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Research papers

The Use of Information and Communication Technology in the Workplace in Egypt

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The Use of Information and Communication Technology in the Workplace in Egypt

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Abstract

The dynamic intersection between technology and labor constitutes the focal point of labor market policies designed to align with technological transitions. Studying the characteristics of digitized work content and work relations is crucial for grasping the evolving landscape of the Egyptian labor market and accompanying policymaking. The paper first investigates the evolution of use of technology in the workplace in Egypt. It explores changes in computer use and internet use, with particular attention to potential firms' responses to Covid-19 (e.g., remote working etc.). We also assess the types and prevalence of digital/computer skills, across the whole population, in the labor force and by type of jobs. Finally, the paper examines employment through digital platforms in Egypt.

Résumé

L'intersection dynamique entre technologie et travail constitue le point central des politiques du marché du travail visant à s'adapter aux transitions technologiques. L'étude des caractéristiques du contenu de travail numérisé et des relations de travail est essentielle pour comprendre l'évolution du marché du travail égyptien et orienter les politiques publiques qui l'accompagnent. Cet article examine d'abord l'évolution de l'usage des technologies sur le lieu de travail en Égypte. Il analyse les changements dans l'utilisation des ordinateurs et d'Internet, en portant une attention particulière aux réactions des entreprises face à la pandémie de Covid-19 (par exemple, le télétravail, etc.). Nous évaluons également les types et la prévalence des compétences numériques et informatiques, dans l'ensemble de la population, au sein de la main-d'œuvre et selon les catégories d'emplois. Enfin, l'article se penche sur l'emploi via les plateformes numériques en Égypte.

1. Introduction

The use of computers and the internet has undergone substantial evolution over the past decade in Egypt, reflecting broader societal shifts in technology adoption and workplace practices. Egypt is leading North African countries in many aspects related to internet connectivity, whether through fixed broadband or mobile connectivity. First, there has been a major focus on improving DSL internet infrastructure, through the upgrade from Asymmetric Digital Subscriber Line (ADSL) with speeds of up to 24 Mbps to Very high-speed Digital Subscriber Line (VDSL) offering speeds of up to 52 Mbps for VDSL1 and 200 Mbps for VDSL2 (GSMA, 2024).[1] With the adoption of VDSL in 2018, Egypt achieved a rapid increase in download and upload speed over wired fixed broadband, reaching a median download speed of 56.61 Mbps and a median upload speed of 25.07 Mbps by 2023 (GSMA, 2024). This is a much higher speed relative to neighboring countries (Morocco, Algeria, and Tunisia) (GSMA, 2024). The upgrade to VDSL lead to boosting the minimum broadband speed from 5 Mbps to 30 Mbps, with only a modest price increase (GSMA, 2024). This enhanced speed and affordability allowed more households to connect over fixed broadband. The number of fixed broadband subscribers surged by 55% from the end of 2019 to June 2023 (GSMA, 2024). In addition, in terms of mobile connectivity, Egypt is one of the most improved countries in the region, with its mobile connectivity index (MCI)[2] improving from 47 in 2014 to 66 in 2024.[3] This places Egypt among countries with advanced connectivity in 2024, up from emerging countries in 2014. Egypt scored high in terms of network coverage and affordability but relatively low in network performance (due to lower speed of upload and download), and skills readiness (GSMA data).[4]

Given these shifts in technology, the focus of this paper is to understand the extent to which these advances in connectivity have shaped employment and how information technology has been adopted in the workplace, differently by type of employment and over time. We examine the use of computers at work, and the use of the internet through other devices like smartphones, tablets, or laptops for work purposes. We also examine the use of technology in the workplace as a response to COVID-19. The paper also seeks to shed light on the distribution of computer skills in the labor force, and the different types of those skills as well as the requirement of

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[1] Digital Subscriber Line (DSL) is the leading technology for fixed broadband services in North Africa, as they use existing phone lines for internet connectivity. The two main types of DSL are Asymmetric Digital Subscriber Line (ADSL) and Very high-speed Digital Subscriber Line (VDSL)

[2] The mobile connectivity index measures multiple enablers of internet connectivity, such as the infrastructure, affordability, consumer readiness, and content and services.
[3] https://www.mobileconnectivityindex.com/index.html#year=2023&zoneIsocode=EGY. Last accessed July 15th, 2024.
[4] Ibid.

jobs in terms of computer skills, and the spectrum of skills required. Finally, the paper examines the prevalence of work through digital platforms, using new questions in the 2023 wave of the ELMPS. Understanding these trends is crucial for assessing digital inclusion and access among various demographic groups and employment profiles.

Following this introduction, Section 2 introduces the main definitions and concepts used in this analysis. Section 3 presents the findings on the use of computer and the internet at work and the use of technology in the workplace as a response to COVID-19, followed by Section 4 which explores the prevalence of computer skills in the labor market. Section 5 focuses on work through digital platforms reporting on the most prevalent types of platforms as well as on the intent and willingness to undertake such work. Section 6 concludes.

2. Data and concepts

In this paper, we use data from the latest three waves of the Egypt Labor Market Panel Survey (ELMPS). The ELMPS is nationally representative panel survey carried out by the Economic Research Forum (ERF) in cooperation with Egypt's Central Agency for Public Mobilization and Statistics (CAPMAS). The ELMPS covers topics such as employment, unemployment, job dynamics and earnings. The ELMPS 2023 wave follows four previous survey waves conducted in 1998, 2006, 2012 and 2018 (OAMDI, 2019, 2020, 2024).[5]

This paper examines several aspects of the prevalence of technology in the workplace. The first aspect we examine is the use of computers or the internet for work purposes. The analysis in this paper triangulates information on this measure from two questions in ELMPS. The first one asks: "Do you use a computer in your work? And if so, is this computer connected to the internet?" This question is included in ELMPS 2012, 2018, and 2023, targeting all currently employed individuals. The second question is from the information technology module in ELMPS 2012, 2018, and 2023, which is administered to all respondents to the survey. It enquires about internet access and usage, asking respondents to identify the three primary purposes for using the internet (on phone, laptop, or tablet): work, education and schooling, news and information, job searching, entertainment, or socializing/communicating. From these two questions, we can identify three modalities of workplace technology use:

1. The worker reports using a computer at work that is not connected to the internet.
2. The worker reports using a computer at work that is connected to the internet.
3. If the worker reports not using a computer, their internet use for work purposes, from the information technology module, is checked to determine their use of digital devices or technology for their work.

The second aspect of technology adoption in the workplace relates to computer skills. The ELMPS 2023 wave enquires about individuals' subjective perception of their level of computer skills (using a 5-point Likert scale). This question was administered to all respondents, which made possible the comparison of the distribution of computer skills between employed and unemployed individuals who are actively searching for a job. As computer skills are diverse, the 2023 wave enquires about a battery of detailed computer skills among those who reported having some computer skills (very weak or above), which we analyze to examine the most prevalent type of computer skills in the labor market. As opposed to perceptions of one's own level of computer skills, the paper also examines the extent to which jobs require computer skills and how this changed over time, in order to further explore the prevalence and needs of

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[5] ELMPS 2023 will be publicly available in October 2024 from www.erfdataportal.com. See Assaad & Krafft (Forthcoming) for details on key characteristics of the 2023 wave.

computer skills in the labor market. The paper also delves into the type of computer skill that is most required in the labor market.

