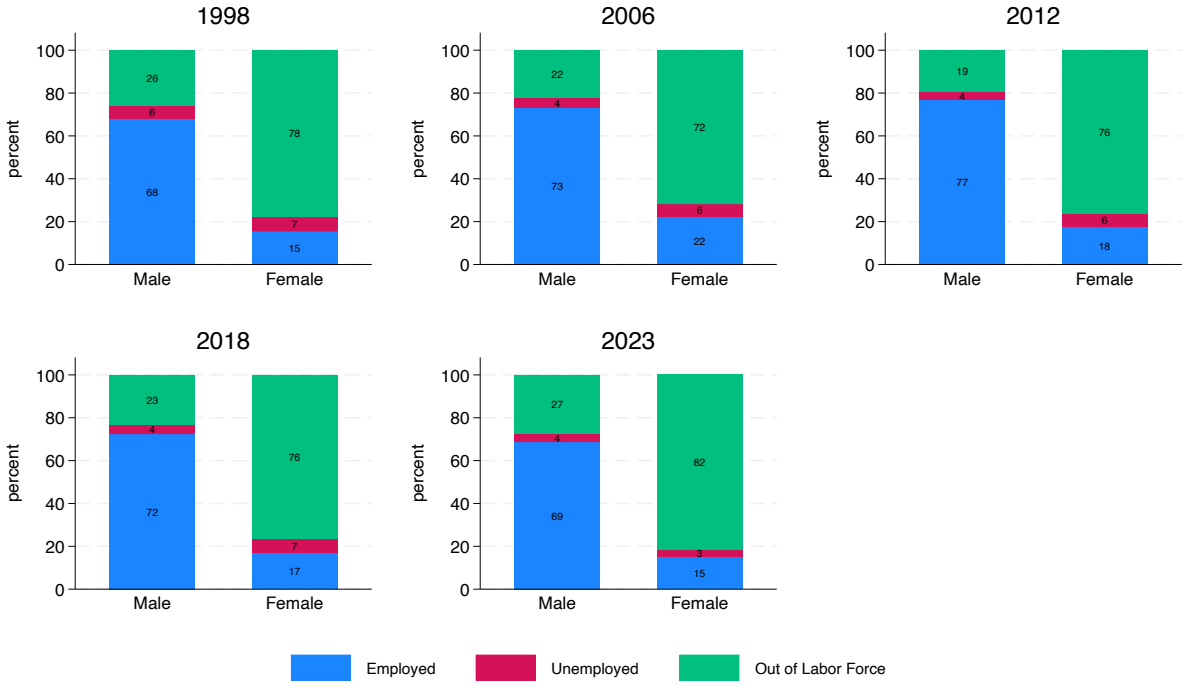
Figure 1 Work status by sex 1998 to 2023 (15 to 65-year-old)



Source: Authors based on ELMPS 1998-2023

Figure 2a gender composition by relative size of 1 digit occupation (extended definition) 1988-2023

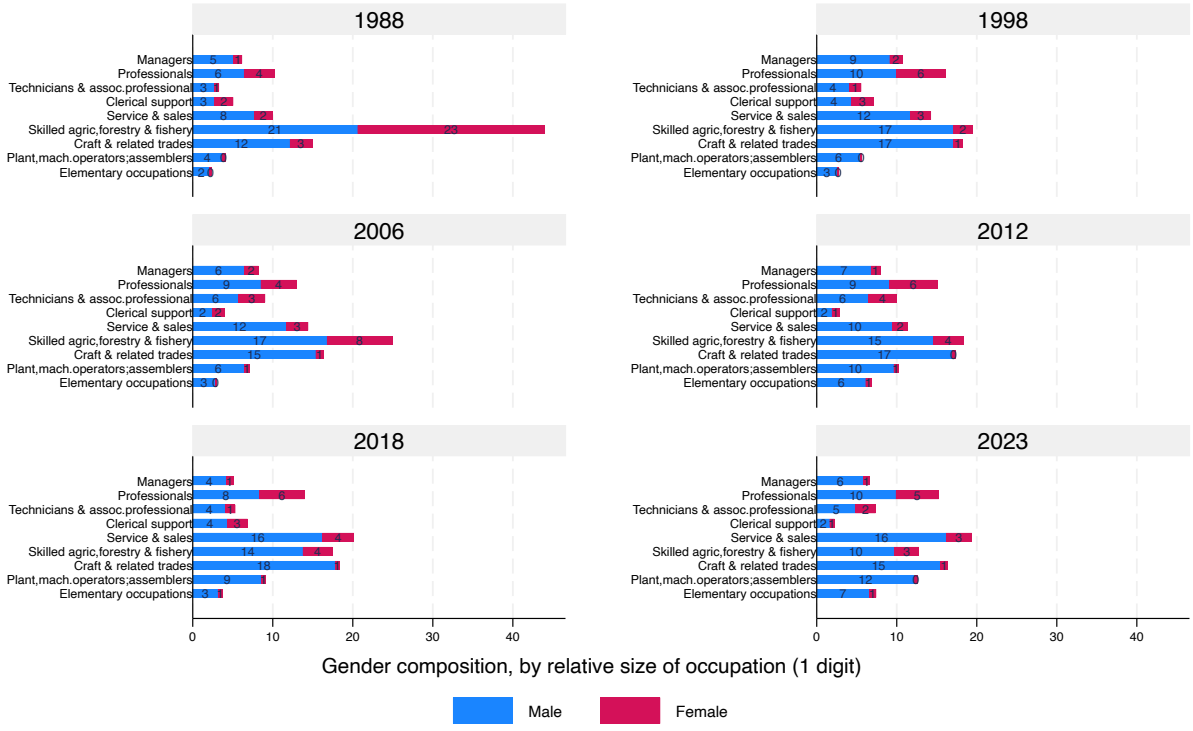


Figure 2b gender composition by relative size of 1 digit occupation (market definition) 1998-2023

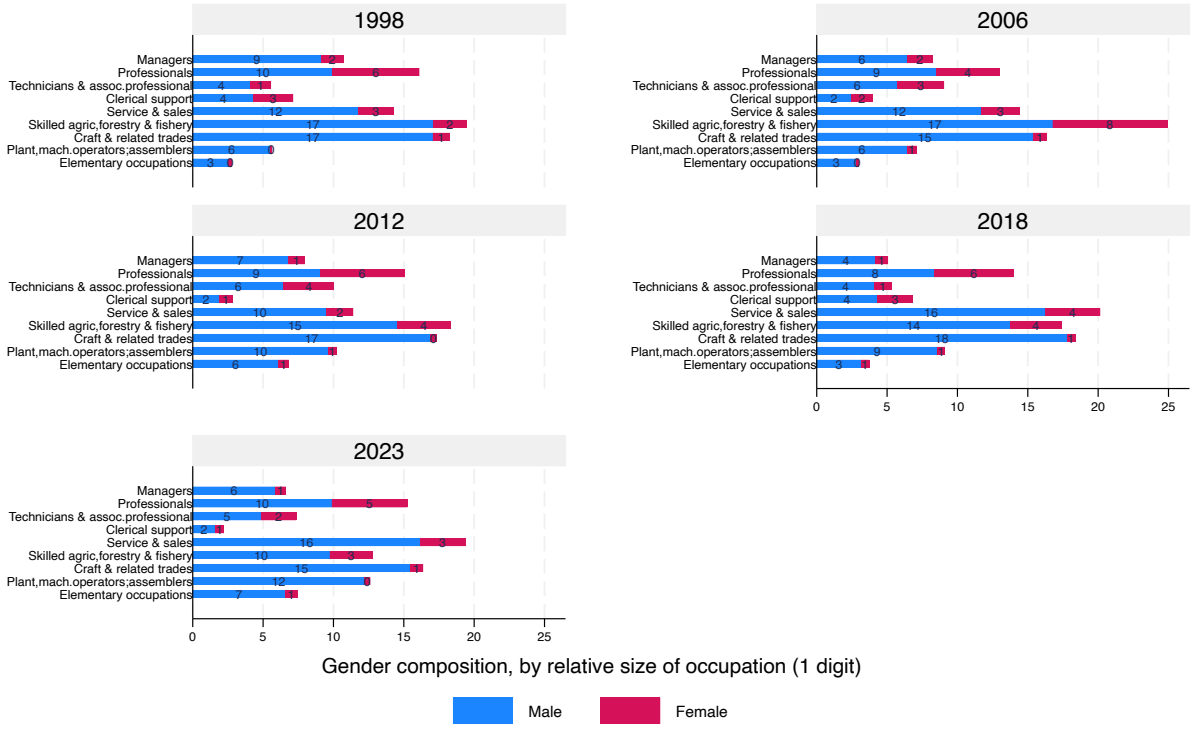


Figure 3a Share of employment (extended definition) by 1 digit occupational categories and gender, 1988 to 2023

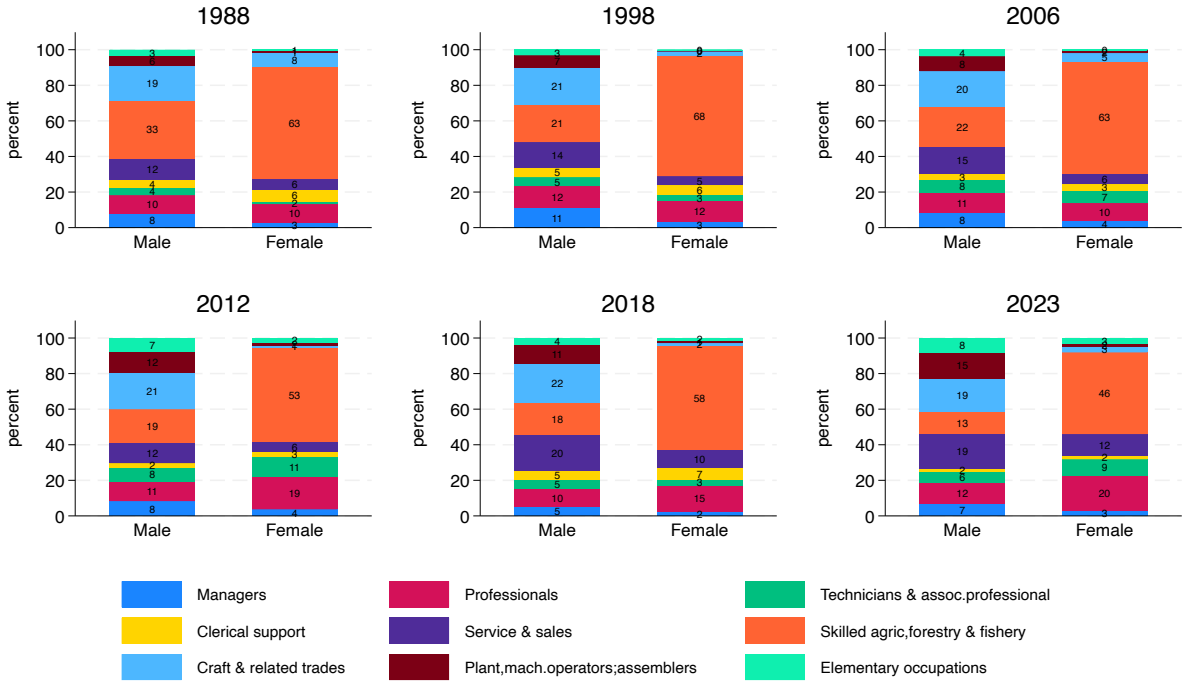
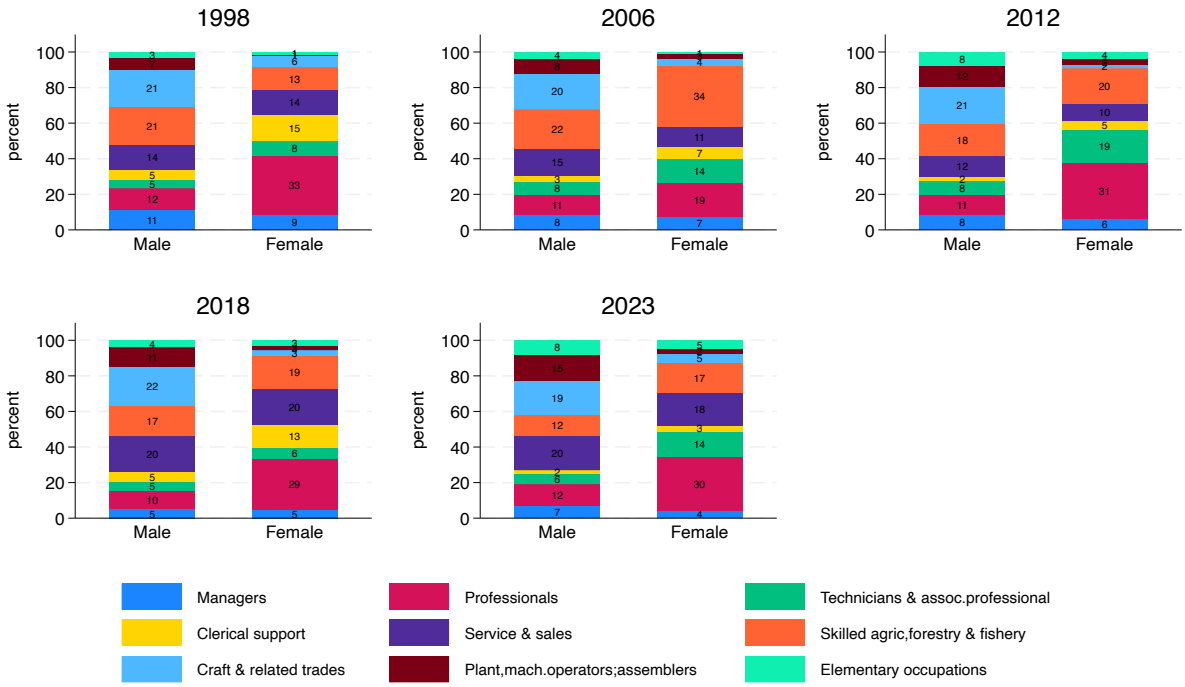
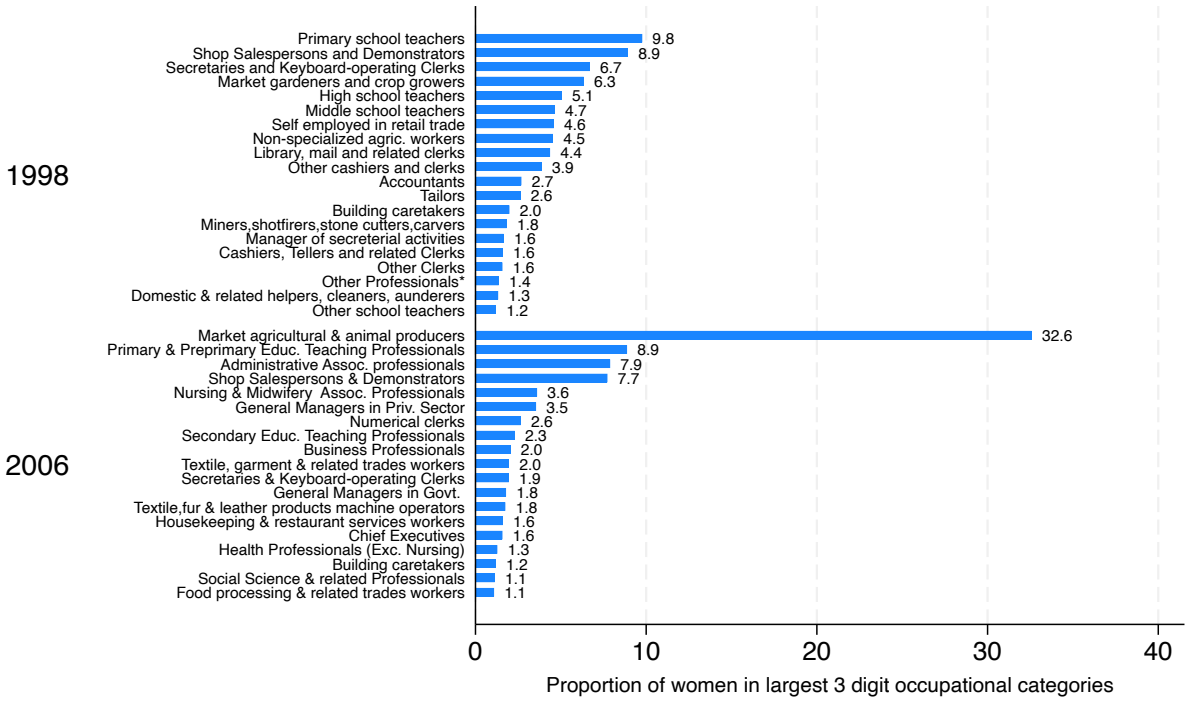


Figure 3b Share of employment (market definition) by 1 digit occupational categories and gender, 1998 to 2023



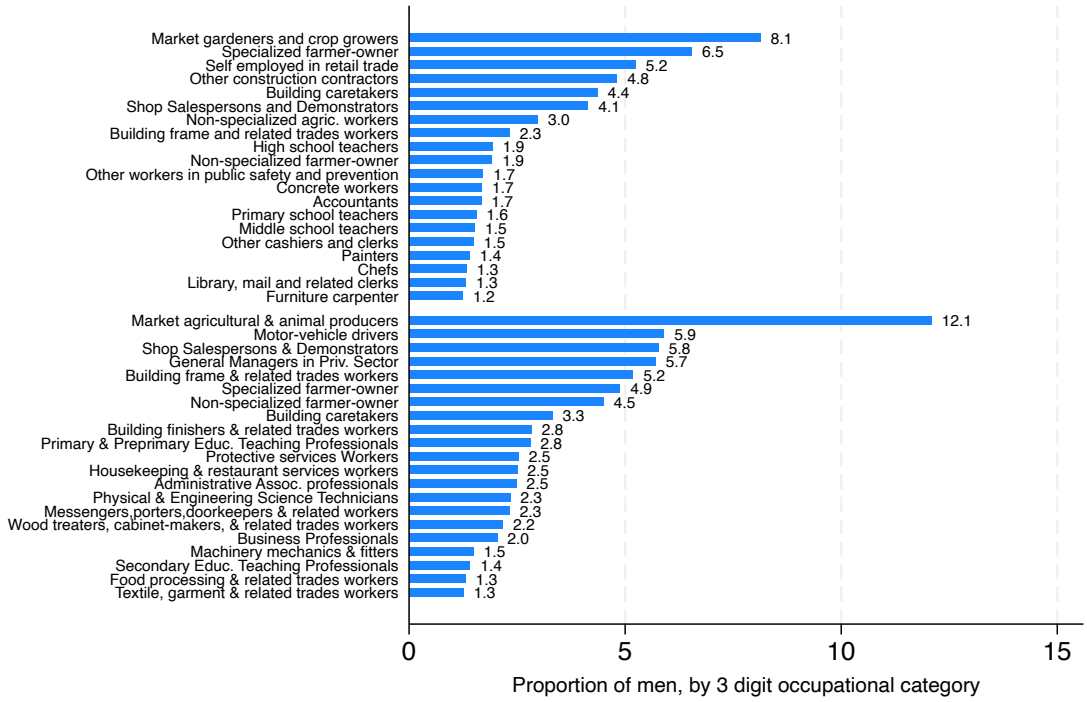
Source: Authors based on ELMPS 1988-2023

Figure 4 Proportion of women and men in the largest 3-digit occupational categories (market definition), 1998 to 2023

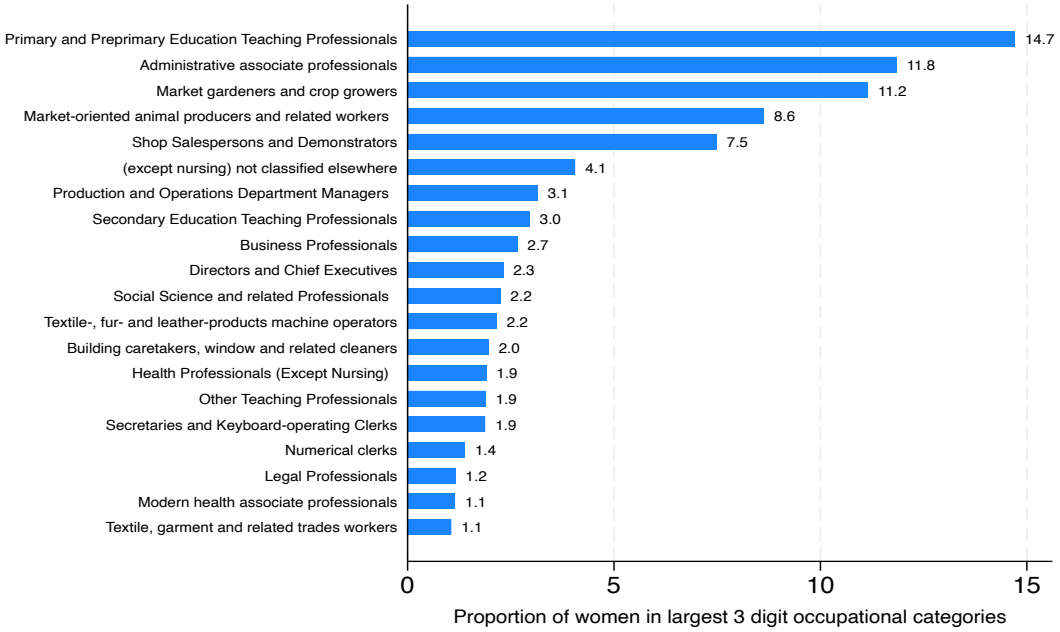


1998

2006



2012



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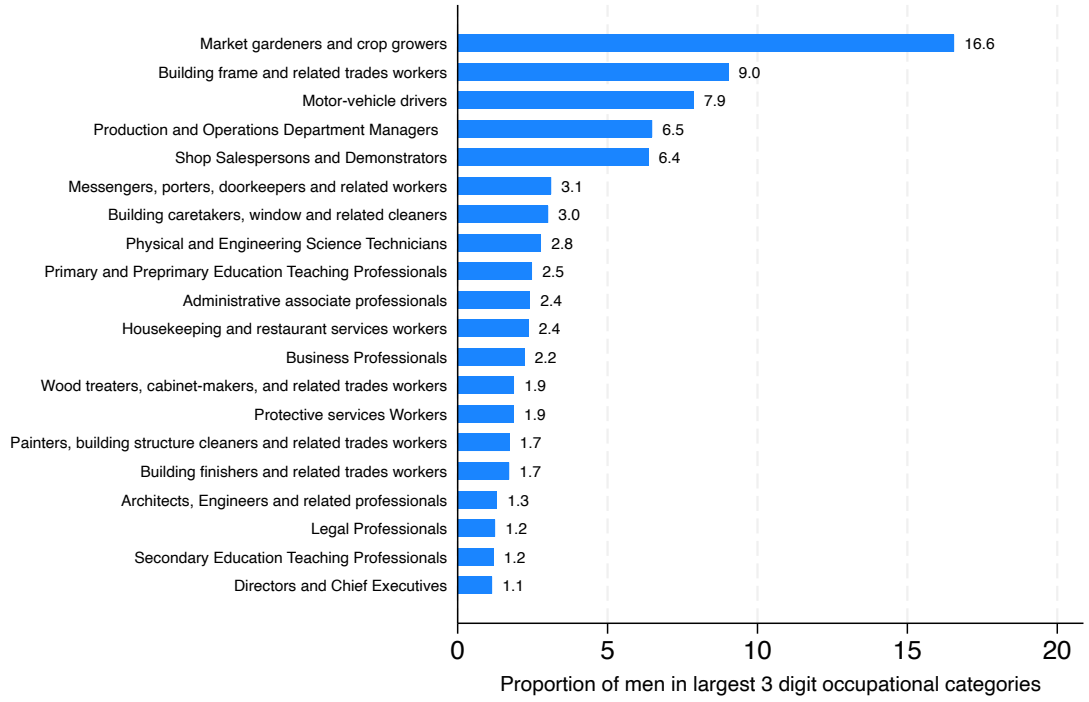

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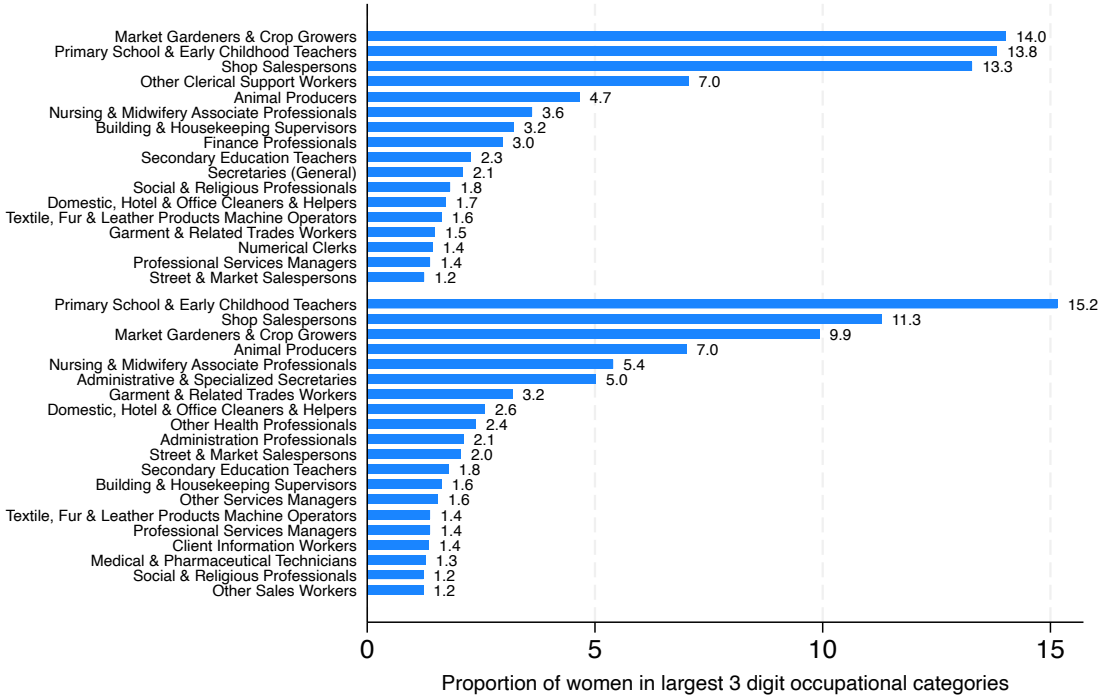
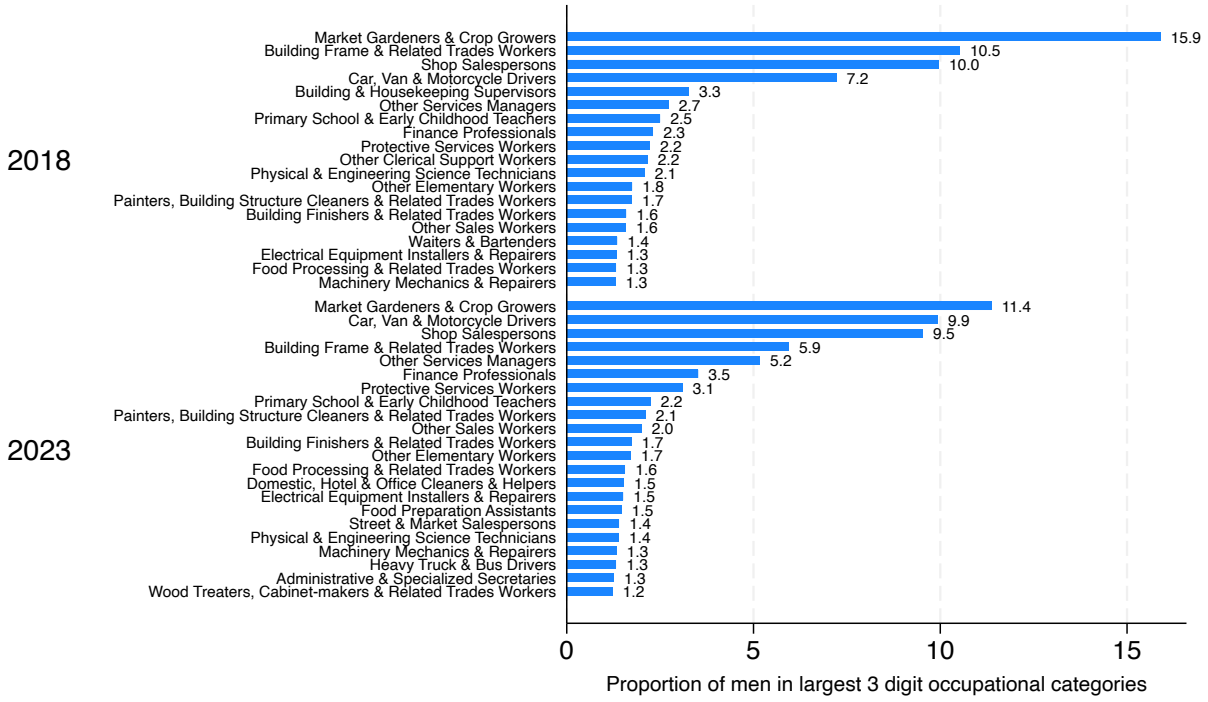
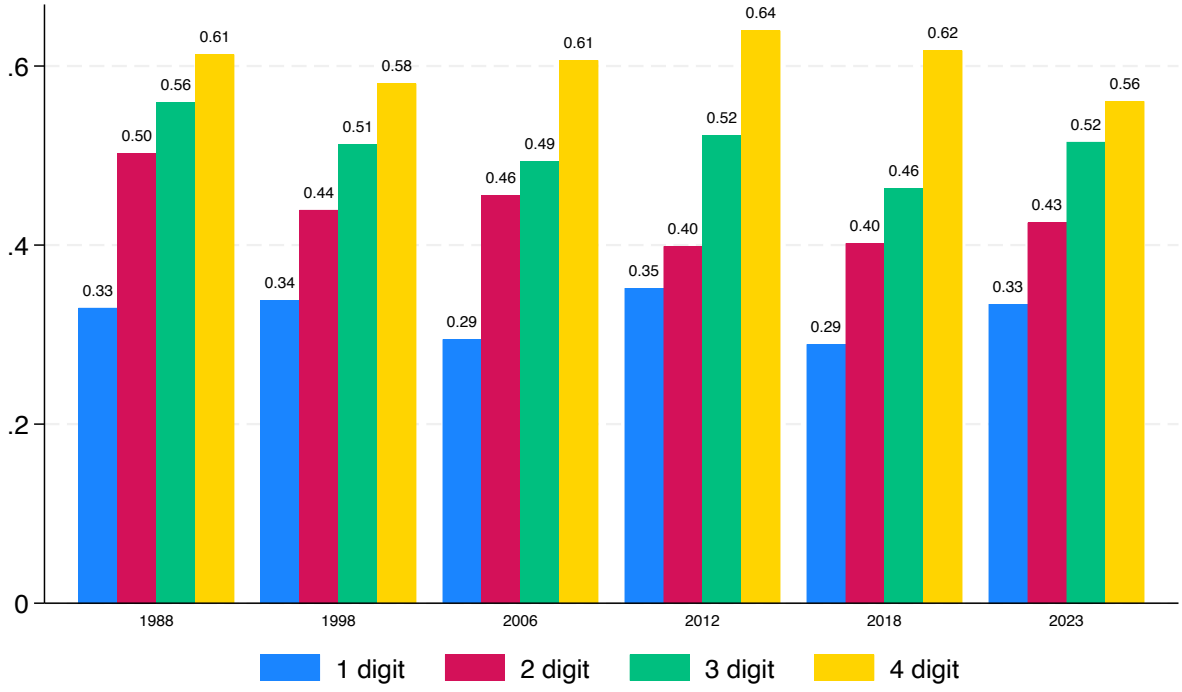




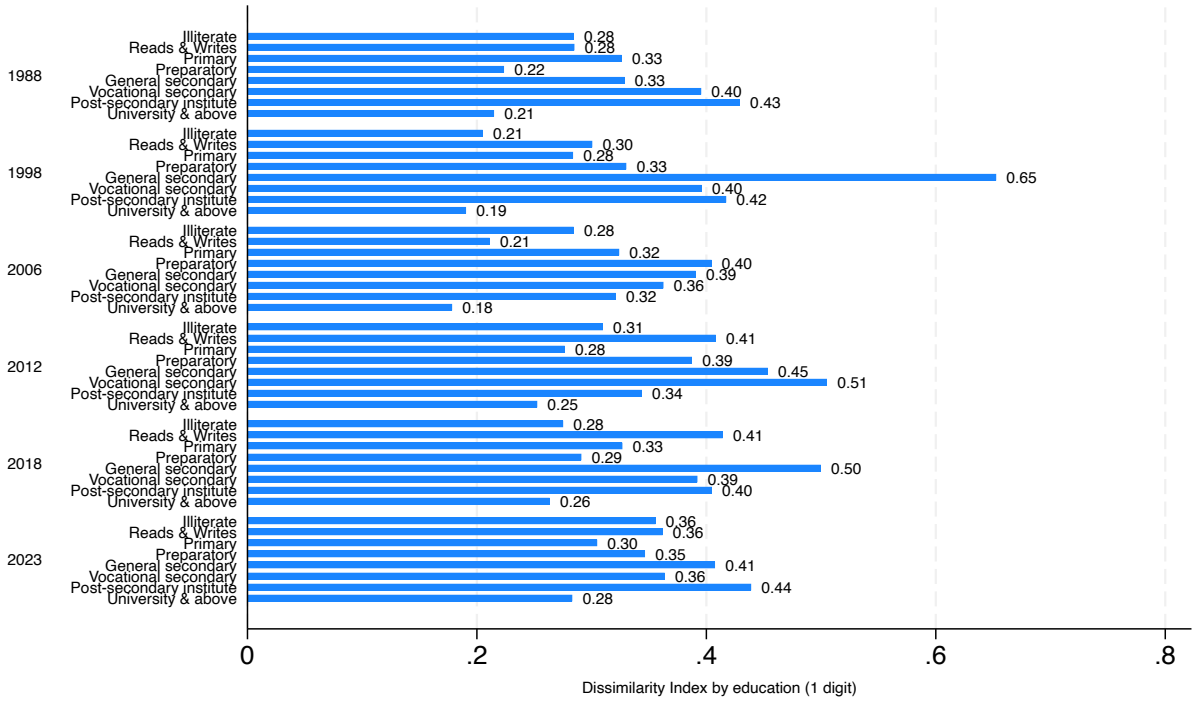
Source: Authors based on ELMPS 1988-2023

Figure 5 Indices of occupational dissimilarity by level of disaggregation, market definition 1988 to 2023



Source: Authors based on ELMPS 1988-2023

Figure 6 Occupational dissimilarity by educational attainment (1 digit and 4 digit), market definition, 1988-2023.



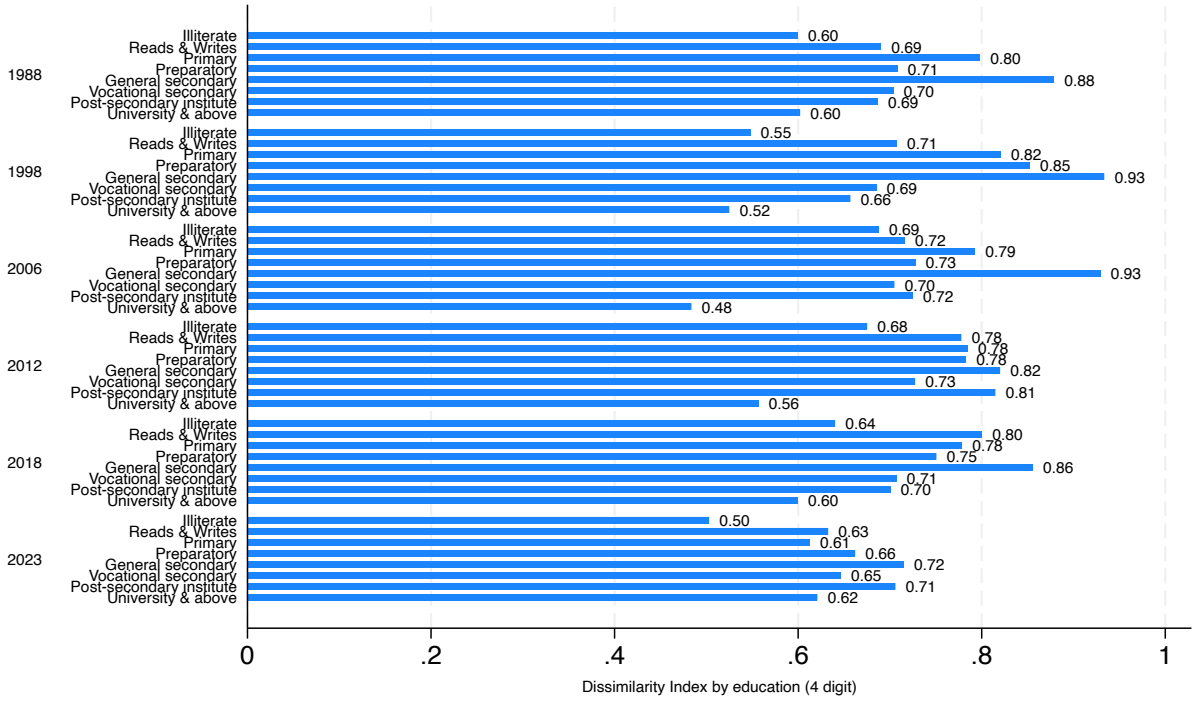


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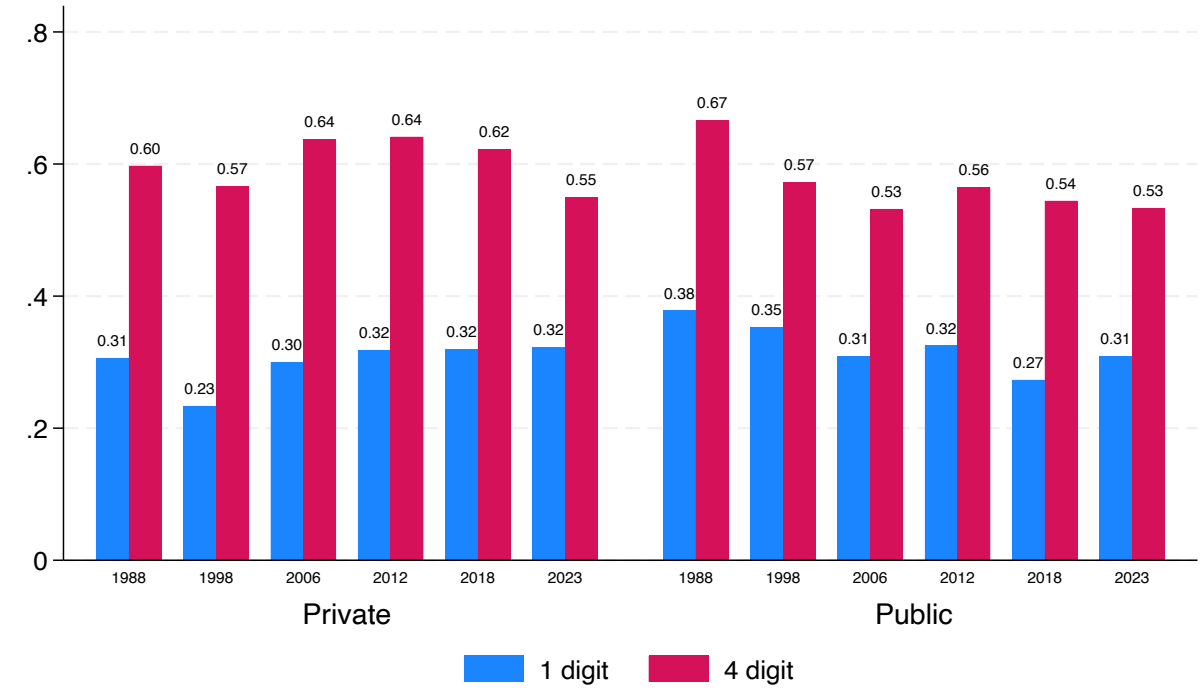
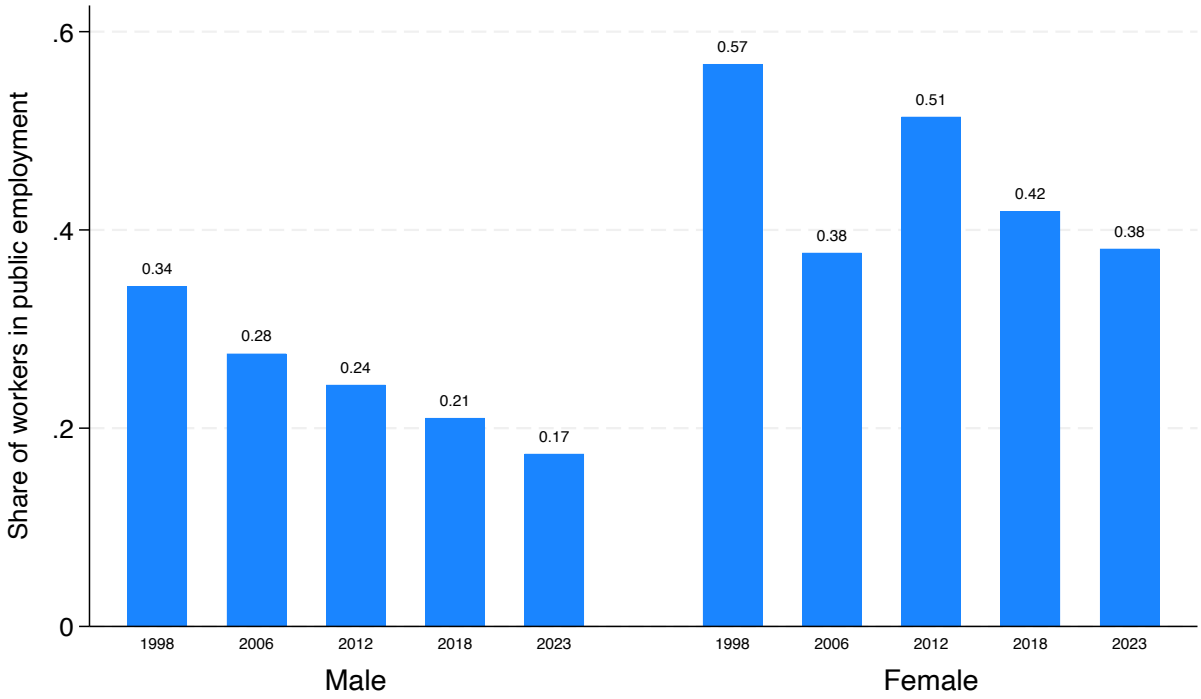
Figure 7. Occupational dissimilarity by sector, market definition 1988-2023