The third aspect of technology adoption in the workplace is the use of digital platforms for work purposes. The 2023 wave included questions about the use of digital platforms for work administered to all currently employed individuals above 6 years old, for their main primary job (in the last three months. The main question we rely on to estimate the use of digital platform in the primary job is: "Do you find work, opportunities, or gigs within this position through a digital platform or app, such as Upwork, Uber, Kareem, Fixawy, Taskty, or similar?"[6] Those who responded yes to the question of use of digital platforms in a primary job were also asked further questions about the characteristics of their digital platform work, such as the type of digital platform or app they used, how many hours of work they undertake through the app/platform, whether they signed a formal contract or agreement with the platform/app, the frequency of pay from their app/platform work, and how long they have been working on the platform/app. Therefore, in addition to the prevalence of digital platform work, we examine the type of digital platform or app that is most frequently used among digital platform/gig workers. The sample size of other characteristics of platform work such as hours, pay, and nature of agreement was too small (less than 30 observations) to provide any reliable estimates, so we were not able to examine these features. In addition, we examine the incidence of using digital platforms for work purposes among those who have a secondary job. Furthermore, the 2023 wave included questions for the unemployed about the intent and willingness to undertake gig work, in comparison with other types of jobs. Therefore, we also examine to what extent the unemployed would accept a job through digital platform work. This would enable us to rank the preference toward gig work and to understand the relative preference toward such jobs versus the actual share of these jobs in the labor market.

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[6] We also rely on employment detection questions, where individuals indicate whether they provided services in the last 3 months through a digital platform or an app.

3. Use of technology in the workplace and its evolution over time

3.1   Types of digital technology

Figure 1 shows the percentage of workers who use digital technology by type of technology: (1) using a non-internet connected computer at work, (2) using an internet-connected computer at work and (3) using the internet for work purposes either through a tablet, laptop, or phone without necessarily using a computer at work. From 2012 to 2023, the overall use of computers or the internet among employed individuals saw marginal changes, hovering around 20 to 21 percent, as shown in Figure 1. There was a slight decline in the use of computers noted in 2018, though the exact reasons for this decrease remain unclear. It might be attributed to the evolution of the structure of employment between 2012 and 2018. Namely, during this period, there was a retrenchment of public and private formal wage employment (where the use of computers/internet is prevalent), and a sharp increase in private informal employment outside of establishments as a result of the rapid growth in the construction and transport industries between 2012 and 2018 (Assaad et al., 2022). The rebound in the use of computer between 2018 and 2023 could then be the result of the contraction of private sector wage work outside of establishments and the increase in private formal wage work (Assaad & Mahmoud, Forthcoming).

There was a noticeable gendered pattern in computers and internet usage among employed individuals. In 2012, employed women were notably more likely than men to use a computer at work or the internet for work purposes not necessarily at work, with 28 percent of women compared to 18 percent of men reporting such use. This is likely due to the higher concentration of women in formal jobs (whether public or formal private sector wage employment) where technology use is higher (see below). This trend persisted across both internet-connected devices (13 percent of women versus 8 percent of men in 2012) and non-connected computers (15 percent of women versus 10 percent of men in 2012). By 2023, the rate of computer and internet use decreased among women, mostly due to the reduced size of the public sector (Assaad & Mahmoud, Forthcoming), but increased for men; however, employed women were still using computers and the internet more than men (24 percent vs. 20 percent).

Over time, there is also an important shift towards using the internet for work purposes, whether through a computer or another device, but not necessarily at work. By 2018, the use of computers not connected to the internet had drastically declined for both men and women. For instance, among male workers, this usage dropped from 10 percent in 2012 to 2 percent in 2018. Similarly, female workers saw a decline from 15 percent to 3 percent over the same period.

Conversely, the use of internet-connected computers increased. Among employed men, this usage grew from 7 percent in 2012 to 10 percent in 2018. For employed women, the increase was even more pronounced, rising from 12 percent in 2012 to 16 percent in 2018. By 2023, the landscape of computers and internet usage underwent further transformation. The use of computers not connected to the internet has become nearly negligible (1 percent of workers). Meanwhile, the adoption of internet access through mobile devices such as smartphones, tablets, or laptops has surged. This mode of access more than tripled across each wave from 1 percent in 2012, to 3 percent in 2018, to 10 percent in 2023, indicating a substantial shift towards mobile and multi-device internet usage among the workforce.

Figure 1 Proportion of workers using technology for work by sex in 2012, 2018 and 2023 (Employed in last 3 months, ages 15 to 64)
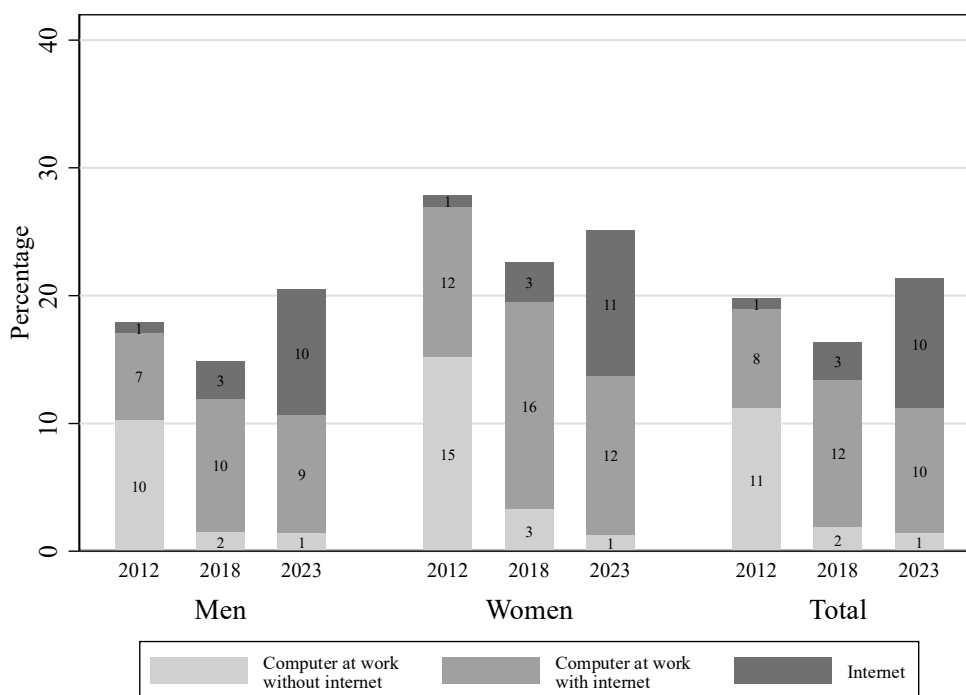
Source: Authors' calculations based on ELMPS 2012, 2018 and 2023.

The use of computers and the internet varies substantially by type of employment (Figure 2). Public sector jobs and formal private sector wage jobs consistently show the highest levels of computer and internet use over time (Figure 2, Total panel). Technology adoption has notably increased in both types of employment, with usage rising from 33 percent in 2012 to 39 percent in 2023 among public sector workers, and from 36 percent to 43 percent among formal private sector wage workers during the same period. However, overall technology use in private sector wage employment (including both formal and informal) remains lower than in the public sector, at 20 percent in 2023, up from 18 percent in 2012. This is primarily due to the substantially

lower use of computers and internet among informal private wage workers, and particularly among those working outside of establishments, where usage rate was just 6 percent in 2023. These workers make up the majority of private sector wage employment (see Appendix Figure 1). Concurrently, there has been a noticeable rise in technology utilization across other types of employment, notably among self-employed and employers. Specifically, employers' use of technology nearly doubled from 12 percent in 2012 to 21 percent in 2023, even slightly exceeding the 20 percent usage rate among private sector wage workers in 2023. This shift reflects a broader trend towards internet-reliant technologies in the workplace, replacing non-connected systems, which we will further demonstrate below.

Gender disparities in technology use within the workforce have also come to light, revealing distinct patterns across types of employment, and changing dynamics over time. Women employed in the public sector exhibited higher rates of computer and internet use compared to their male counterparts. In 2023, 41 percent of employed women in the public sector reported using technology in their jobs, compared to 39 percent of men. Therefore, because of the higher concentration of women in the public sector (e.g., 37 percent of total employed women in 2023) relative to men (17 percent of total employed men in 2023), as shown in Appendix Figure 1, women were more likely (24 percent) on average than men (20 percent) to use technology in work (Figure 1).

Similarly, among private sector wage workers (both formal and informal), 29 percent of women used computers or the internet in 2023, compared to 18 percent of men, highlighting a consistent trend favoring women in technology adoption within professional environments. The gender gap in technology adoption was even more pronounced in formal private wage employment in 2012 and 2018, but it is smaller 2023. Specifically, the use of computers and the internet among women in formal private wage employment was nearly double, reaching 60 and 63 percent in 2012 and 2018, respectively, compared to 33 and 32 percent for men. By 2023, men caught up with women in technology adoption in formal private wage work, with their usage rates growing to 42 percent, while women's rates dropped to 54 percent.

In addition to the gendered pattern, there is an important difference in technology adoption between formal and informal private sector waged jobs. For instance, the use of computers and the internet among formal wage workers was double that of their informal counterparts working inside establishments, for both men and women. As for private sector wage workers outside establishments, they have the second lowest use of technology (after unpaid family workers) and shows no noticeable gender difference.

Figure 2 Proportion of workers using technology for work by type of employment and by sex in 2012, 2018 and 2023 (Employed in last 3 months, ages 15 to 64)
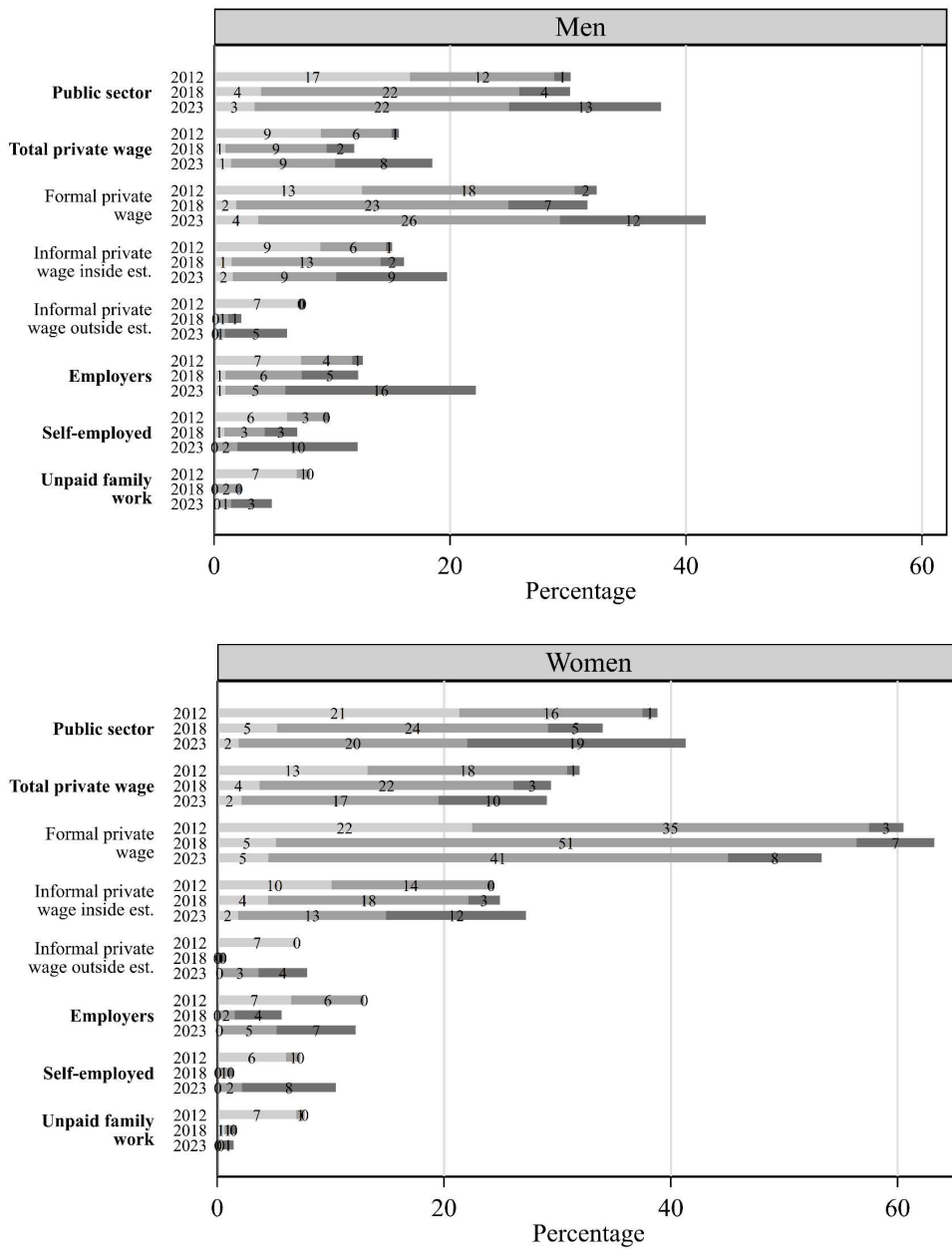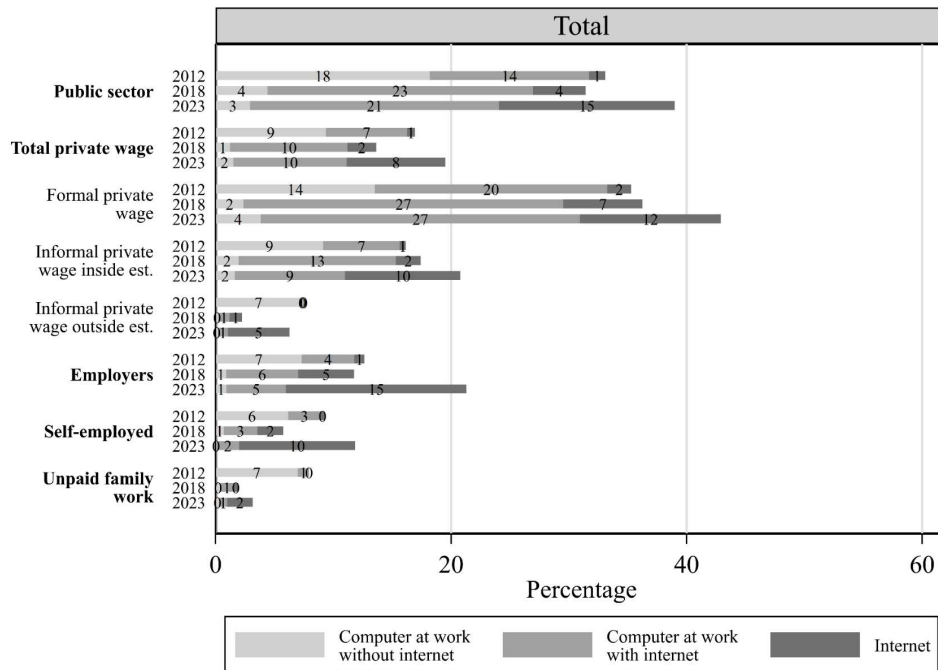
Source: Authors' calculations based on ELMPS 2012, 2018 and 2023.