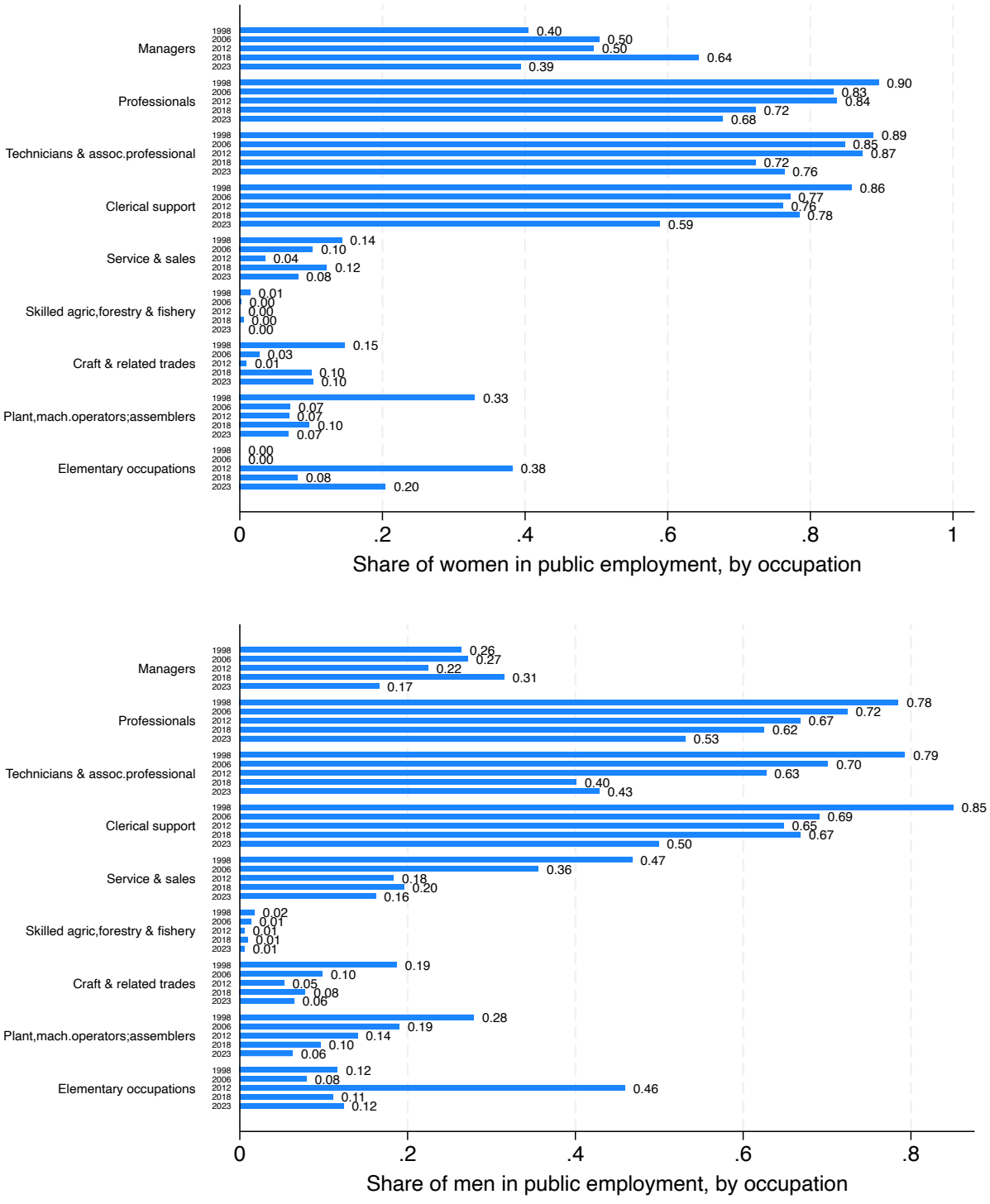
Source: Authors based on ELMPS 1988-2023

Figure 8 Share of men and women in public employment over time



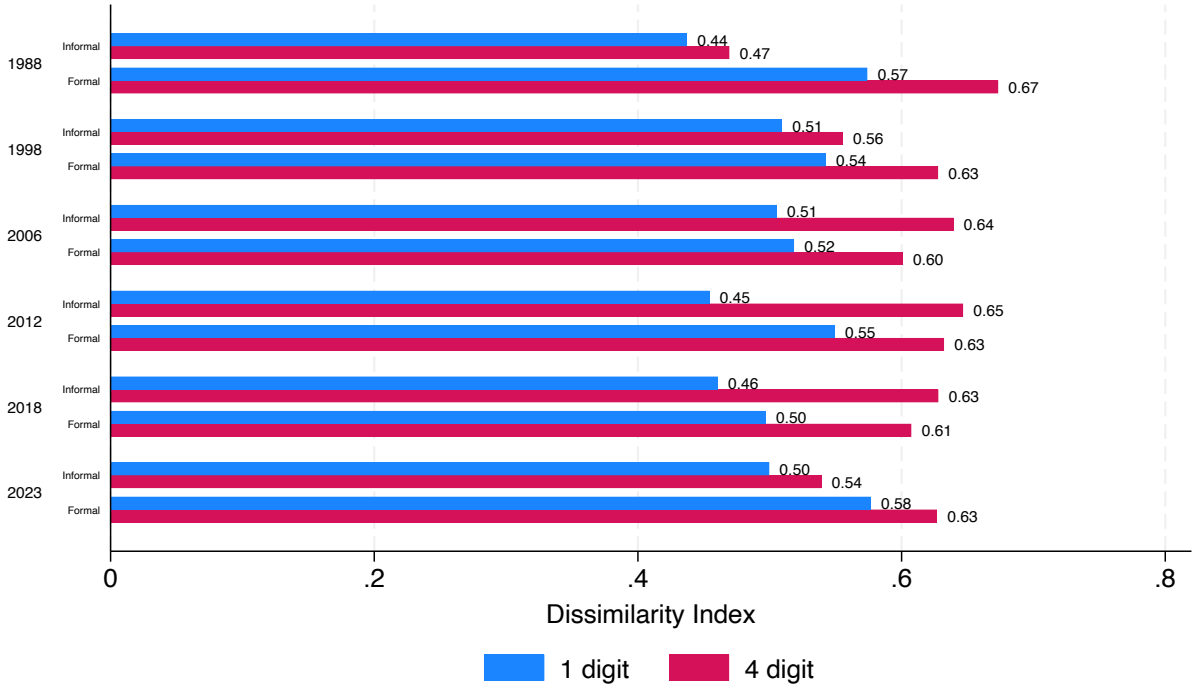
Source: Authors based on ELMPS 1988-2023

Figure 9 Share of workers in public employment by occupation and year



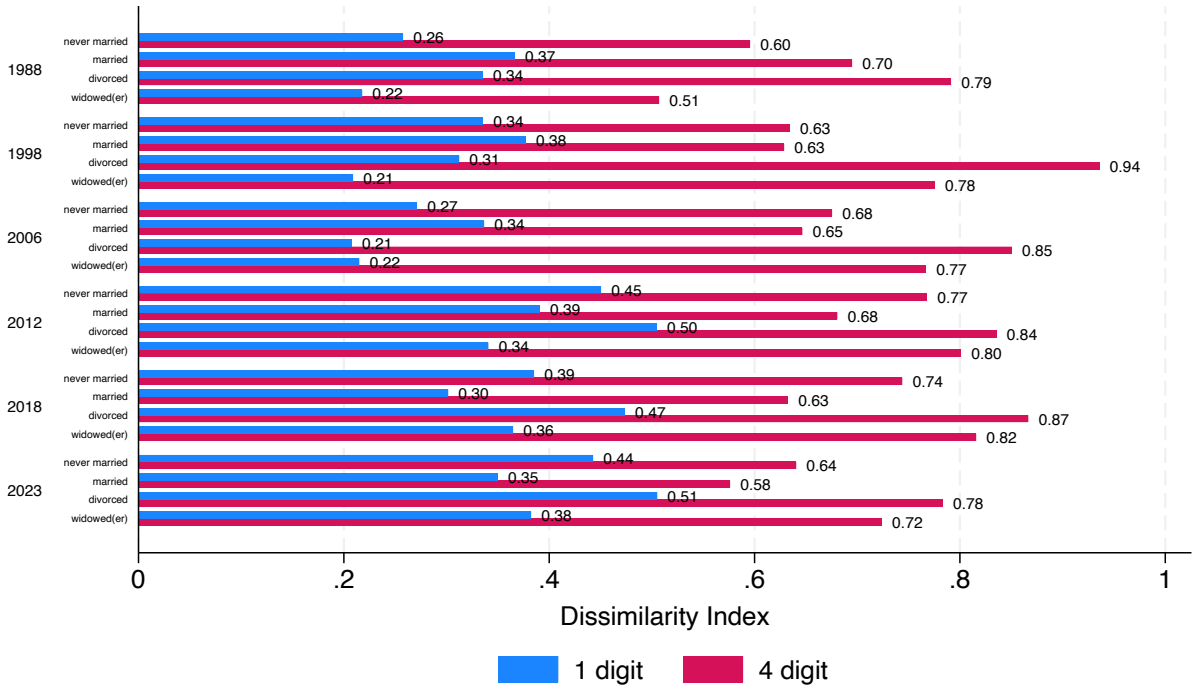
Source: Authors based on ELMPS 1988-2023.

Figure 10 Occupational dissimilarity by formality status (1 and 4 digit), market definition, 1988-2023



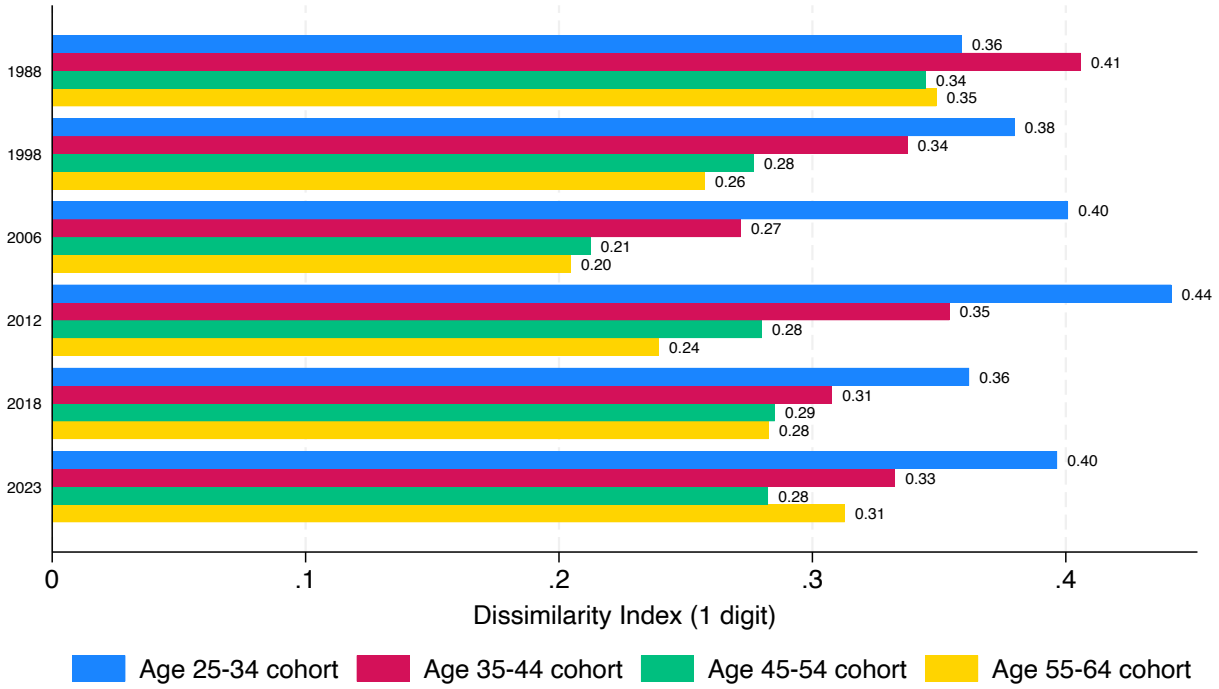
Source: Authors based on ELMPS 1988-2023

Figure 11 Occupational dissimilarity by marital status (1 and 4 digit), market definition, 1988-2023



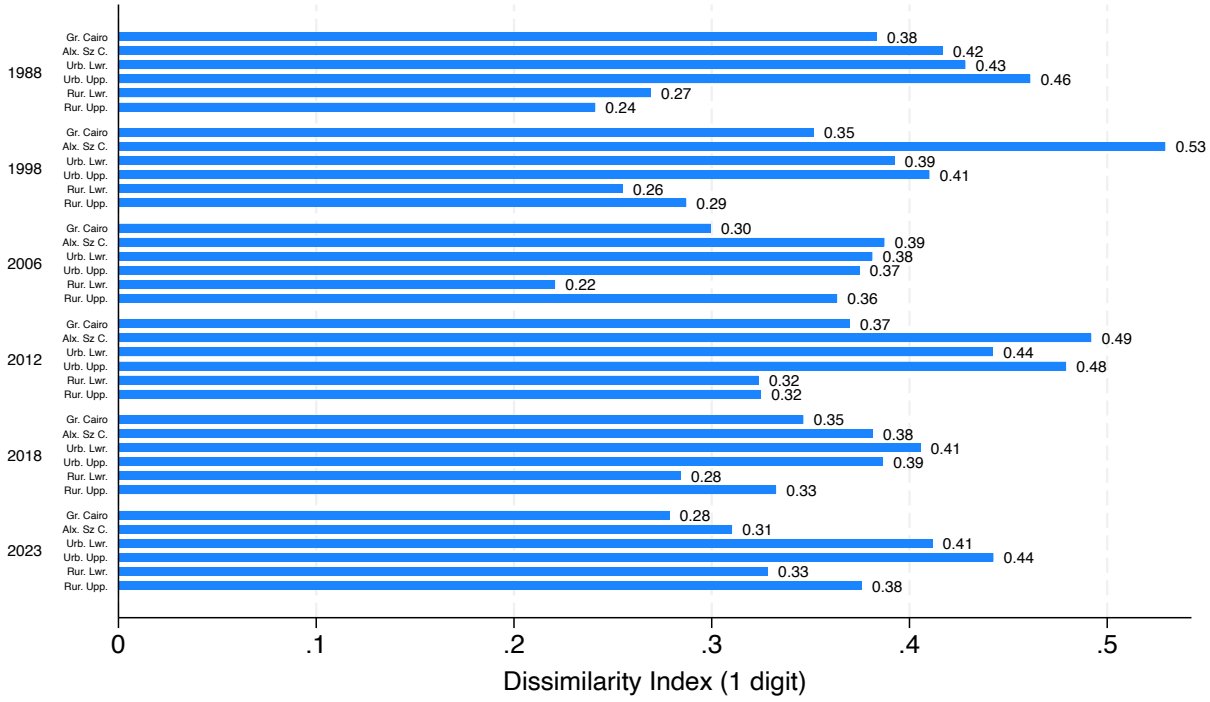
Source: Authors based on ELMPS 1988-2023

Figure 12 Occupational dissimilarity by age group cohort (1 digit), market definition, 1988-2023



Source: Authors based on ELMPS 1988-2023

Figure 13 Occupational dissimilarity by region of residence (1 digit), market definition, 1988-2023



Source: Authors based on ELMPS 1988-2023

Figure 14a Mean Real Hourly Wage and Female employment share by 3-digit Occupation (extended definition)