The patterns of technology adoption vary substantially by sector of economic activity. Figure 3, which shows the share of workers using computers or the internet by sector of economic activity, reveals that, as expected, the highest technology adoption is observed among workers in the information and communication technology sector, with 76 percent of them reporting to use computers at work or the internet. The real estate activities sector comes in second place in terms of the use of computers and the internet, at 74 percent in 2023, marking an important and steady increase up from 49 percent in 2018 and 17 percent in 2012; followed by the financial and professional services sector, at 73 percent and the professional, scientific and technical activities, at 65 percent in 2023. These four sectors have consistently exhibited the highest technology usage over time. Comparatively, other sectors lag considerably, with around 35-40 percent of workers in 'public administration', 'health', and 'education' sectors using computers/internet – which are more sectors primarily in the public sector. The agriculture, construction and transport and storage have the lowest proportions of workers using computers and the internet. These findings may explain the decline in the use technology from 2012 to 2018, a period characterized by rapid growth in wage work outside of establishments, namely construction jobs, which is associated with low technology use. However, between 2018 and 2023, the share of wage work outside of establishments declined, while financial and professional services, along with other services, saw the fastest employment growth (Assaad & Mahmoud, Forthcoming).

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Figure 3 Proportion of workers using technology for work by sectors of economic activity (one-digit level) and by sex in 2012, 2018 and 2023 (Employed in last 3 months, ages 15 to 64)
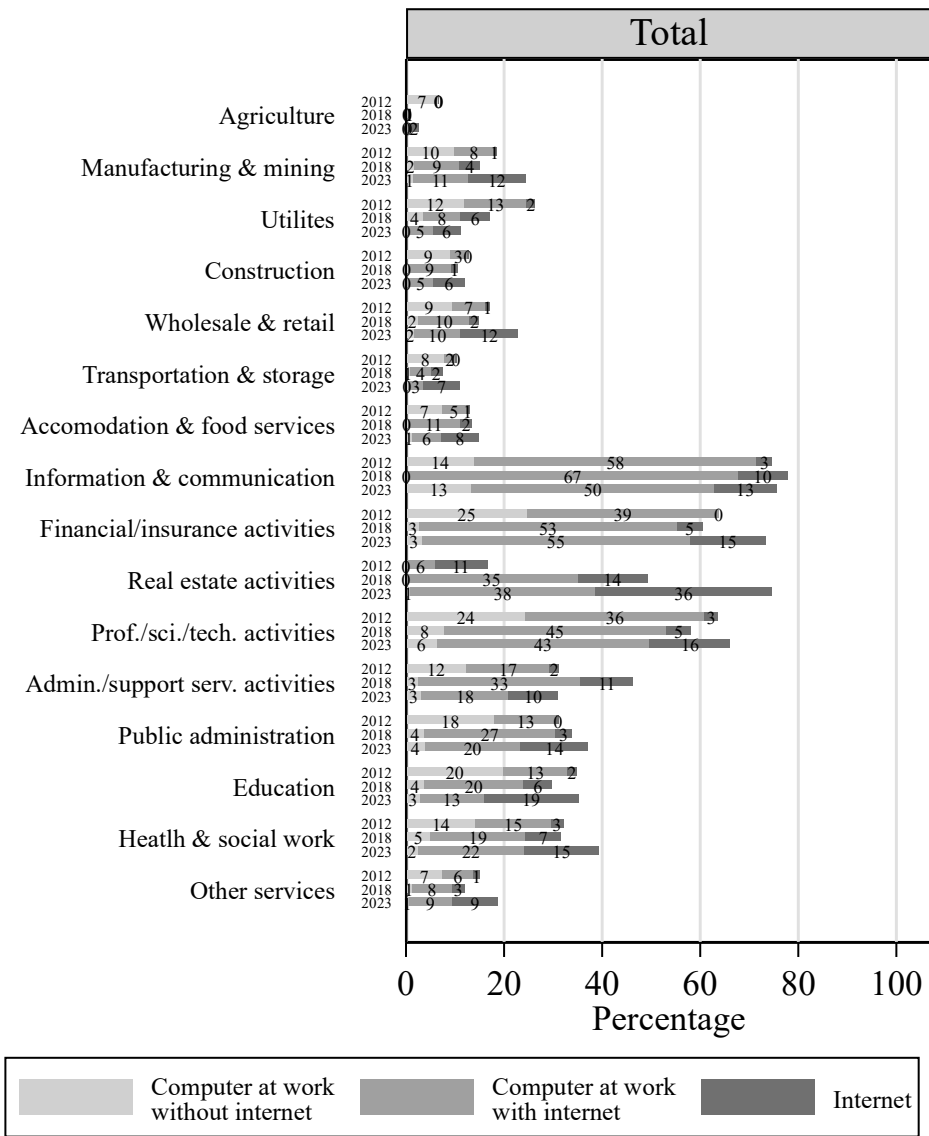
Notes: Sectors of economic activity following ISIC Revision 4 has been aggregated as follows: Mining and quarrying (Section B) have been added to Manufacturing (Section C); Utilities include electricity, gas, steam and air conditioning supply (Section D), and Water supply; sewerage, waste management and remediation activities (Section E); and other services include arts, entertainment and recreation (Section R), other service activities (Section S), activities of households as employers; undifferentiated goods- and services-producing activities of households for own use (Section T), and activities of extraterritorial organizations and bodies (Section U).

3.2   Focus on the use of internet

The next section delves into the increased use of the internet through various devices, highlighting the shift from using non-connected computers to broader internet use across multiple devices like smartphones, tablets, and laptops, whether or not these are used at the workplace. The main outcome is the use of the internet for work purposes through different devices, like laptops, tablets, smartphones not necessarily at work (relying on data from the information technology module), or the use of the internet through a connected computer at work. **Figure 4** shows that on average and across the three waves, there has been an acceleration in the use of the internet for work across employment profiles and gender. Internet usage more than doubled from 9 percent in 2012 to 20 percent in 2023, overall. Although employed women consistently used the internet more than men across the three waves, men saw slightly faster adoption of internet (a 12-percentage point (p.p.) increase from 8 percent in 2012 to 20 percent in 2023), compared to women (a 10-p.p. increase from 14 percent in 2012 to 24 percent in 2023).

Patterns of internet adoption across employment types also evolved over time. Internet usage among employers and the self-employed increased remarkably between 2012 and 2023 for both men and women, with faster adoption for women (from 2 percent in 2012 to 11 percent in 2023) than for men (from 5 percent to 15 percent). Such increases for men were driven by the rapid expansion of using the internet among both employers and the self-employed. Specifically, male employers' use of the internet doubled across each wave, from 6 percent in 2012, to 12 percent in 2018, and 22 percent in 2023. Likewise, the use of the internet among self-employed men increased from 4 percent in 2012, to 7 percent in 2018, and 12 percent in 2023. As for women, the rapid increase in internet use was primarily driven by the self-employed. Internet use grew ten times between 2012 and 2023, from a negligible 1 percent in 2012 and 2018, to 10 percent in 2023. As for internet usage among female employers, it stagnated in 2012 and 2018 at 6 percent, then doubled to 12 percent in 2023, thus growing relatively slower than that among self-employed women. These trends of fast adoption of internet use among male and female employers and self-employed workers, could be interpreted as reflective of the increasing role of the internet in supporting business activities, particularly in marketing and sales services in sectors like retail trade or 'other personal services', or sectors like education; something we further examine below.