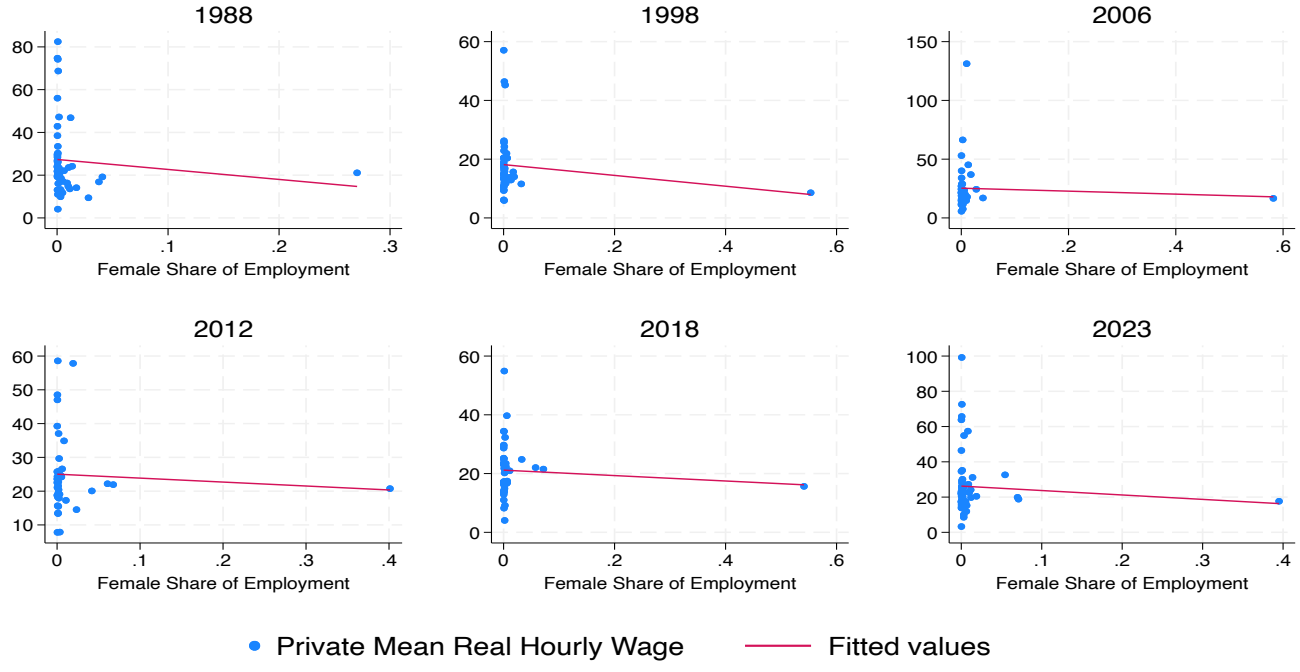
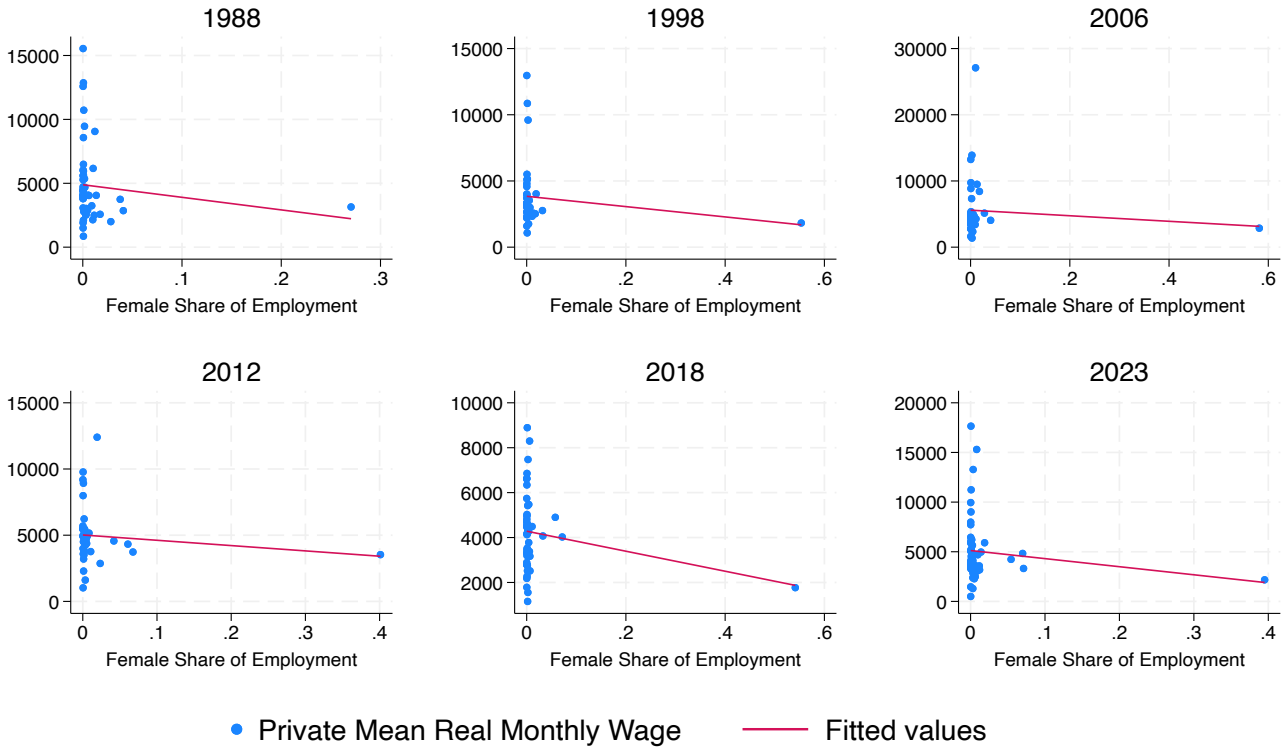


Figure 14b Mean Real Monthly Wage and Female employment share by 3-digit Occupation



Source: Authors based on ELMPS 1988-2023

Figure 15a Mean Real Hourly Wage and Female employment share by 3-digit Occupation (market definition)

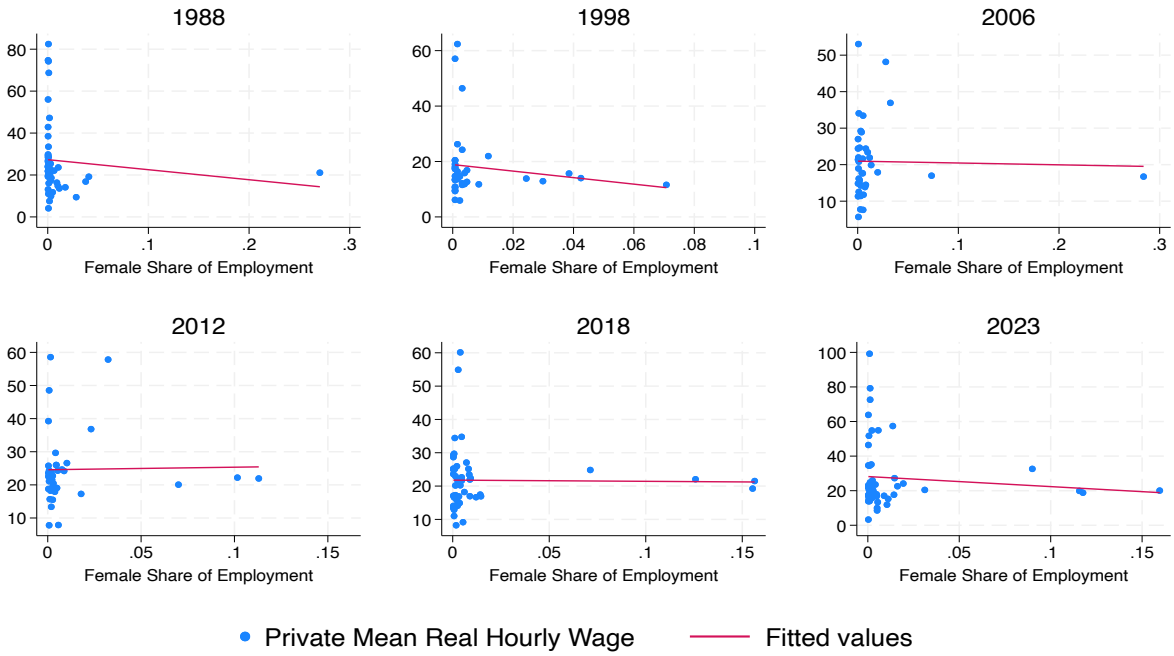


Figure 15b Mean Real Monthly Wage and Female employment share by 3-digit Occupation (market definition)

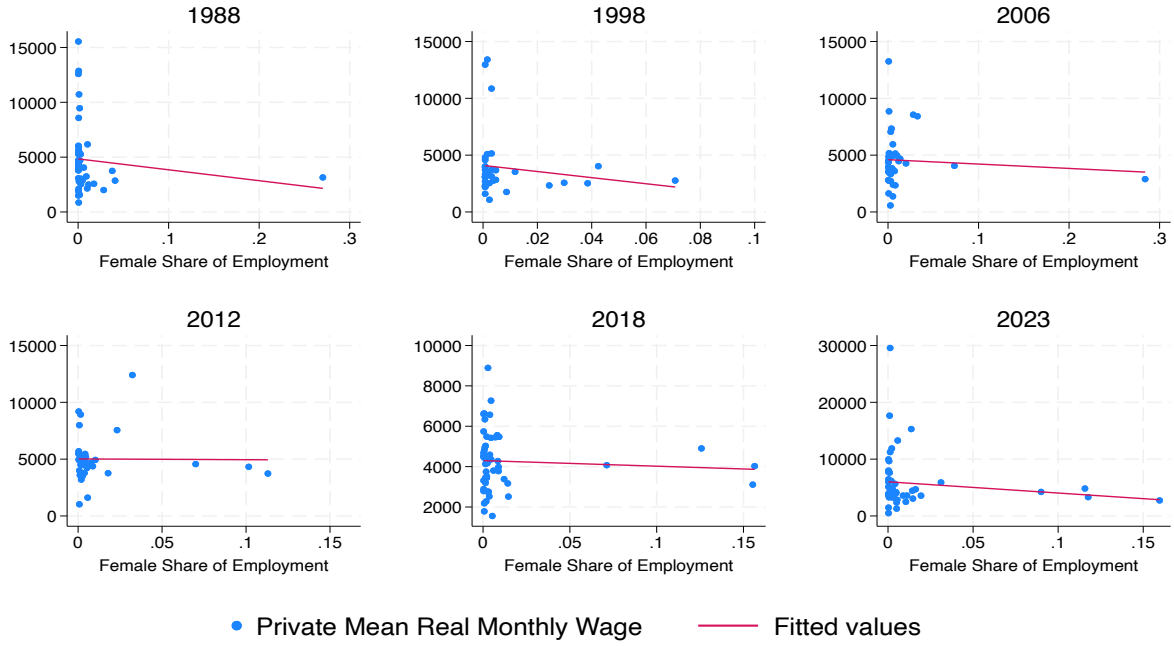
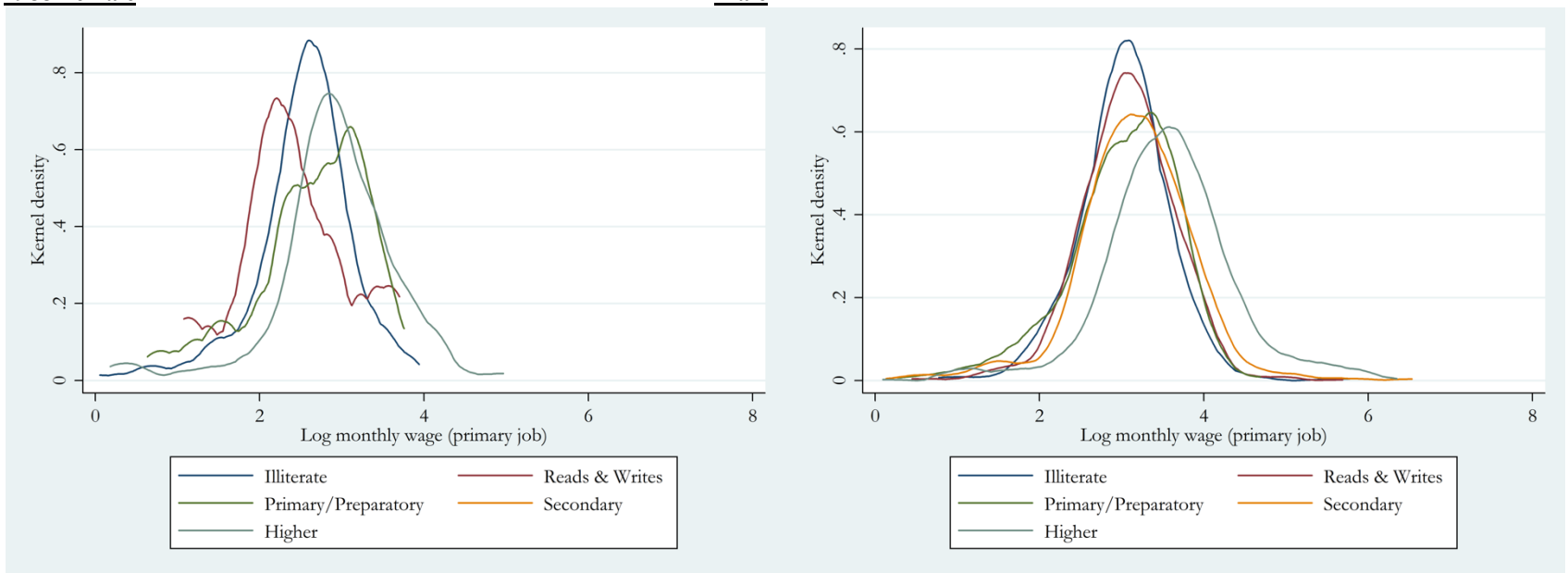
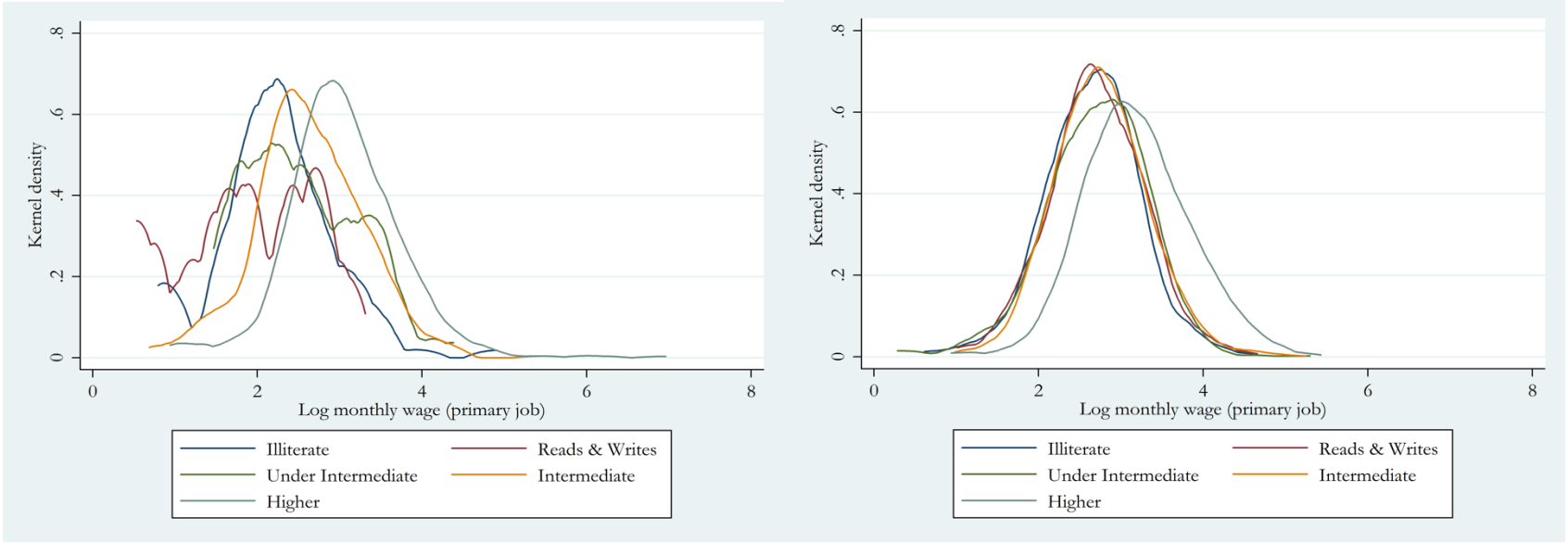


Figure 16a. Kernel density plots of log real monthly wage by gender and education level, 1988–2023

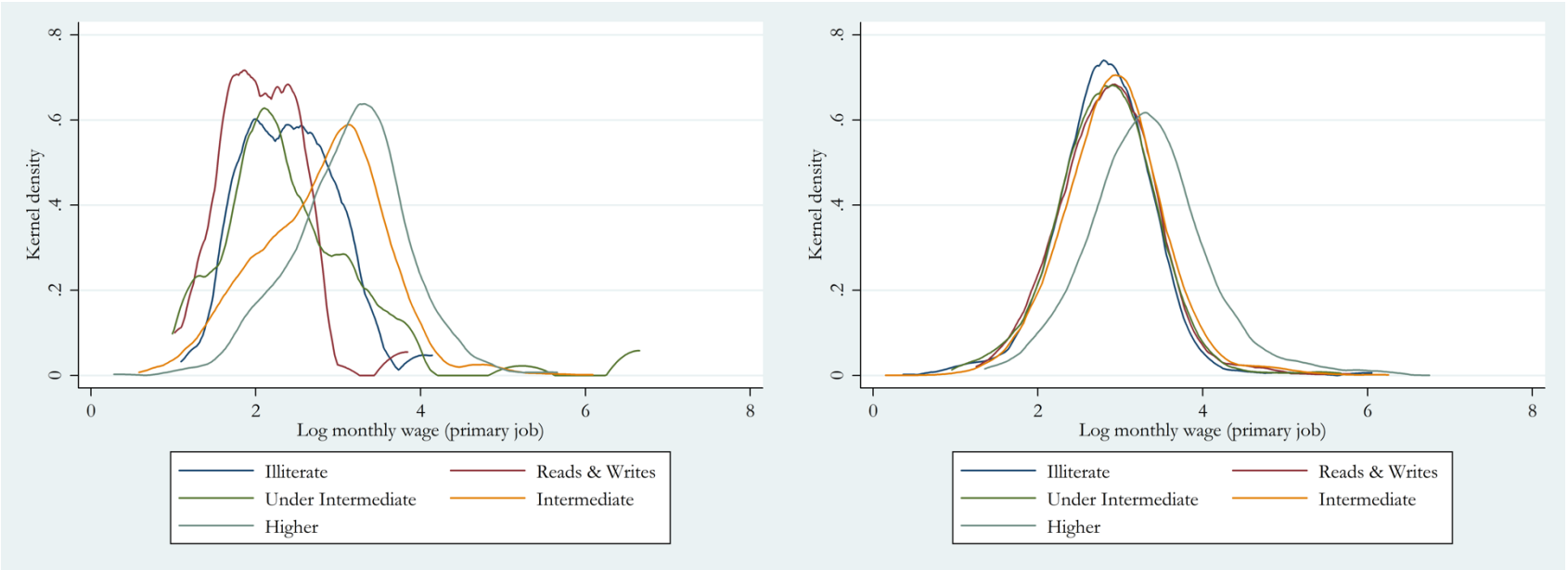
1988 Female **Male**



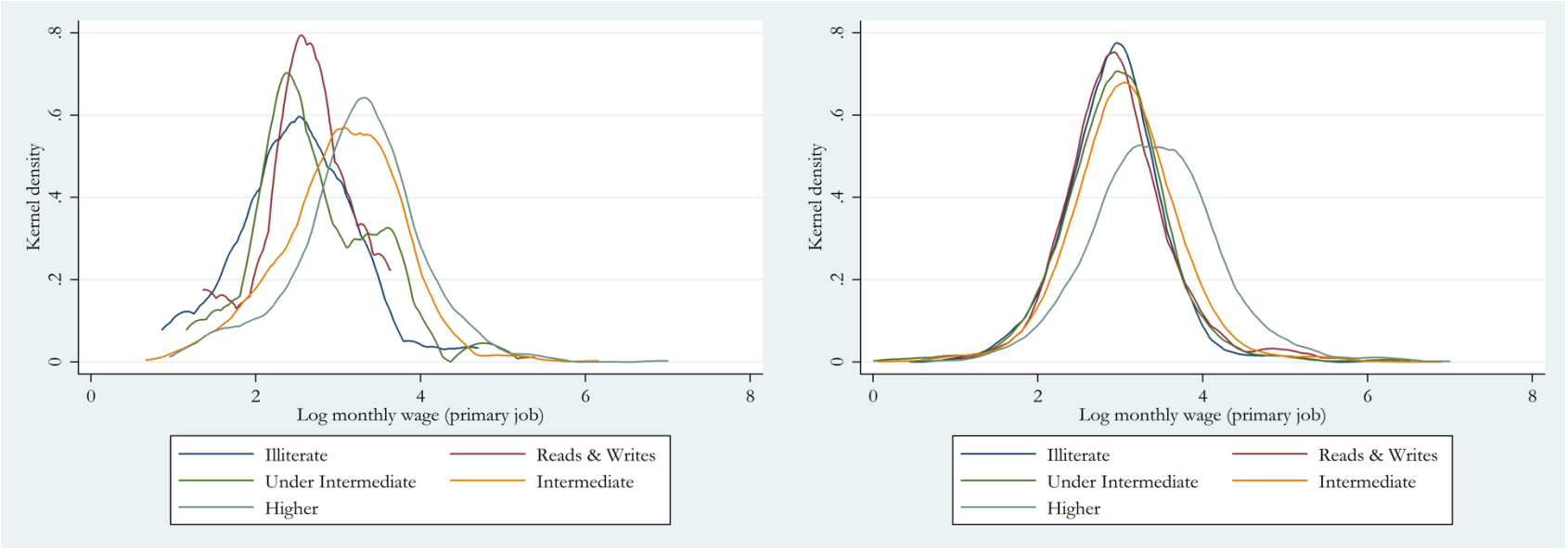
1998 Female **Male**



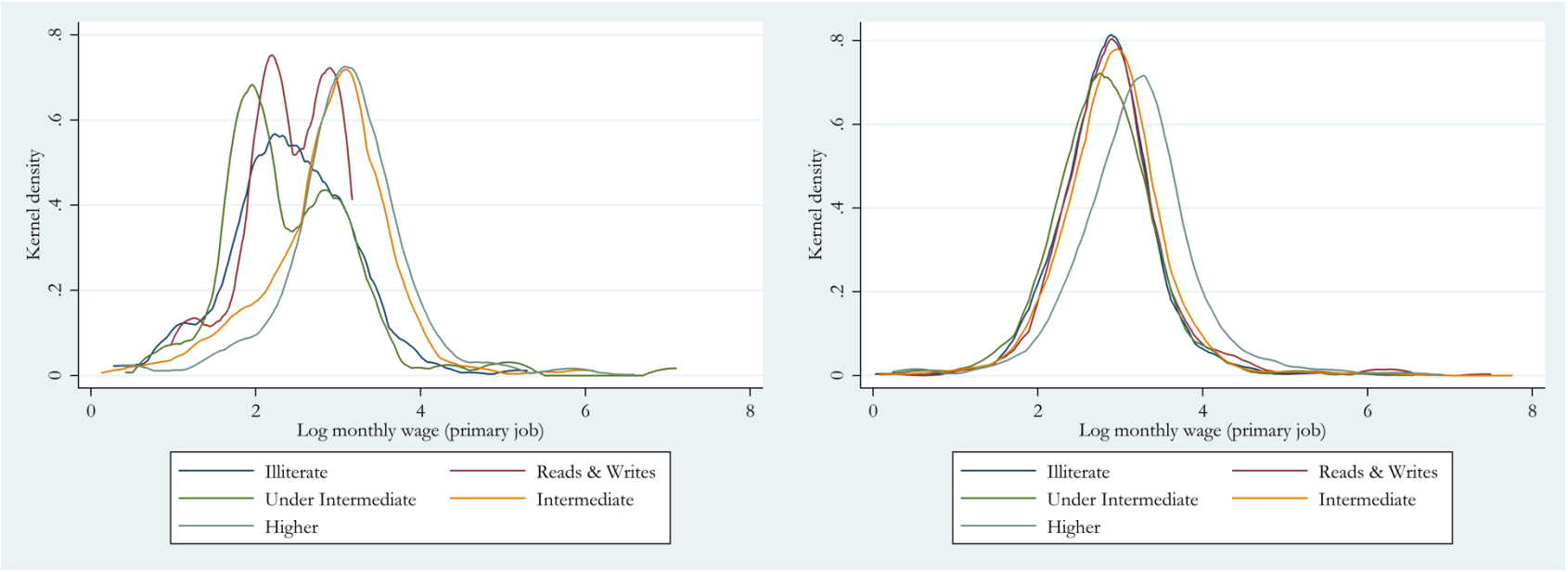
2006 Female **Male**



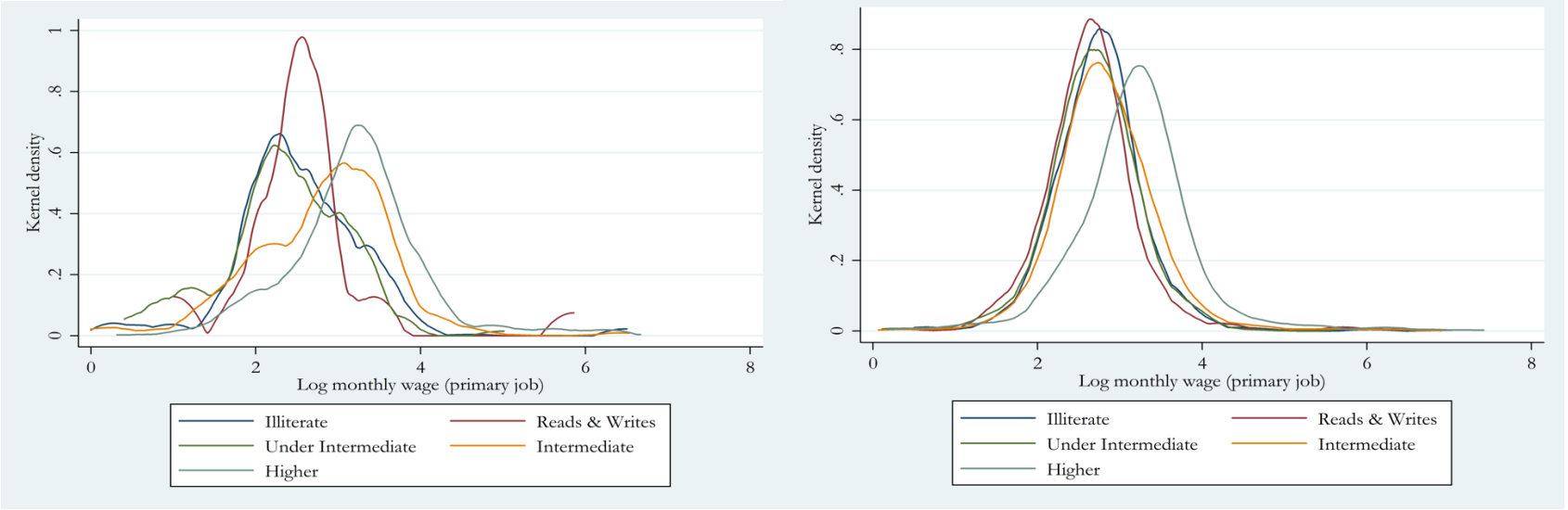
2012 Female **Male**



2018 Female **Male**



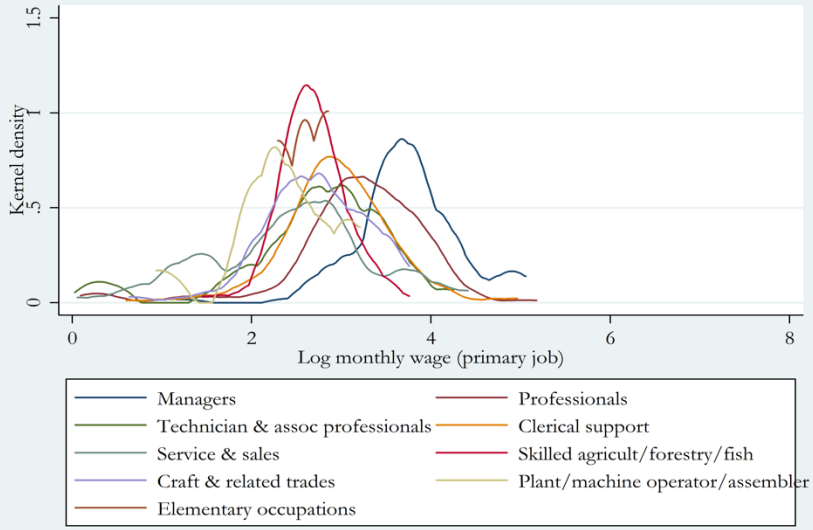
2023 Female **Male**



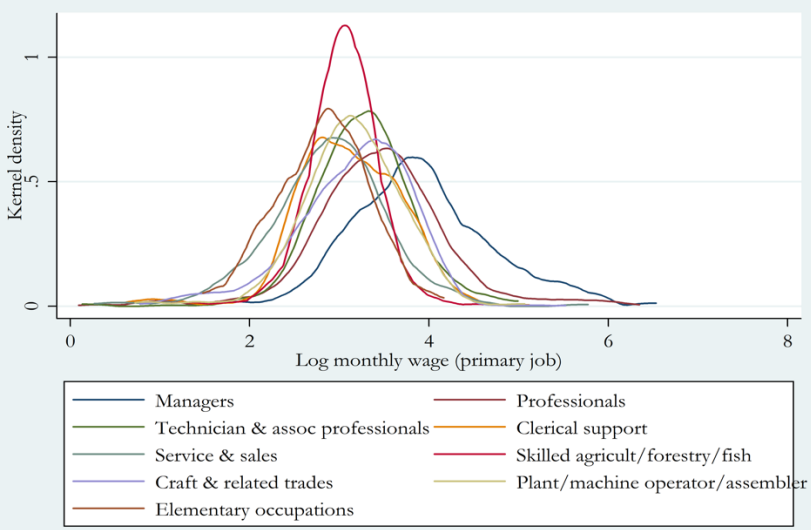
Source: Authors based on ELMPS 1988-2023, population-weighted samples restricted to private-sector workers.

Figure 16b. Kernel density plots of log real monthly wage by gender and 1-digit occupation group, 1988–2023