There has been a noticeable downward trend in internet usage among women employed in formal private sector wage work, despite this group having the highest rates of internet usage across the board. Despite leading in internet usage across employment types, the share of formal wage-employed women using the internet fell from 60 percent in 2018 to 49 percent in 2023. It is worth noting that formal wage work represents a limited and stagnant share of total

women's employment (hovering 5-7 percent between 2012 and 2023, as shown in Appendix Figure 1). In contrast, internet use among female informal wage workers (inside establishments), steadily increased, with 25 percent using the internet in 2023, compared to 15 percent in 2018. This is a type of job that grew between 2012 to 2018 to reach 14 percent of total women's employment and stabilized at that share in 2023 (Appendix Figure 1). The increase in internet usage among informal wage workers has counteracted its drop among formal private wage workers, leading to a relatively stable internet usage of women in the private sector (27 percent in 2023). As for men, there has been an expansion in internet usage for both formal and informal private wage workers, with formal private wage workers leading at 39 percent in 2023 and informal private wage workers at 18 percent.

Figure 4 Proportion of workers using the internet for work by sex and type of employment in 2012, 2018 and 2023, employment in the last 3 months, ages 15 to 64
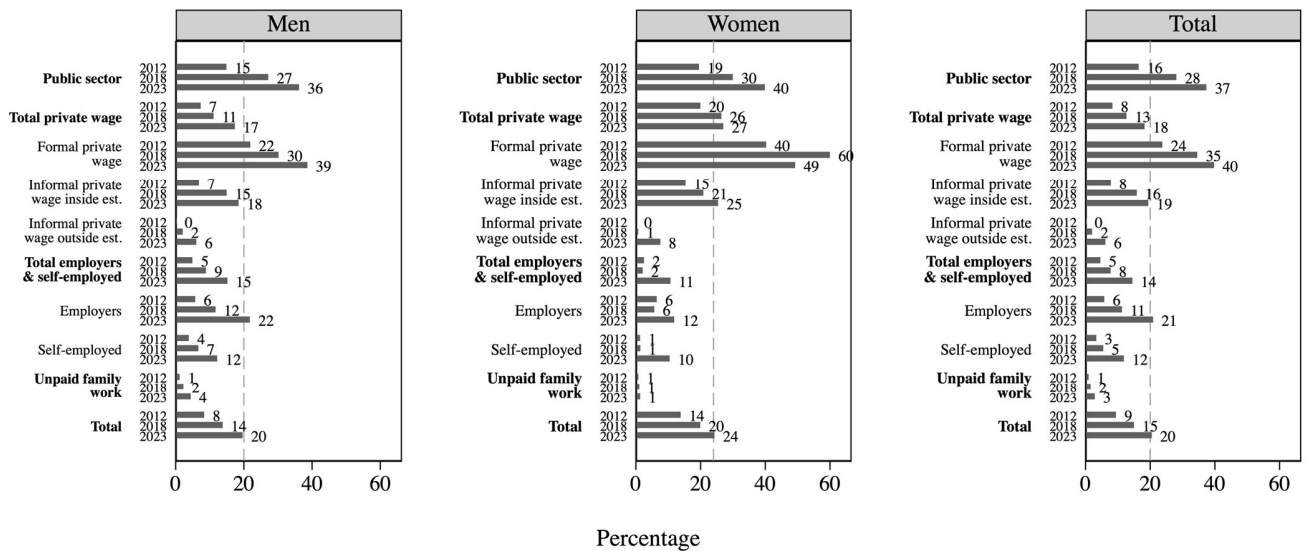
Dashed line is the average internet use (%) in 2023

Source: Authors' calculations based on ELMPS 2012, 2018 and 2023.

To better understand the profiles of workers who used the internet at work, we ranked occupations at the three-digit level for both men and women based on internet use. Figure 5 shows the top 30 occupations for men and the top 13 for women, where the rates of internet use are above the average for male and female workers, respectively.[7] In 2023, the top occupations for men included electrotechnology engineers who were the most likely to use the internet at work (79 percent), followed by business services and administrative managers (78

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[7] Occupations with small sample cells (lower than 30 respondents per three-digit occupation) have been dropped from the analysis, and therefore there are lower number of top occupations presented for women, as there were many instances where their three-digit level occupations had a small sample size.

percent), engineering professionals and finance professionals (both at 73 percent), client information workers (71 percent), and managers and chief executives (70 percent). As for women, the leading occupations were other health professionals (74 percent),[8] client information workers (70 percent) and other sales workers (67 percent). Notably, 'client information workers' was a common role for both men and women, with similarly high usage rates. Another common occupation was finance professionals, ranking among the top for internet use for both men and women, with men using the internet slightly more (73 percent) than women (63 percent). Interestingly, our results, drawing on the 2023 wave of the ELMPS, for the top occupations using the internet and those with highest concentration of strong/very strong computer skills, match closely most occupations that OECD's Programme for the International Assessment of Adult Competencies (PIAAC)[9] identifies as either ICT specialists or ICT-task intensive occupations , as shown in

Appendix Figure 2 (ILO, 2023a)

Figure 5 Top occupations at the 3-digit level with the highest proportion of workers using the internet for work in 2023 by sex (Employed last 3 months, ages 15-64)
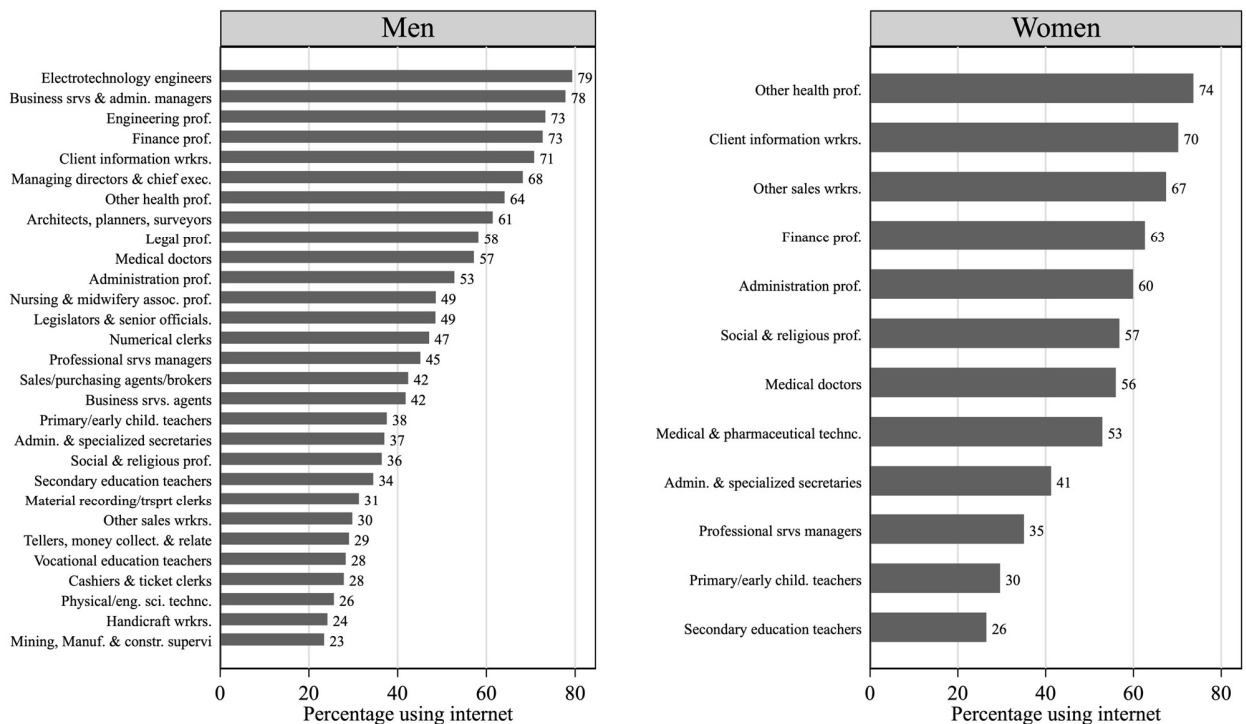
Source: Authors' calculations based on ELMPS 2023.