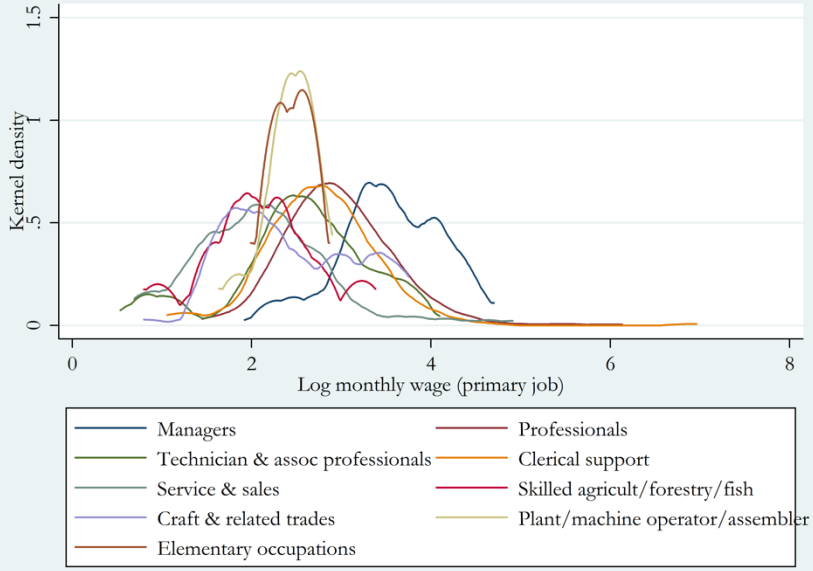
1988 Female



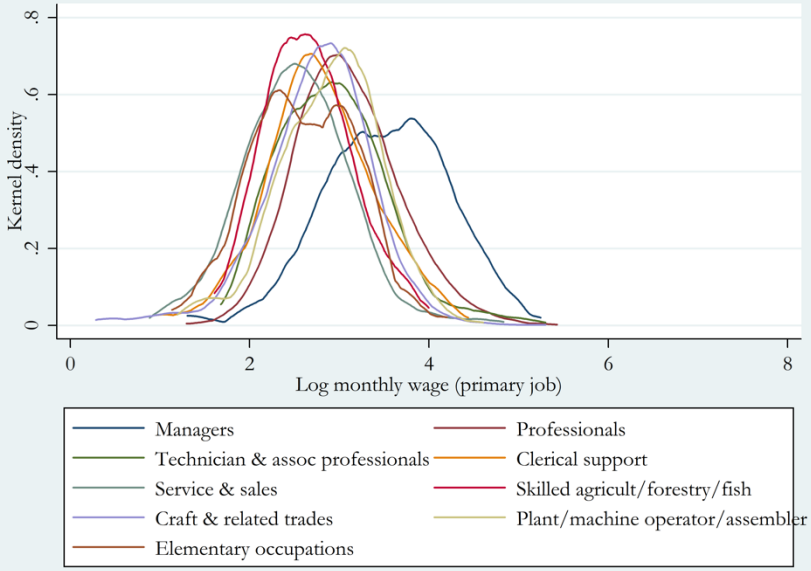
Male



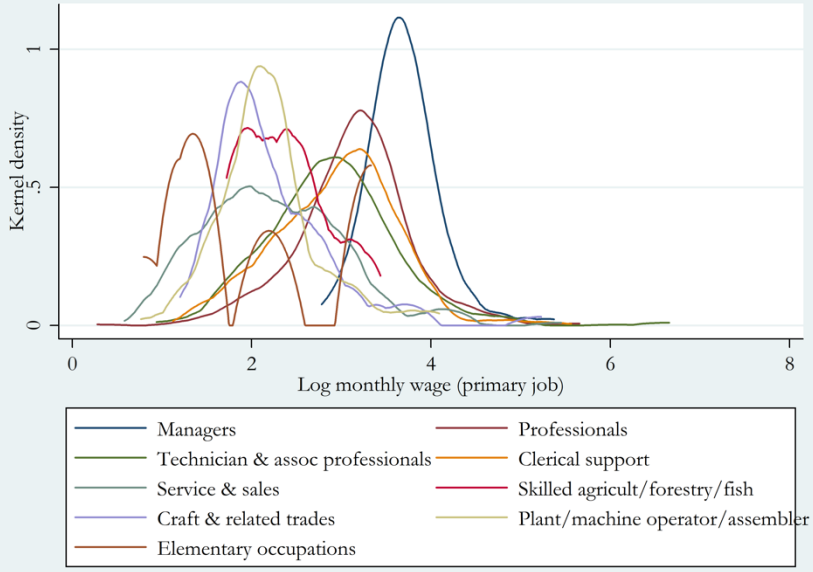
1998 Female



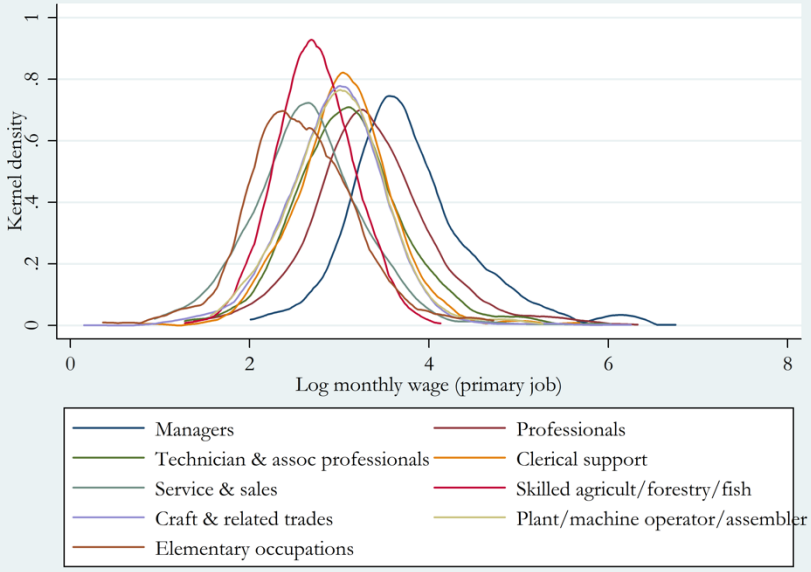
Male



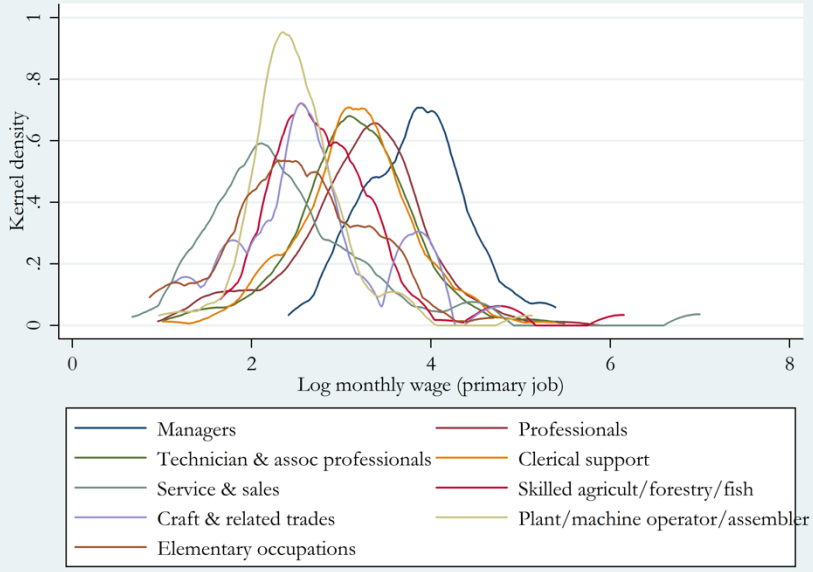
2006 Female



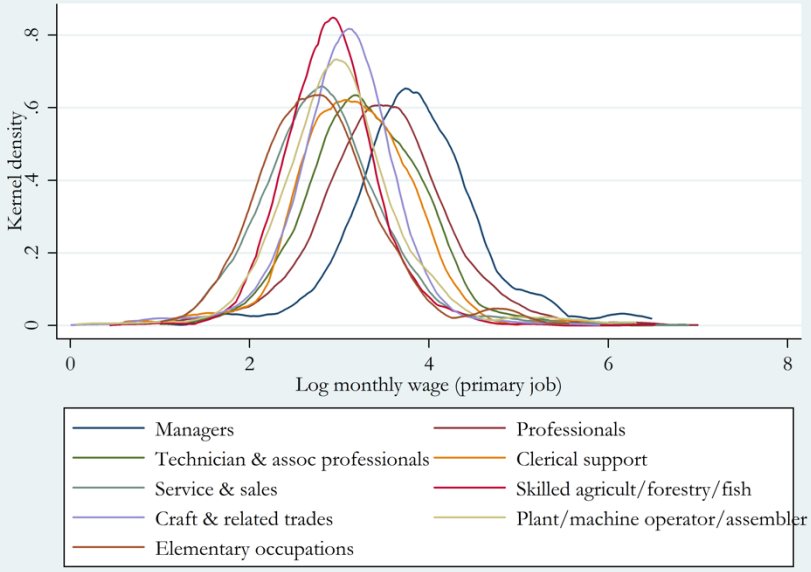
Male



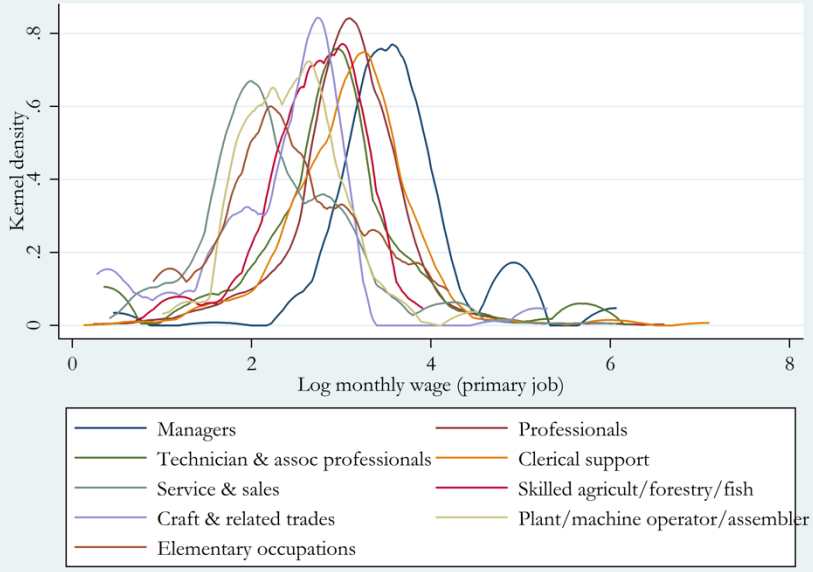
2012 Female



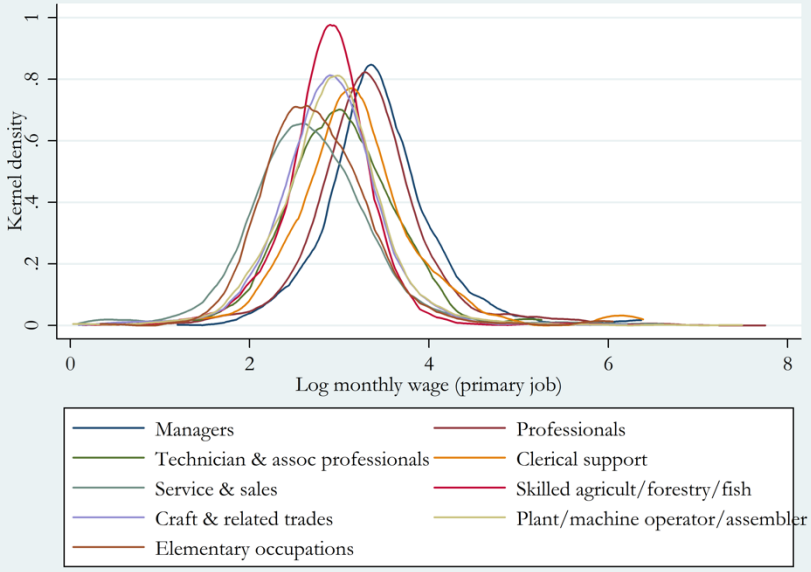
Male



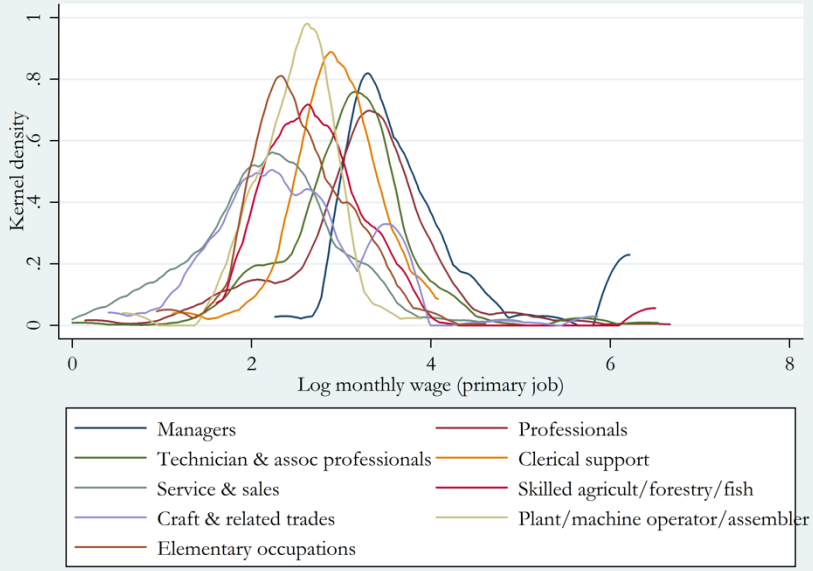
2018 Female



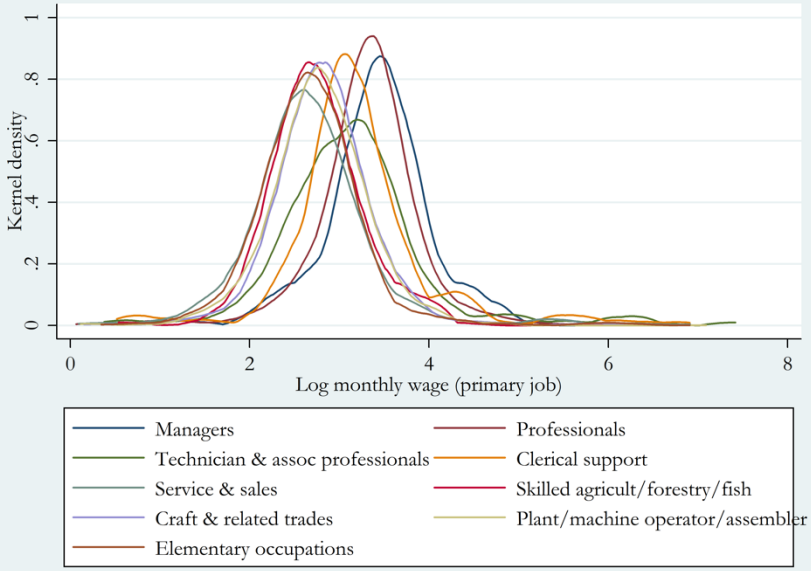
Male



2023 Female

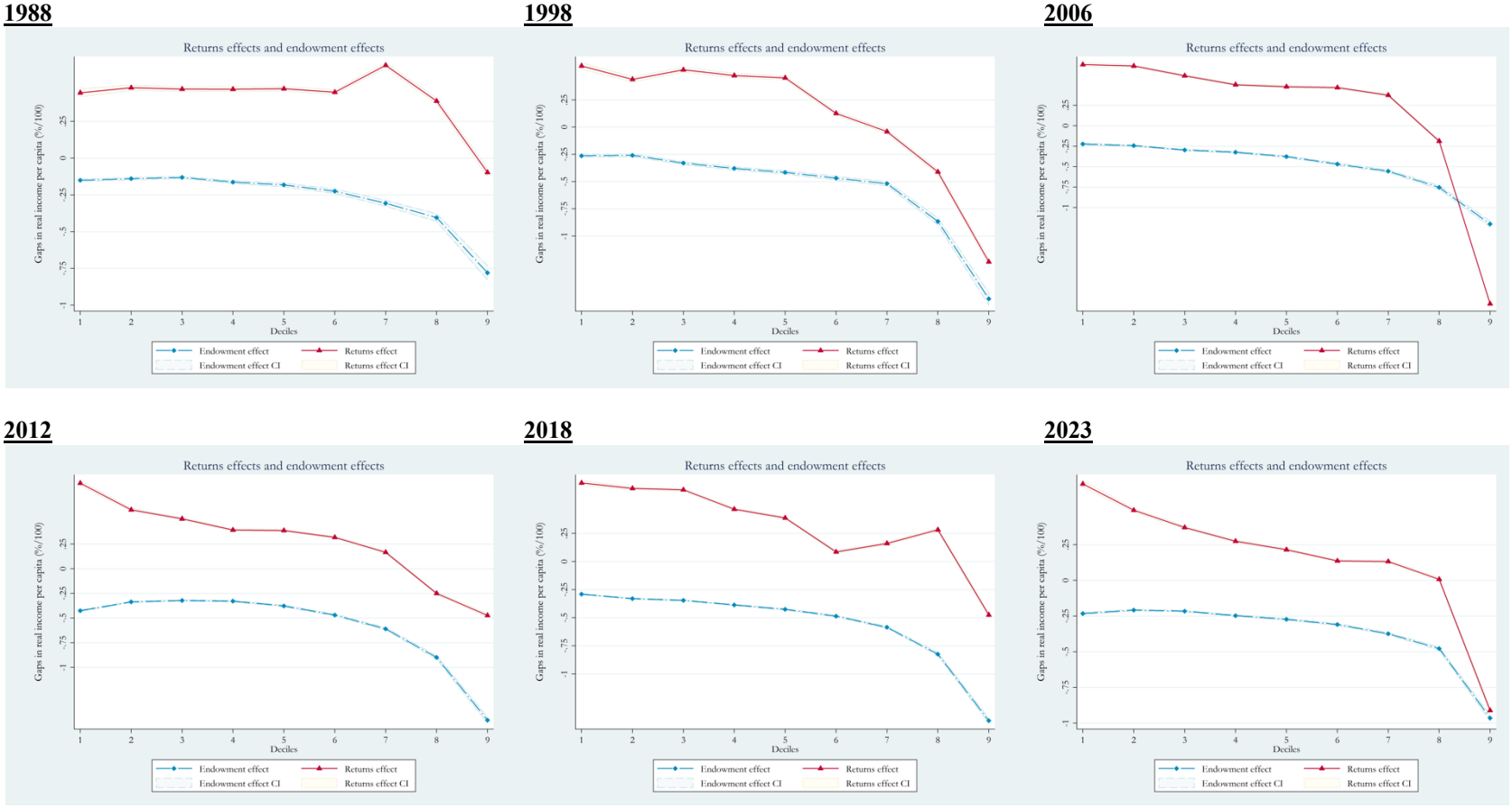


Male



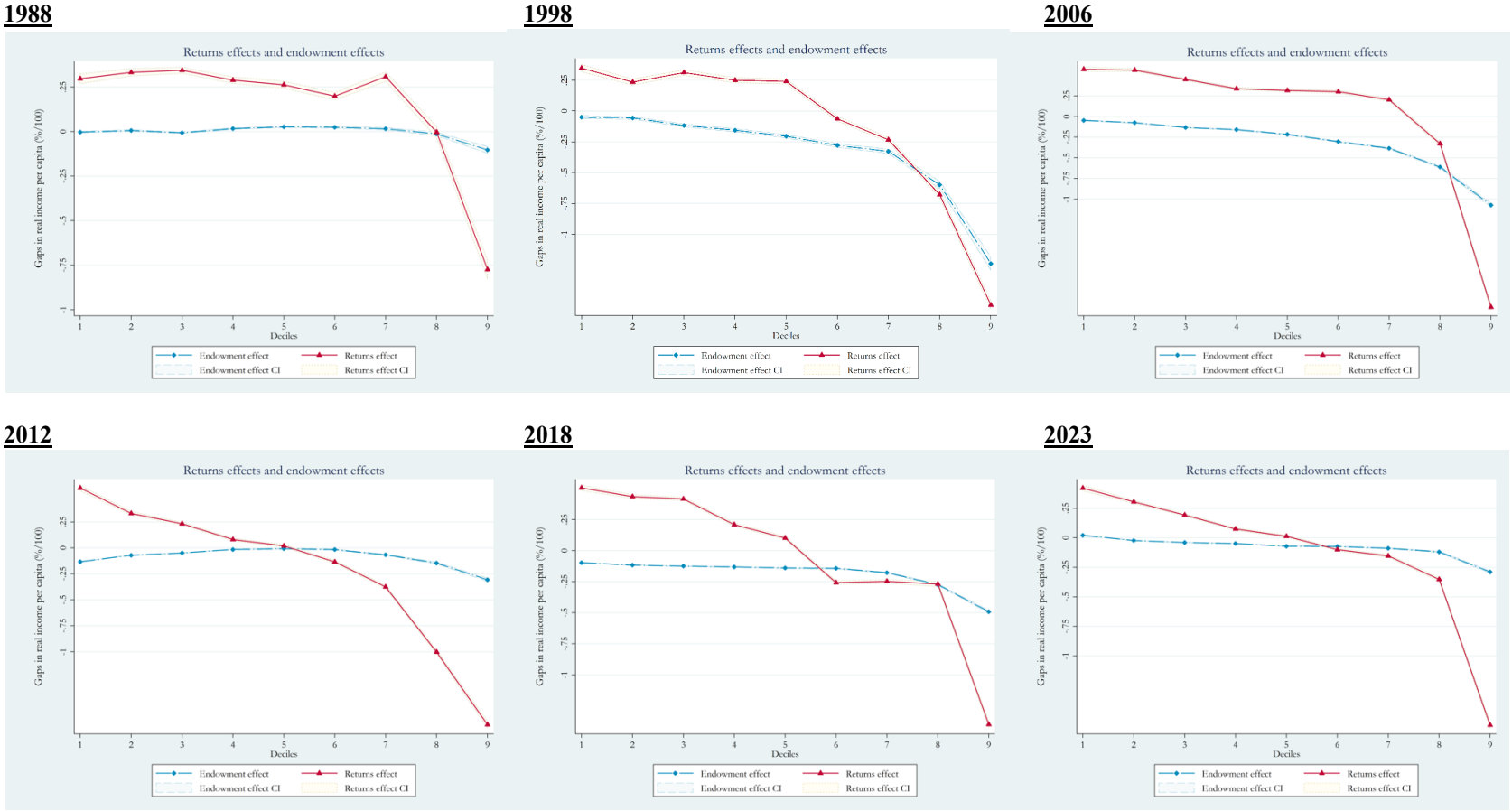
Source: Authors based on ELMPS 1988-2023, population-weighted samples. Evaluated for both private and public sector workers, in part because of small sample sizes for some occupation group–gender combinations.

Figure 17. Gender wage gap decomposition by unconditional wage decile: Returns and endowment effects (controlling for occupation & institutional sector)



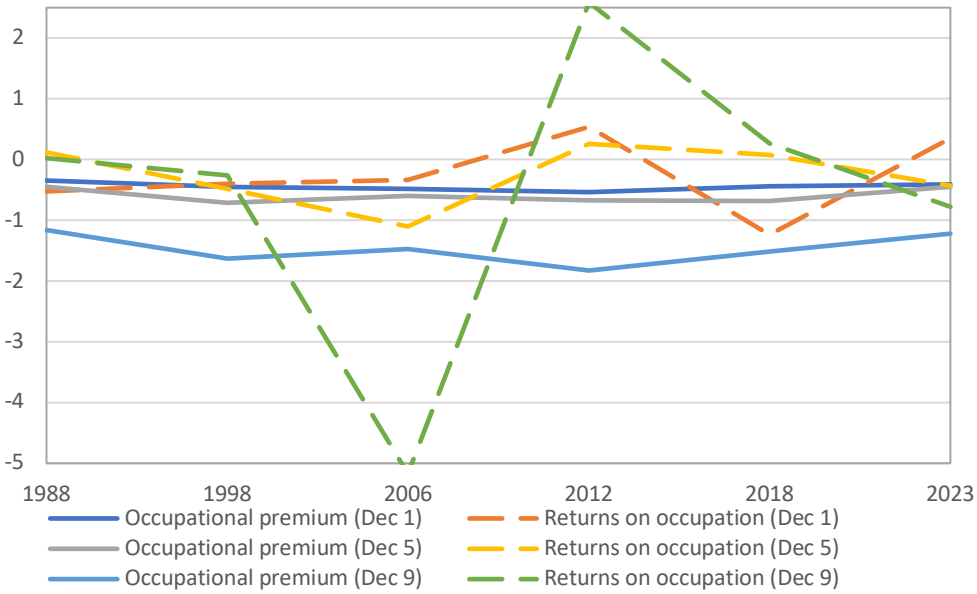
Source: Authors' analysis of ELMPS 1998-2023. Population-weighted samples restricted to private-sector workers. Confidence intervals computed using the delta method.

Figure 18. Gender wage gap decomposition by unconditional wage decile: Returns and endowment effects (only human capital and employer controls)



Source: Authors' analysis of ELMPS 1998-2023. Population-weighted samples restricted to private-sector workers. Confidence intervals computed using the delta method.

Figure 19. The endowment and returns effects associated with occupation differences between genders: bottom, middle and top deciles



Notes: Authors' analysis of ELMPS 1998-2023. Population-weighted samples restricted to private-sector workers. This figure shows the coefficients on the endowment and returns effects on workers' occupation – negative values indicate differentials favoring men (see table A1).

Appendix

Table A1a. Quantile decomposition of gender wage gaps, selected deciles, by year, controlling for occupation & institutional sector

		1988			1998			2006		
		10th pctile	50th pctile	90th pctile	10th pctile	50th pctile	90th pctile	10th pctile	50th pctile	90th pctile
	Women	3.958***	4.996***	7.413***	4.809***	5.874***	7.731***	5.341***	6.350***	8.032***
		(0.014)	(0.010)	(0.028)	(0.016)	(0.012)	(0.033)	(0.013)	(0.009)	(0.020)
	Men	3.664***	4.706***	8.289***	4.510***	5.837***	10.540***	4.815***	6.249***	11.410***
		(0.015)	(0.007)	(0.025)	(0.009)	(0.007)	(0.030)	(0.006)	(0.007)	(0.030)
	Overall gap	0.294***	0.290***	-0.877***	0.299***	0.037***	-2.813***	0.526***	0.101***	-3.381***
		(0.021)	(0.012)	(0.038)	(0.018)	(0.014)	(0.045)	(0.014)	(0.011)	(0.036)
	Endowments	-0.151***	-0.182***	-0.780***	-0.263***	-0.416***	-1.577***	-0.223***	-0.377***	-1.202***
		(0.023)	(0.015)	(0.039)	(0.042)	(0.028)	(0.054)	(0.033)	(0.019)	(0.033)
	Constant (Unexplained)	0.125	-0.948***	-3.425***	-2.176***	-0.608	-0.175	0.283	-0.542	0.584
		(0.510)	(0.227)	(0.438)	(0.637)	(0.408)	(0.746)	(0.958)	(0.537)	(0.728)
	Returns on endow.+Constant	0.445***	0.472***	-0.097***	0.562***	0.453***	-1.237***	0.749***	0.478***	-2.179***
		(0.030)	(0.016)	(0.030)	(0.045)	(0.028)	(0.046)	(0.035)	(0.020)	(0.030)
Explained/Endowments	Potential work experience	-0.004	-0.004**	-0.000	0.002	-0.000	-0.001	-0.004	-0.006**	-0.008***
		(0.003)	(0.002)	(0.002)	(0.006)	(0.004)	(0.003)	(0.003)	(0.002)	(0.002)
	Education	-0.014	0.006	0.024**	0.005	0.015**	0.020*	0.011	-0.004	0.011
		(0.011)	(0.006)	(0.011)	(0.012)	(0.007)	(0.011)	(0.009)	(0.005)	(0.007)
	Employer type	0.026	0.067***	0.166***	-0.048	0.065	-0.184*	0.062	0.019	0.052
		(0.029)	(0.017)	(0.030)	(0.103)	(0.064)	(0.101)	(0.083)	(0.046)	(0.060)
	Administr. region	-0.011	-0.002	-0.008	0.026***	0.018***	0.021***	-0.005	0.011***	0.019***
		(0.008)	(0.005)	(0.008)	(0.009)	(0.005)	(0.008)	(0.006)	(0.003)	(0.004)
	Occupation & instit. sector	-0.146***	-0.249***	-0.961***	-0.247**	-0.513***	-1.433***	-0.287***	-0.397***	-1.275***
		(0.034)	(0.021)	(0.048)	(0.110)	(0.069)	(0.113)	(0.086)	(0.048)	(0.066)
Unexplained/Returns	Potential work experience	0.126	0.272***	0.053	1.186***	0.917***	0.633***	0.886***	0.571***	0.271**
		(0.157)	(0.076)	(0.143)	(0.140)	(0.089)	(0.153)	(0.119)	(0.073)	(0.120)
	Education	0.179	0.154**	0.943***	2.086***	0.222	0.324	-0.324	0.998*	0.370
		(0.154)	(0.065)	(0.127)	(0.458)	(0.286)	(0.461)	(0.932)	(0.515)	(0.677)
	Employer type	0.362	0.481***	2.060***	-0.302	0.343	-1.551***	-0.133	0.118	1.482***
		(0.386)	(0.176)	(0.336)	(0.444)	(0.289)	(0.554)	(0.565)	(0.323)	(0.458)
	Administr. region	-0.025	0.192***	0.047	-0.037	-0.139**	-0.408***	0.171***	0.234***	0.086
		(0.115)	(0.054)	(0.102)	(0.090)	(0.059)	(0.115)	(0.060)	(0.043)	(0.081)
	Occupation & instit. sector	-0.324	0.321***	0.225	-0.195	-0.284**	-0.061	-0.135	-0.902***	-4.971***
		(0.236)	(0.095)	(0.189)	(0.217)	(0.137)	(0.234)	(0.569)	(0.316)	(0.422)
	Observations		5,907			5,029			9,811	

Notes: Authors' analysis of ELMPS 1998-2023. Population-weighted samples restricted to private-sector workers. The 10th, 50th and 90th percentiles are selected for illustration – other deciles are available from the authors on request. Standard errors computed using the delta method are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A1b. Quantile decomposition of gender wage gaps, selected deciles, by year, controlling for occupation & institutional sector

		2012			2018			2023		
		10th pctile	50th pctile	90th pctile	10th pctile	50th pctile	90th pctile	10th pctile	50th pctile	90th pctile
	Women	6.108***	7.019***	8.531***	6.848***	7.790***	9.301***	7.599***	8.473***	9.978***
		(0.013)	(0.007)	(0.018)	(0.011)	(0.007)	(0.016)	(0.0120)	(0.005)	(0.013)
	Men	5.664***	7.007***	10.540***	6.439***	7.828***	11.190***	7.156***	8.531***	11.850***
		(0.009)	(0.008)	(0.025)	(0.009)	(0.008)	(0.021)	(0.010)	(0.008)	(0.027)
	Overall gap	0.444***	0.012	-2.008***	0.409***	-0.038***	-1.891***	0.443***	-0.058***	-1.875***
		(0.016)	(0.011)	(0.030)	(0.014)	(0.010)	(0.026)	(0.016)	(0.010)	(0.030)
	Endowments	-0.425***	-0.377***	-1.535***	-0.290***	-0.425***	-1.416***	-0.233***	-0.273***	-0.964***
		(0.052)	(0.025)	(0.041)	(0.038)	(0.022)	(0.044)	(0.038)	(0.016)	(0.033)
	Constant (Unexplained)	0.466	-0.627	-3.144***	1.488	-1.276	-4.105**	-0.056	-0.155	-1.037
		(0.685)	(0.418)	(0.621)	(1.744)	(1.017)	(1.896)	(0.730)	(0.369)	(0.734)
	Returns on endow.+Constant	0.869***	0.389***	-0.473***	0.699***	0.388***	-0.475***	0.676***	0.215***	-0.911***
		(0.054)	(0.025)	(0.036)	(0.040)	(0.023)	(0.043)	(0.041)	(0.017)	(0.033)
Explained/Endowments	Potential work experience	-0.003	-0.006***	-0.007***	-0.001	-0.004***	-0.007***	-0.002	-0.003***	-0.001
		(0.003)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)
	Education	-0.003	0.010**	0.017***	0.010*	0.010***	0.003	0.011*	0.007***	0.004
		(0.009)	(0.004)	(0.006)	(0.006)	(0.003)	(0.006	(0.006)	(0.002)	(0.004)
	Employer type	-0.081	0.080*	0.060	-0.061	0.039	-0.124**	-0.042	-0.031*	0.045
		(0.104)	(0.048)	(0.068)	(0.056)	(0.032)	(0.060)	(0.040)	(0.016)	(0.029)
	Administr. region	-0.001	0.013***	0.022***	0.002	0.014***	0.026***	0.009**	0.003**	0.009***
		(0.006)	(0.003)	(0.004)	(0.004)	(0.003)	(0.006)	(0.004)	(0.002)	(0.003)
	Occupation & instit. sector	-0.337***	-0.473***	-1.627***	-0.240***	-0.485***	-1.315***	-0.209***	-0.249***	-1.022***
		(0.103)	(0.048)	(0.072)	(0.058)	(0.034)	(0.064)	(0.042)	(0.017)	(0.036)
Unexplained/Returns	Potential work experience	0.680***	0.561***	0.250**	0.488***	0.369***	0.313**	0.508***	0.209***	-0.080
		(0.145)	(0.076)	(0.110)	(0.126)	(0.078)	(0.148)	(0.150)	(0.075)	(0.150)
	Education	-1.027***	-0.248	-0.140	0.229	1.655*	3.314*	-0.001	-0.020	-0.122
		(0.268)	(0.173)	(0.258)	(1.663)	(0.966)	(1.801)	(0.070)	(0.037)	(0.075)
	Employer type	-0.032	0.232	-0.072	-0.550	-0.657***	-0.102	-0.522	0.349**	0.601*
		(0.611)	(0.378)	(0.563)	(0.402)	(0.242)	(0.456)	(0.346)	(0.174)	(0.346)
	Administr. region	0.044	0.013	-0.151***	0.081	0.017	-0.359***	0.193	0.0587	0.314
		(0.067	(0.037)	(0.055)	(0.053)	(0.034)	(0.064)	(0.470)	(0.189)	(0.349)
	Occupation & instit. sector	0.738***	0.458***	2.784***	-1.037***	0.280	0.464	0.553	-0.228	-0.583
		(0.228)	(0.146)	(0.218)	(0.351)	(0.217)	(0.409)	(0.500)	(0.313)	(0.647)
	Observations		11,393			15,274			15,821	

Notes: Authors' analysis of ELMPS 1998-2023. Population-weighted samples restricted to private-sector workers. The 10th, 50th and 90th percentiles are selected for illustration – other deciles are available from the authors on request. Standard errors computed using the delta method are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A2a. Quantile decomposition of gender wage gaps, selected deciles, by year, only human capital and employer controls

		1988			1998			2006		
		10th pctile	50th pctile	90th pctile	10th pctile	50th pctile	90th pctile	10th pctile	50th pctile	90th pctile
	Women	3.958***	4.996***	7.413***	4.809***	5.874***	7.731***	5.341***	6.350***	8.032***
		(0.014)	(0.010)	(0.029)	(0.016)	(0.012)	(0.033)	(0.013)	(0.009)	(0.020)
	Men	3.664***	4.706***	8.289***	4.510***	5.837***	10.540***	4.815***	6.249***	11.410***
		(0.015)	(0.007)	(0.025)	(0.009)	(0.007)	(0.030)	(0.006)	(0.007)	(0.030)
	Overall gap	0.294***	0.290***	-0.877***	0.299***	0.037***	-2.813***	0.526***	0.101***	-3.381***
		(0.021)	(0.012)	(0.038)	(0.018)	(0.014)	(0.045)	(0.014)	(0.011)	(0.036)
	Endowments	-0.003	0.027***	-0.103***	-0.049**	-0.204***	-1.238***	-0.046**	-0.216***	-1.073***
		(0.014)	(0.010)	(0.029)	(0.023)	(0.016)	(0.041)	(0.023)	(0.015)	(0.035)
	Constant (Unexplained)	0.229	0.241	1.327*	-2.541***	-1.074***	1.775**	0.479	-2.093***	-4.115***
		(0.440)	(0.249)	(0.718)	(0.569)	(0.371)	(0.716)	(1.071)	(0.704)	(1.500)
	Returns on endow.+Constant	0.297***	0.263***	-0.774***	0.348***	0.241***	-1.575***	0.572***	0.316***	-2.308***
		(0.025)	(0.016)	(0.045)	(0.028)	(0.018)	(0.035)	(0.026)	(0.018)	(0.041)
Explained/Endowmnt	Potential work experience	-0.003	0.0001	0.015	0.003	0.0004	-0.001	-0.011***	-0.017***	-0.050***
		(0.003)	(0.003)	(0.009)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.008)
	Education	0.008	0.034***	0.114***	0.013	0.026***	0.050***	0.033***	0.0204***	0.060***
		(0.011)	(0.007)	(0.021)	(0.012)	(0.007)	(0.013)	(0.010)	(0.006)	(0.013)
	Employer type	0.008	0.004	-0.180***	-0.099***	-0.261***	-1.338***	-0.065***	-0.231***	-1.086***
		(0.012)	(0.009)	(0.025)	(0.023)	(0.016)	(0.042)	(0.022)	(0.015)	(0.034)
	Administr. region	-0.016**	-0.011*	-0.052***	0.035***	0.030***	0.051***	-0.003	0.011***	0.004
		(0.008)	(0.006)	(0.016)	(0.009)	(0.006)	(0.010)	(0.006)	(0.004)	(0.008)
Unexplained/Returns	Potential work experience	0.128	0.261***	0.291	0.972***	0.760***	0.580***	0.815***	0.451***	0.081
		(0.155)	(0.092)	(0.261)	(0.136)	(0.089)	(0.176)	(0.119)	(0.087)	(0.220)
	Education	0.188	-0.126*	-0.533***	2.403***	0.466	0.517	-0.181	1.379**	2.155*
		(0.125)	(0.068)	(0.198)	(0.462)	(0.301)	(0.553)	(0.994)	(0.641)	(1.309)
	Employer type	-0.120	-0.207	-1.409**	-0.469	0.272	-3.841***	-0.738**	0.415	-0.030
		(0.386)	(0.217)	(0.627)	(0.307)	(0.201)	(0.418)	(0.375)	(0.273)	(0.688)
	Administr. region	-0.127	0.094	-0.452**	-0.017	-0.182***	-0.606***	0.198***	0.165***	-0.399***
		(0.118)	(0.068)	(0.195)	(0.092)	(0.061)	(0.137)	(0.063)	(0.053)	(0.152)
	Observations		5,907			5,029			9,811	

Notes: Authors' analysis of ELMPS 1998-2023. Population-weighted samples restricted to private-sector workers. The 10th, 50th and 90th percentiles are selected for illustration – other deciles are available from the authors on request. Standard errors computed using the delta method are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A2b. Quantile decomposition of gender wage gaps, selected deciles, by year, only human capital and employer controls

		2012			2018			2023		
		10th pctile	50th pctile	90th pctile	10th pctile	50th pctile	90th pctile	10th pctile	50th pctile	90th pctile
	Women	6.108***	7.019***	8.531***	6.848***	7.790***	9.301***	7.599***	8.473***	9.978***
		(0.013)	(0.007)	(0.018)	(0.011)	(0.007)	(0.0156)	(0.012)	(0.005)	(0.013)
	Men	5.664***	7.007***	10.540***	6.439***	7.828***	11.190***	7.156***	8.531***	11.850***
		(0.009)	(0.008)	(0.025)	(0.009)	(0.008)	(0.021)	(0.010)	(0.008)	(0.027)
	Overall gap	0.444***	0.012	-2.008***	0.409***	-0.038***	-1.891***	0.443***	-0.058***	-1.875***
		(0.016)	(0.011)	(0.030)	(0.014)	(0.010)	(0.026)	(0.016)	(0.010)	(0.030)
	Endowments	-0.133***	-0.008	-0.307***	-0.097***	-0.140***	-0.491***	0.022	-0.071***	-0.289***
		(0.043)	(0.022)	(0.053)	(0.030)	(0.019)	(0.043)	(0.031)	(0.014)	(0.033)
	Constant (Unexplained)	0.694	-0.487	0.776	1.256	1.549***	3.392***	-0.169	0.256	1.032
		(0.664)	(0.504)	(1.191)	(0.777)	(0.520)	(1.166)	(1.205)	(0.599)	(1.493)
	Returns on endow.+Constant	0.577***	0.020	-1.702***	0.506***	0.102***	-1.399***	0.421***	0.013	-1.586***
		(0.045)	(0.024)	(0.058)	(0.033)	(0.021)	(0.048)	(0.035)	(0.017)	(0.042)
Explained/Endowmnt	Potential work experience	-0.012***	-0.017***	-0.055***	-0.006***	-0.011***	-0.031***	-0.010***	-0.012***	-0.031***
		(0.004)	(0.003)	(0.009)	(0.002)	(0.002)	(0.005)	(0.002)	(0.002)	(0.005)
	Education	0.012	0.026***	0.073***	0.024***	0.027***	0.057***	0.025***	0.018***	0.032***
		(0.009)	(0.005)	(0.012)	(0.006)	(0.004)	(0.008)	(0.006)	(0.003)	(0.007)
	Employer type	-0.131***	-0.029	-0.337***	-0.115***	-0.166***	-0.523***	-0.002	-0.078***	-0.288***
		(0.043)	(0.022)	(0.053)	(0.030)	(0.019)	(0.043)	(0.031)	(0.014)	(0.033)
	Administr. region	-0.002	0.011***	0.012*	0.001	0.010***	0.006	0.008**	0.001	-0.003
		(0.006)	(0.003)	(0.007)	(0.004)	(0.003)	(0.006)	(0.004)	(0.002)	(0.004)
Unexplained/Returns	Potential work experience	0.663***	0.504***	0.254	0.365***	0.141	-0.164	0.441***	0.117	-0.574**
		(0.145)	(0.089)	(0.210)	(0.128)	(0.087)	(0.196)	(0.153)	(0.087)	(0.230)
	Education	-1.116***	-0.511**	-1.184**	0.123	-0.103	-0.326	0.114	0.039	-0.047
		(0.277)	(0.219)	(0.518)	(0.371)	(0.286)	(0.639)	(0.082)	(0.047)	(0.123)
	Employer type	0.185	0.498	-1.166	-1.401***	-1.265***	-3.237***	-0.281	-0.492	-2.070
		(0.581)	(0.441)	(1.041)	(0.394)	(0.257)	(0.577)	(1.089)	(0.549)	(1.379)
	Administr. region	0.151**	0.016	-0.381***	0.163	-0.220	-1.065	0.316	0.093	0.073
		(0.069)	(0.046)	(0.108)	(0.545)	(0.340)	(0.765)	(0.490)	(0.218)	(0.511)
	Observations		11,393			15,274			15,821	

Notes: Authors' analysis of ELMPS 1998-2023. Population-weighted samples restricted to private-sector workers. The 10th, 50th and 90th percentiles are selected for illustration – other deciles are available from the authors on request. Standard errors computed using the delta method are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Figure A1a Gender composition by broad occupational category, extended definition 1988-2023.

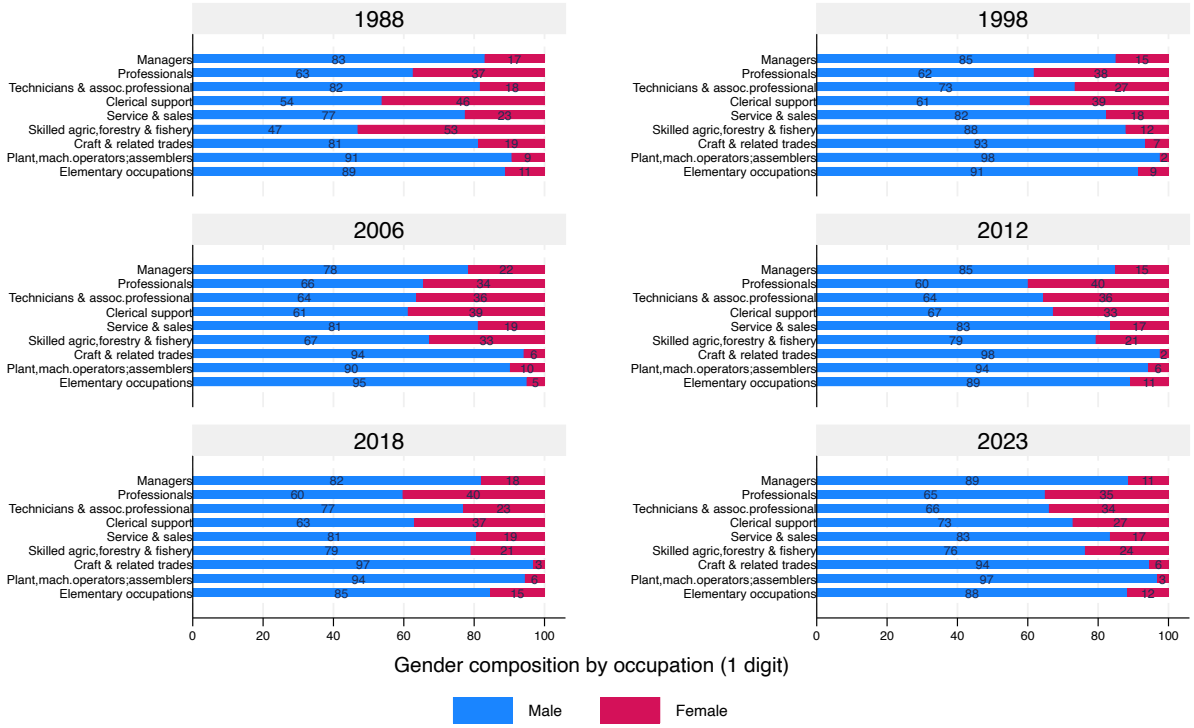
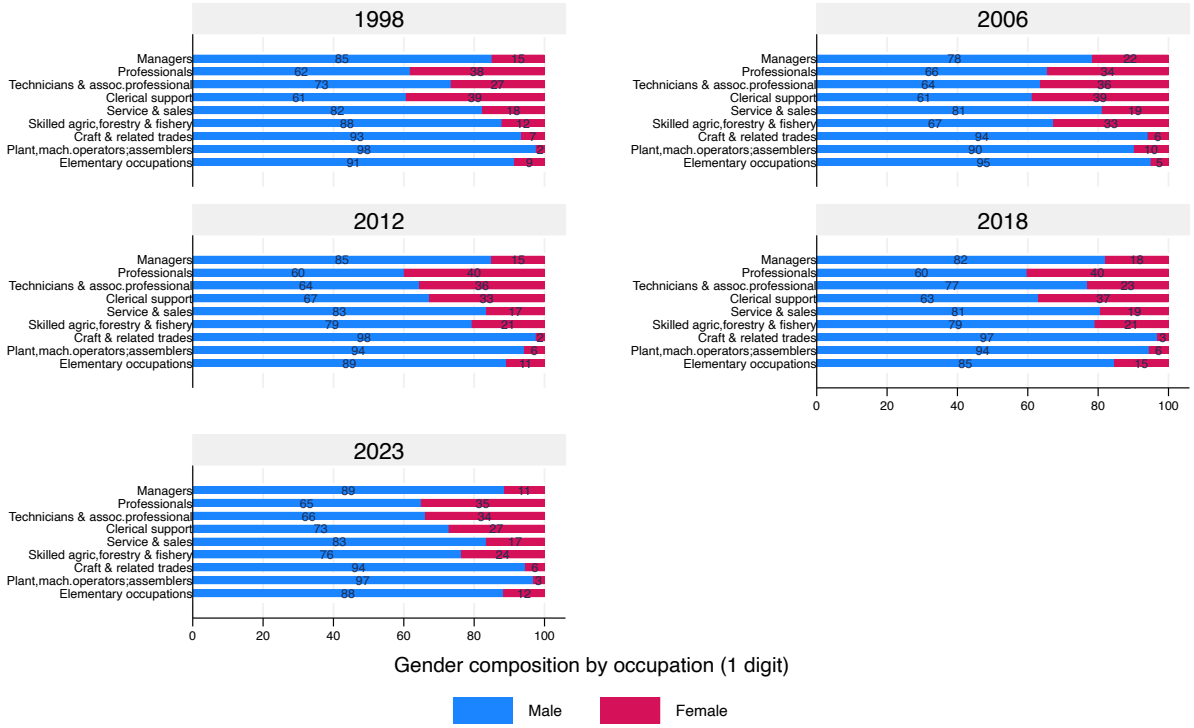
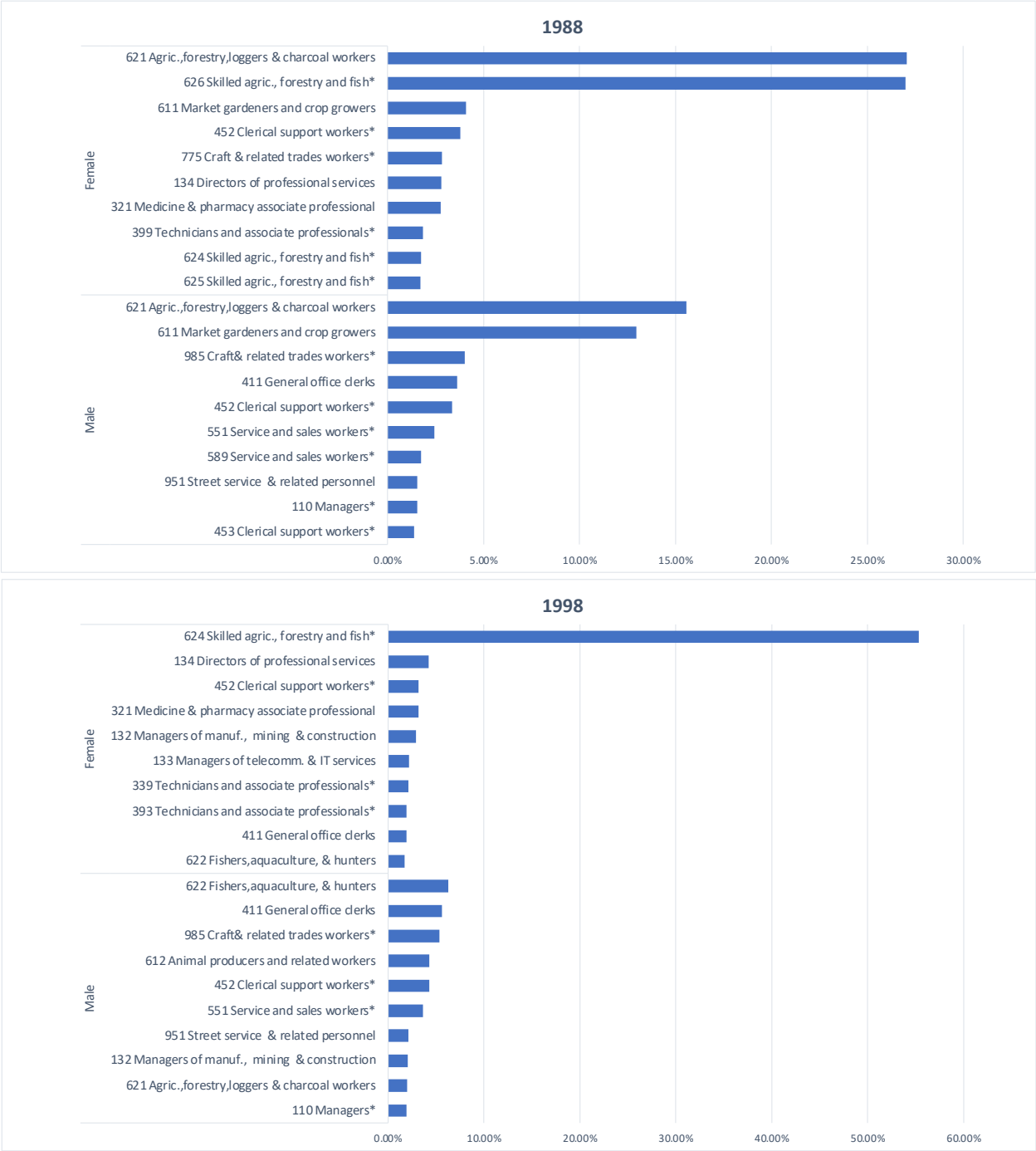
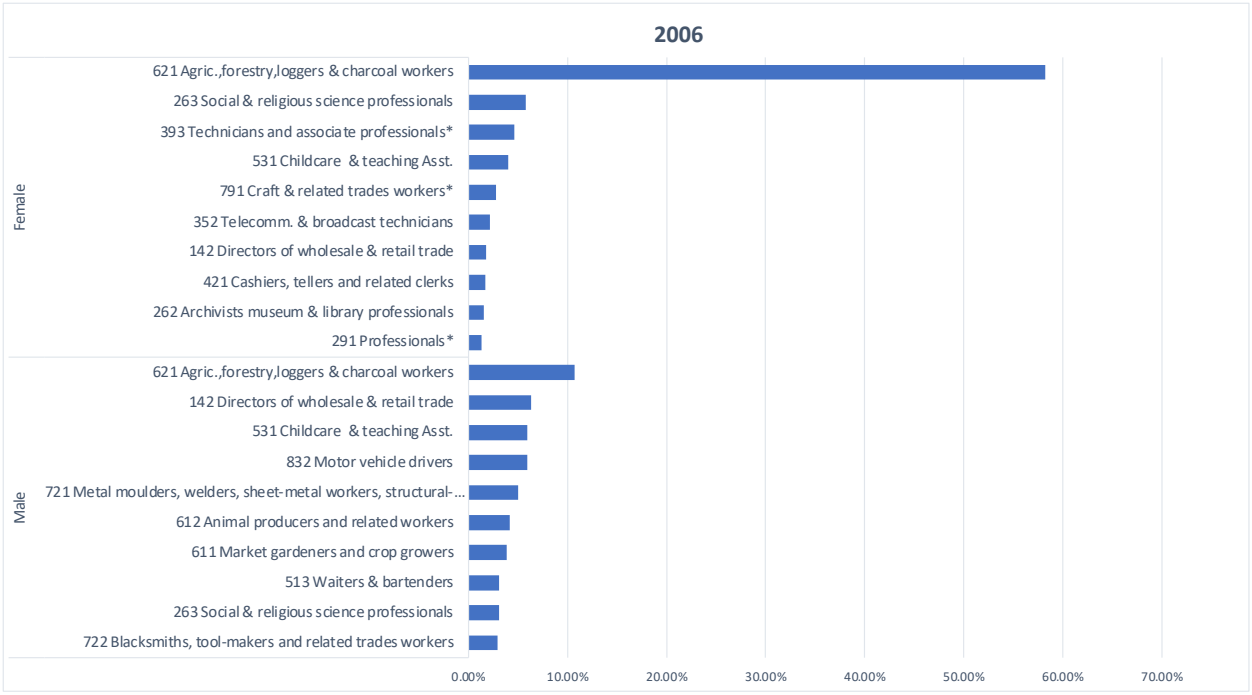