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[8] Examining the four-digit level occupations, other health professionals who used the internet most were pharmacists (occupation 2411).
[9] PIAAC consists of three parts: a direct skills assessment called the Survey of Adult Skills, a background questionnaire, and a module on the use of skills on the job; and is one of three main approaches to identify digital tasks (ILO, 2023a).

Figure 6 shows the top five economic activities at the two-digit level of detail in 2023 according to the highest rates of internet use (**Figure 4**).[10] For instance, for men, financial services (excluding insurance activities) had the highest proportion of workers using the internet in 2023. This also echoes with finance professionals being one of the top occupations using the internet in 2023. Real estate activities had the second highest rate of internet usage in 2023 for men (73 percent), followed by legal and accounting activities (69 percent), manufacture of coke and refined petroleum (62 percent), and manufacture of pharmaceuticals (61 percent). The manufacture of pharmaceuticals as leading industry in internet usage is also in line with 'other health professionals', namely pharmacists, being of the top occupations with the highest internet usage.

As for women, the top three industries were quite different from men, reflecting women's employment patterns in the labor market, their concentration in the public sector, and the potential gender divide in sectoral composition. For instance, women in 'public administration and defense', 'human health and social work activities and 'education' sectors were among the top internet users. These are all industries that are primarily concentrated in the public sector.

Figure 6 Sectors of economic activity (at the two-digit level) with the highest proportion of workers using the internet for work in 2023 by sex (Employed last 3 months, ages 15-64)

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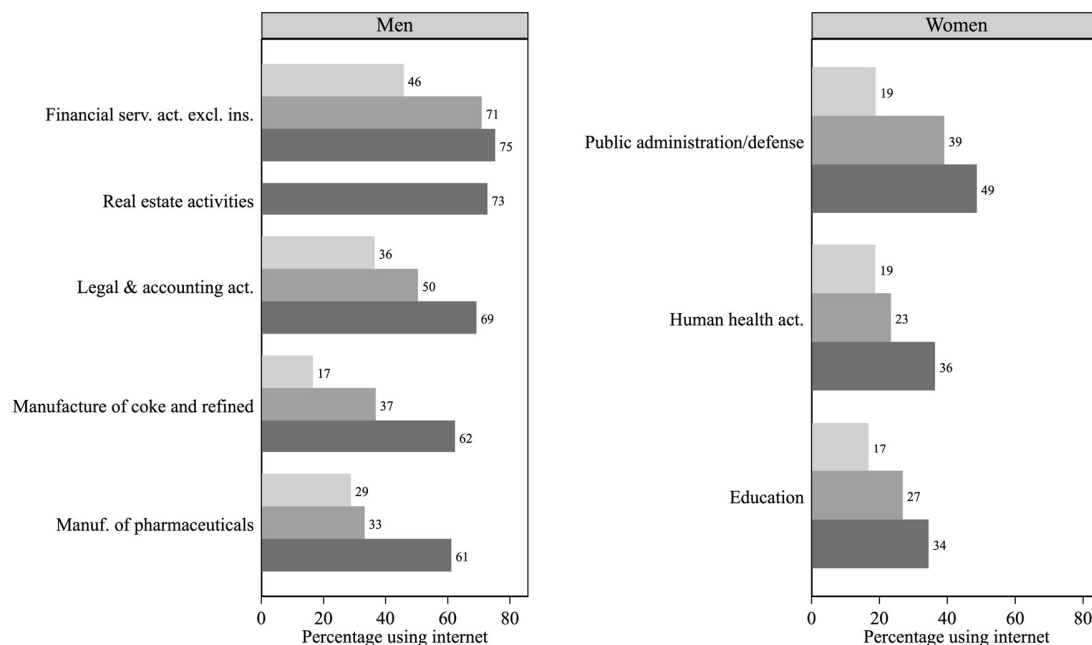
[10] Economic activity sub-sectors at the two-digit level with more than 30 observations have been included in the analysis, and with higher-than-average internet usage for men and women respectively.

The analysis of top industries at the two-digit level by type of employment shows that the rise in internet usage among male employers and self-employed workers was primarily driven by the increase in the use of the internet among those working in the 'repair of computer, personal and household goods' sector (see Appendix Figure 3). Specifically, the proportion of male employers and self-employed workers using the internet reached 42 percent in 2023, down from 13 percent in 2012. The other sector which exhibited a rapid increase in internet usage was the 'other personal service activities' sector, where the rate of internet use reached 22 percent of male employers and self-employed workers in this sub-industry in 2023, up from 4 percent in 2012.

As for female employers and self-employed workers, the top economic activity was education, where 26% used internet in 2023. This is in line with education being the fastest growing sector for own-account workers during the 2018-2023, as an indication for the increase in private tutoring jobs among women (Assaad & Mahmoud, Forthcoming). This is likely driven by the rise of online tutoring during the COVID-19 pandemic, highlighting a potential and nascent shift toward digital tools in education.

3.3   Use of technology in the workplace as a response to COVID-19

The COVID-19 pandemic had varying impacts on employment status across different sectors. **Figure 7** reveals that the majority of workers (87 percent) did not experience any change in their job or work arrangement since the onset of the pandemic in February 2020. However, some nuances exist. Around 13 percent reported changes in their work arrangements: approximately 6 percent of workers reported working in shifts in their jobs as a response to the pandemic, another 6 percent reported not working post-pandemic, and the remaining 1 percent transitioned to remote work. Notably, female workers predominantly drove this shift to remote work, and this kind of change constituted 3 percent of the changes experienced by female respondents (compared to almost none among men).

Further investigation of job profiles reveals that job stability played a crucial role in facilitating these changes. Workers with more stable jobs were more likely to experience adjustments as a response to COVID-19. Public sector employees were the most likely to witness job changes, with 14 percent working in shifts and 3 percent moving to remote work. Among public sector workers, shifting to remote work as a response to the pandemic was more pronounced for women (5 percent) compared to men (3 percent).

Despite the overall stability post-pandemic, some employment statuses reported higher rates of not working post-pandemic. Employers and the self-employed were particularly affected,

with not working being prevalent at rates of 8 percent and 7 percent, respectively, which is higher relative to other job types.

Figure 7 Distribution (in percentage) of changes to work arrangements that are due to Covid-19 since February 2020 by sex and sector (Employed last 3 months, ages 15 to 64)
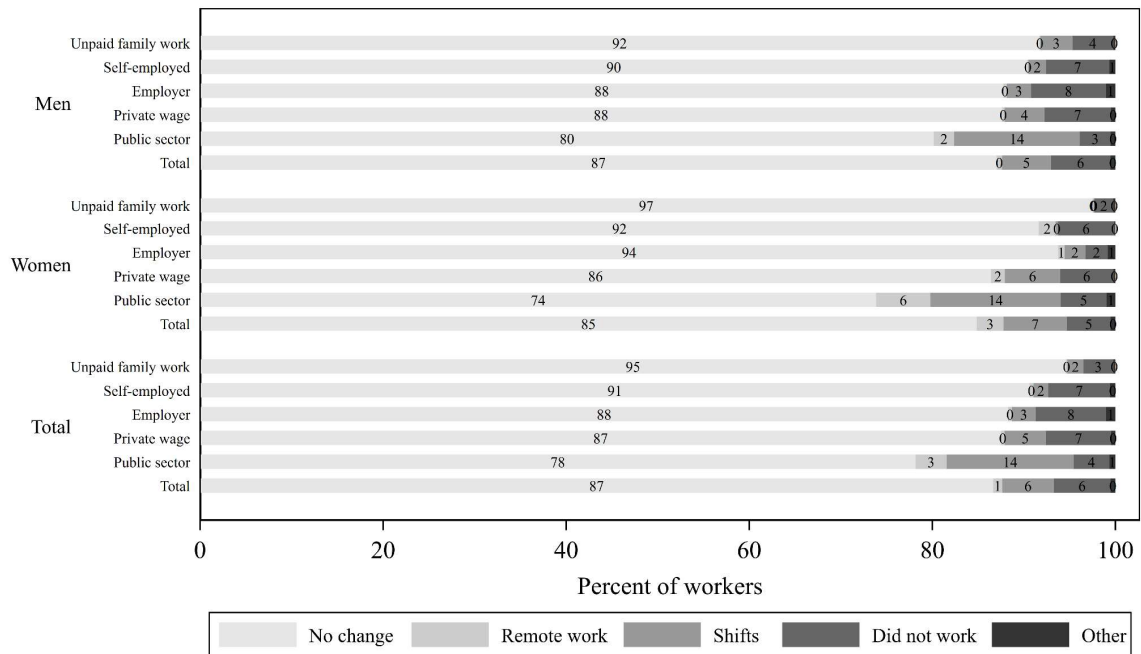
Source: Authors' calculations based on ELMPS 2023.

Looking further into the top occupations at the three-digit level that were most able to transition to remote work, for women, the occupation with the highest rate of transitioning to remote work were the secondary education teachers, with a rate of 14 percent, followed by other sales workers (12 percent) and primary school and early childhood teachers (11 percent) (

Figure 8). This is in line with school closures and transition to online schooling being one of the primary responses to Covid-19 in Egypt (Krafft et al., 2022, 2024).

Figure 8 Proportion of workers who transitioned to remote work since February 2020 by occupation at the three-digit level (Employed last 3 months, ages 15-64)
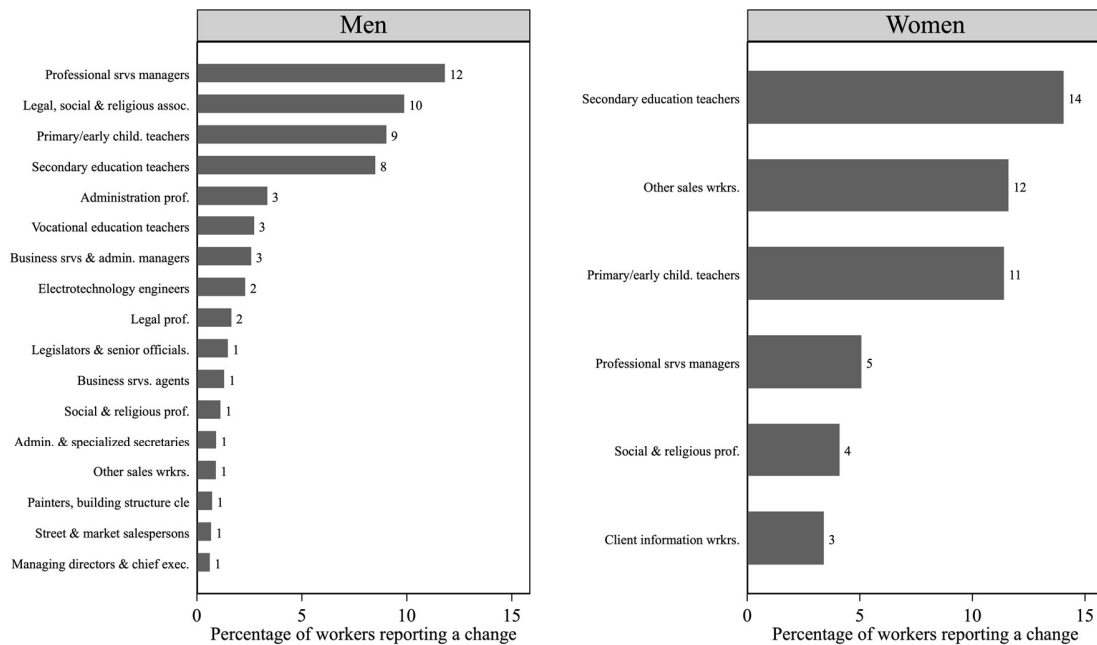
Source: Authors' calculations based on ELMPS 2023. Notes: the figure shows occupations at the three-digit level with a sample size of 30 observations or more, and with higher-than-average rate of transitioning to remote work for men and women respectively.

To mitigate the risks associated with physical proximity during the pandemic, workplaces adopted various adjustments (**Figure 9**). Public sector workers and formal private sector wage workers were notably proactive in using the internet as a response to COVID-19, with approximately 25 percent and 31 percent of workers respectively, using the internet either permanently or temporarily. This trend was in contrast to other means of distanced communication such as phone usage, where public sector workers reported a 10 percent increase. Instead, this tool was more predominant than the internet among informal wage workers as well as non-wage workers (employers, self-employed and unpaid family workers), with between 13 to 24 percent of workers using this adjustment. Phone usage might also be reflective of using social media phone apps to connect. However, the distinction between phone calls and the use of internet-based communication apps via phones is unclear, making it difficult to determine how respondents to the survey perceived and reported phone usage.

In terms of direct anti-infection measures, there was a substantial implementation of barriers for customers across all occupations, with around 80 percent temporary or permanent implementation rate. However, the most precarious occupations, non-wage work and informal wage work, saw the least implementation of barriers for workers themselves. Specifically, 40

percent and 22 percent of workers in these categories reported no barriers implemented at all, underscoring the disparities in workplace protections based on job security and stability.