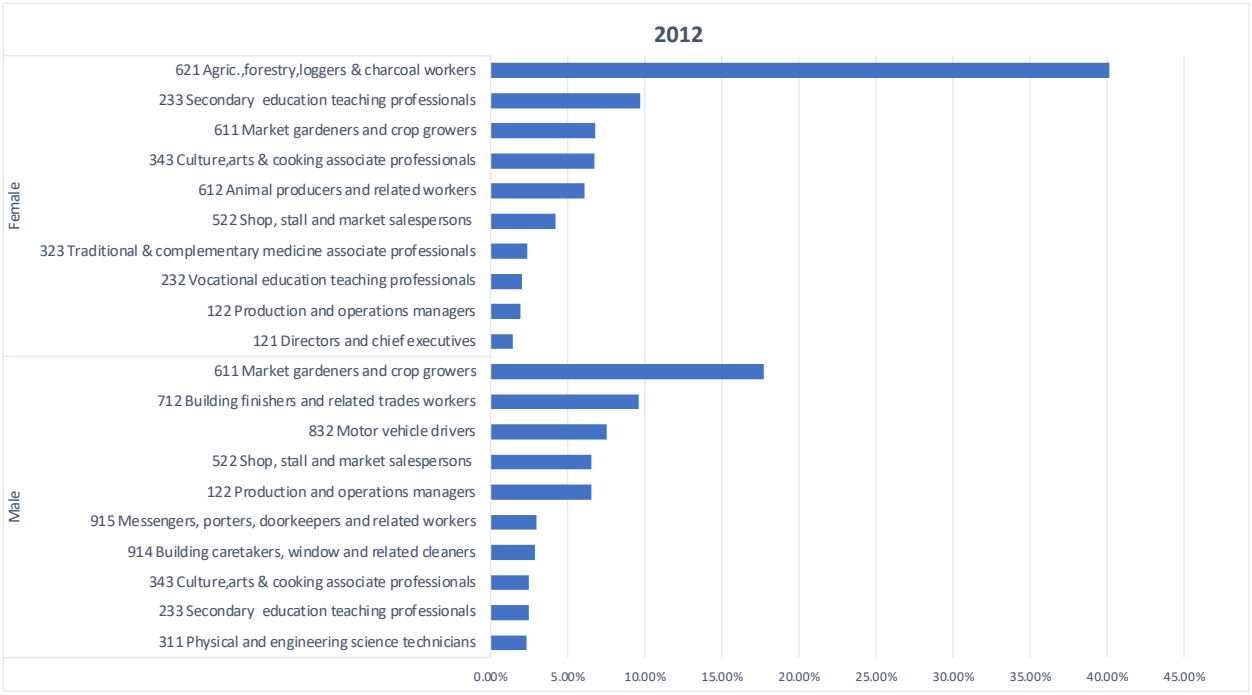
Figure A1b Gender composition by broad occupational category, market definition 1998-2023.

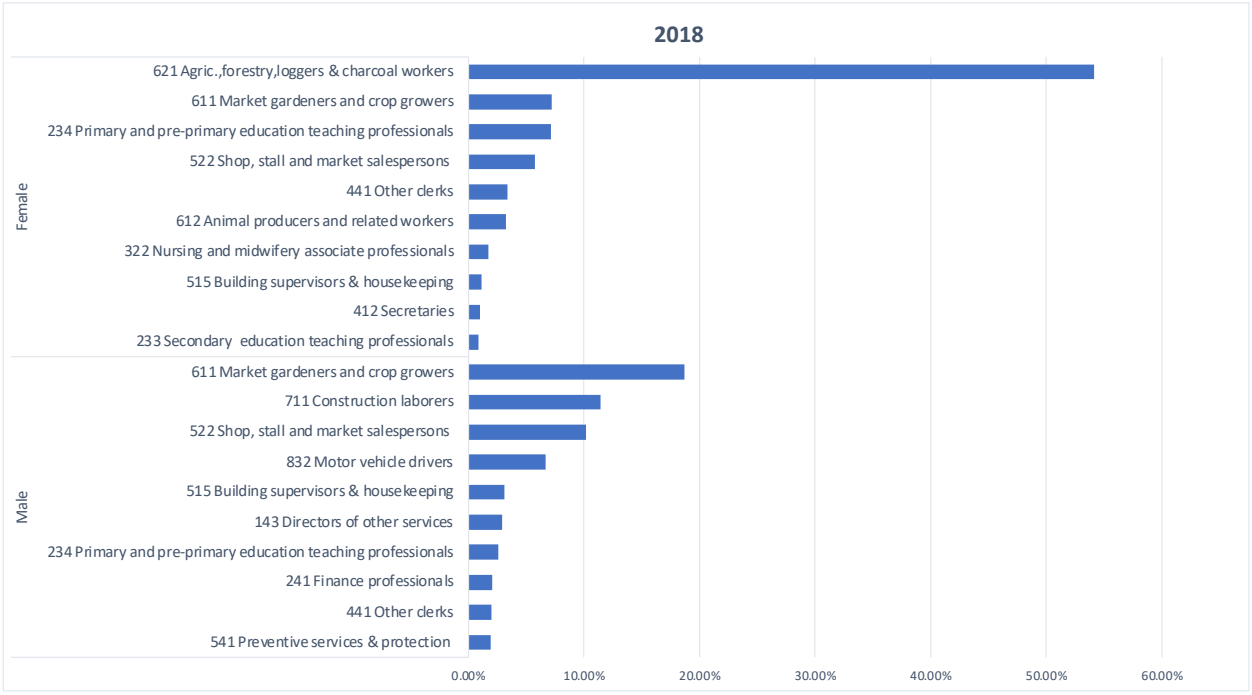


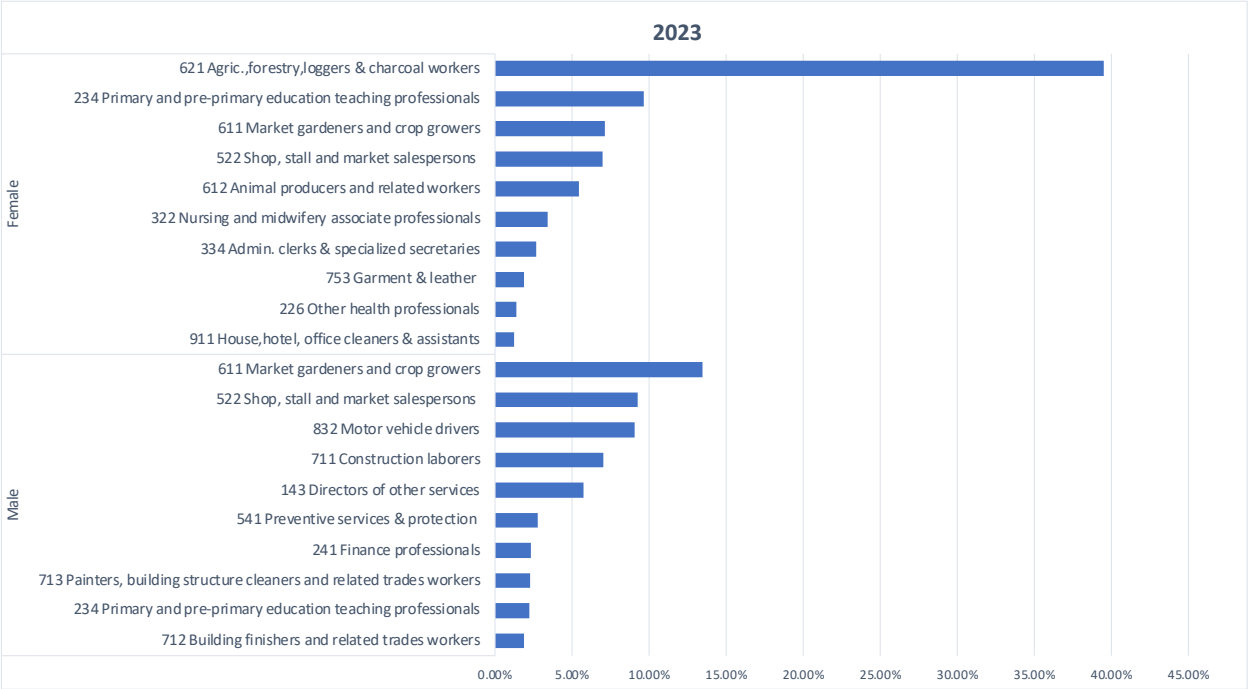
FigureA2 Proportion of men and women's employment in Top 10 3-digit occupational categories by gender, extended definition 1988 to 2023




2006
Female
621 Agric.,forestry,loggers & charcoal workers
263 Social & religious science professionals
393 Technicians and associate professionals*
531 Childcare & teaching Asst.
791 Craft & related trades workers*
352 Telecomm. & broadcast technicians
142 Directors of wholesale & retail trade
421 Cashiers, tellers and related clerks
262 Archivists museum & library professionals
291 Professionals*
Male
621 Agric.,forestry,loggers & charcoal workers
142 Directors of wholesale & retail trade
531 Childcare & teaching Asst.
832 Motor vehicle drivers
721 Metal moulders, welders, sheet-metal workers, structural-...
612 Animal producers and related workers
611 Market gardeners and crop growers
513 Waiters & bartenders
263 Social & religious science professionals
722 Blacksmiths, tool-makers and related trades workers
0.00%
10.00%
20.00%
30.00%
40.00%
50.00%
60.00%
70.00%


2012
Female
621 Agric.,forestry,loggers & charcoal workers
233 Secondary education teaching professionals
611 Market gardeners and crop growers
343 Culture,arts & cooking associate professionals
612 Animal producers and related workers
522 Shop, stall and market salespersons
323 Traditional & complementary medicine associate professionals
232 Vocational education teaching professionals
122 Production and operations managers
121 Directors and chief executives
Male
611 Market gardeners and crop growers
712 Building finishers and related trades workers
832 Motor vehicle drivers
522 Shop, stall and market salespersons
122 Production and operations managers
915 Messengers, porters, doorkeepers and related workers
914 Building caretakers, window and related cleaners
343 Culture,arts & cooking associate professionals
233 Secondary education teaching professionals
311 Physical and engineering science technicians
0.00% 5.00% 10.00% 15.00% 20.00% 25.00% 30.00% 35.00% 40.00% 45.00%

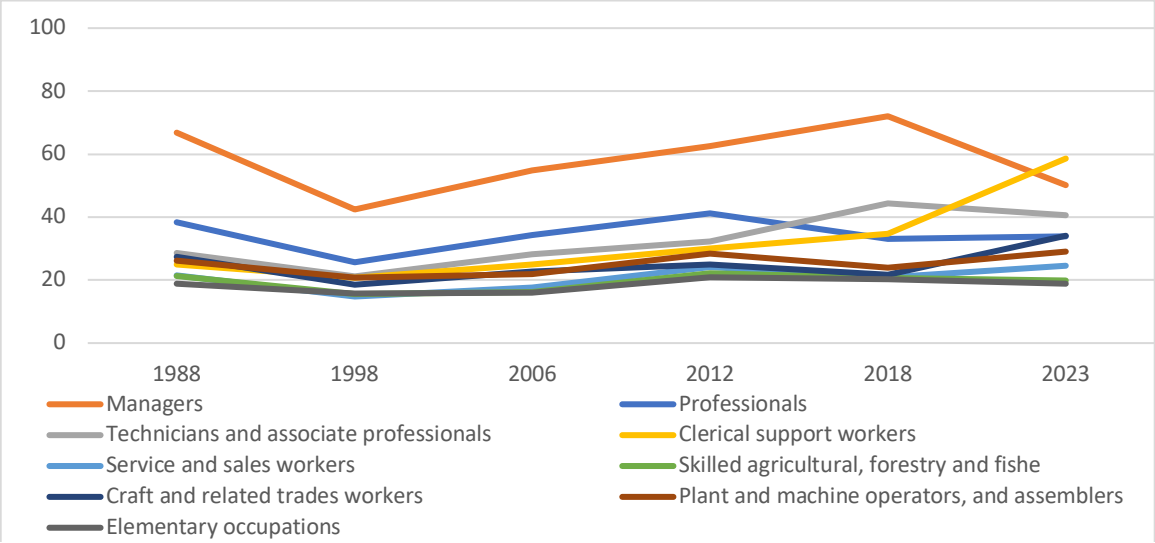

2018
Female
621 Agric.,forestry,loggers & charcoal workers
611 Market gardeners and crop growers
234 Primary and pre-primary education teaching professionals
522 Shop, stall and market salespersons
441 Other clerks
612 Animal producers and related workers
322 Nursing and midwifery associate professionals
515 Building supervisors & housekeeping
412 Secretaries
233 Secondary education teaching professionals
Male
611 Market gardeners and crop growers
711 Construction laborers
522 Shop, stall and market salespersons
832 Motor vehicle drivers
515 Building supervisors & housekeeping
143 Directors of other services
234 Primary and pre-primary education teaching professionals
241 Finance professionals
441 Other clerks
541 Preventive services & protection
0.00% 10.00% 20.00% 30.00% 40.00% 50.00% 60.00%



Source: Authors based on ELMPS 1988-2023

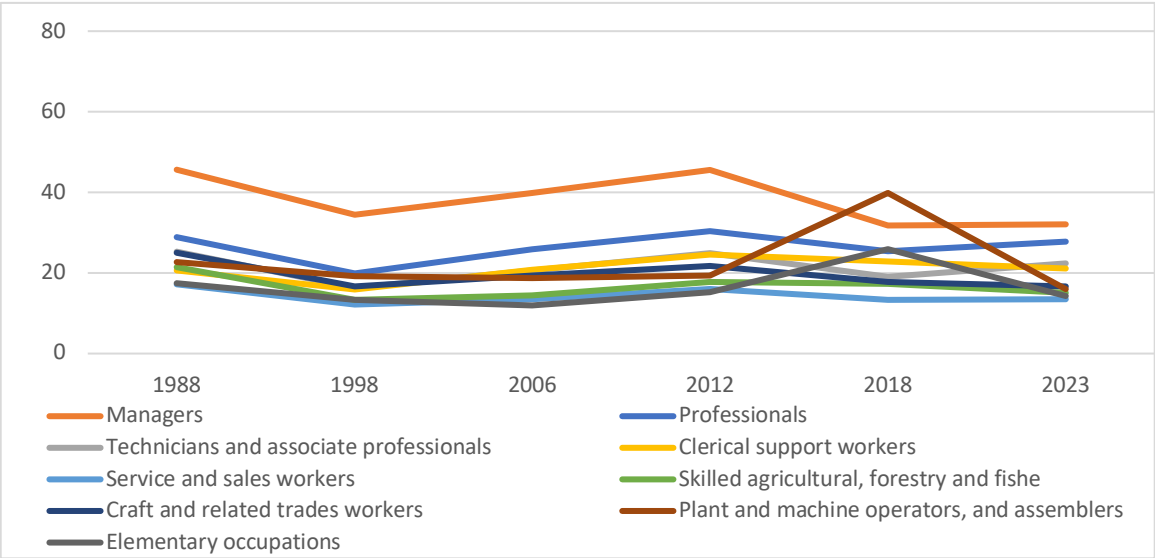
Figure A2 demonstrates that by the extended definition, across all years, women are heavily concentrated in a handful of skilled agriculture subcategories. These highly disaggregated categories absorbed 40 to 58% of all working women in some years reflecting the extreme concentration of women in a very narrow set of occupations. Clerical support work was the next most common occupation for women in 1988 and 1998. Beginning in 2012 women's second most important occupations were in teaching: secondary school and then in 2018 and 2023 pre-primary and primary school teachers. Women also increasingly started working as salespersons after 2012 although overall this still made up relatively small shares. Contrary to common perception, under 5% of working women are in the highly disaggregated nursing, midwifery and other medical professions in all years and there does not appear to be a rising share of women over time in these categories.

Figure A3. Mean real wages by occupation group



Source: Authors based on ELMPS 1988-2023

Figure A4. Median real wages by occupation group



Source: Authors based on ELMPS 1988-2023