Figure 9 Patterns of adjustment in workplaces to reduce being directly in physical proximity with customers or co-workers, employed in last 3 months, among those whose workplace adjusted business model to reduce physical proximity with customers, ages 15-64
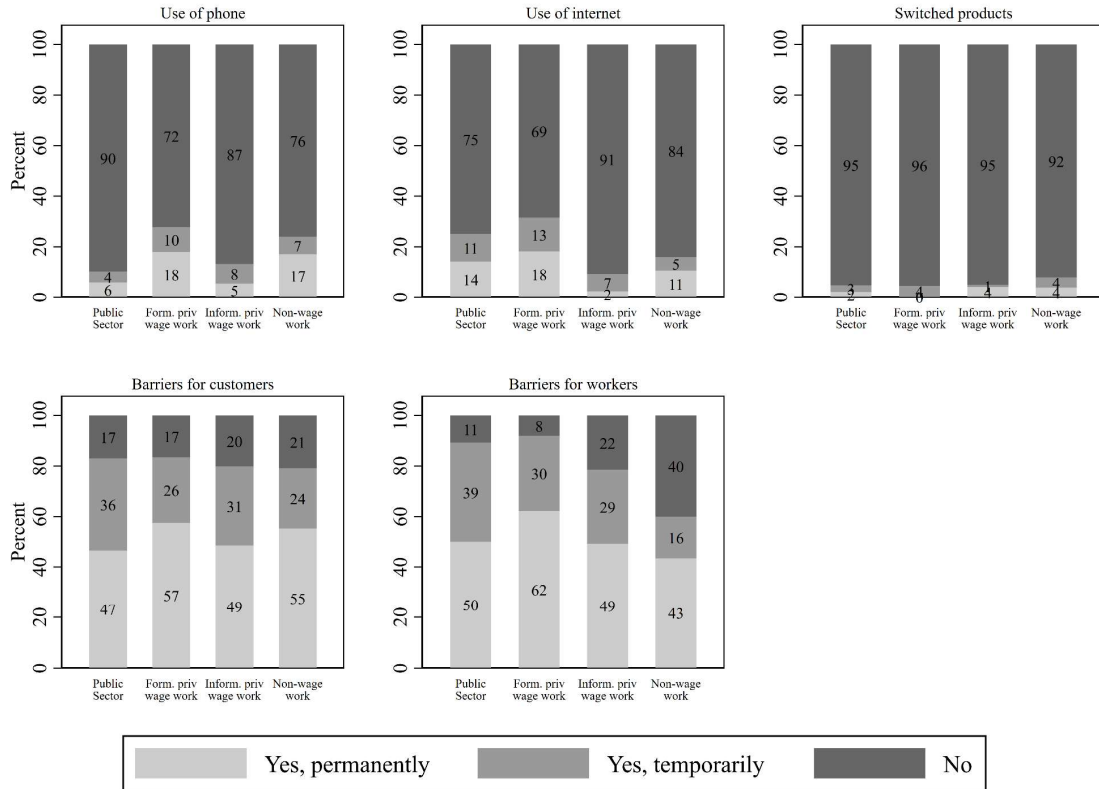
Source: Authors' calculations based on ELMPS 2023.

4. Evolution of computer skills in the labor market

4.1   Supply of computer skills

In this section, we examine the computer skills supply, among the working age population (15-64), and among the labor force distinguishing between the currently employed and the currently unemployed. There is a contrasting narrative regarding gender disparities in the supply of computer skills between the working-age population and the labor force, given the selection process for women into the labor force, which favors the more educated. Figure 10 reveals that on average, working-age women (whether in or out of the labor force) are less likely than working age men to report having computer skills, with 9 percent of working age women versus 13 percent of working age men reporting having strong or very strong competencies. Looking at statistics by age cohorts (Figure 10), this gender divide is persistent across almost all age cohorts, with a notable exception in the 15–19 age group where gender parity for strong or very strong computer skills is observed, reported by around 12 percent of young women and young men.

Figure 10 Distribution (in percentage) of levels of computer skills by sex and age group among the working age population (ages 15–64) in 2023

Source: Authors' calculations based on ELMPS 2023.

24
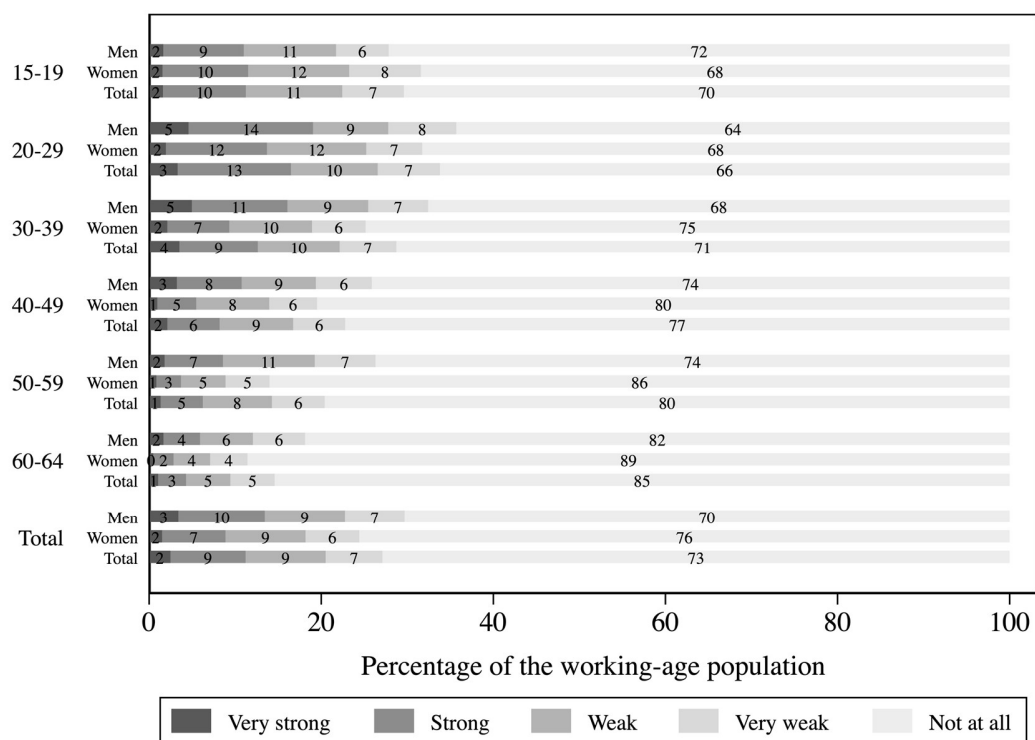
When focusing on the labor force using the standard definition (search required for unemployment), around 11 percent reported having strong or very strong computer skills, and 70 percent reported having no skills at all (Figure 11). Interestingly, a significant shift in gender dynamics emerges when focusing on the labor force compared to the working age population. Figure 11 shows that the supply of skills among women in the labor force is higher than among men. 16 percent of women in the labor force reported having strong or very strong computer skills versus 13 percent of men in the labor force reporting proficiency. Moreover, fewer women in the labor force report having no computer skills at all (64 percent) in contrast to men (71 percent), indicating a stronger selectivity into the labor force by educated women. This strong selectivity is also clear if we compare computer skills between employed and unemployed women. Unemployed women were substantially more likely (23 percent) than employed women (13 percent) to have strong or very strong computer competencies. Noticeably, there is a larger share of unemployed women than unemployed men who reported having weak computer skills (17 percent vs. 9 percent). This confirms that unemployment primarily affects educated workers, especially educated women in Egypt (Assaad et al., 2020; Krafft et al., Forthcoming). This higher supply of computer skills among the unemployed is also observed for men, but to a lesser extent: 21 percent of unemployed men had strong computer competencies relative to 15 percent of employed men.

Figure 11 Distribution (in percentage) of levels of computer skills by sex, among the labor force (standard definition) (ages 15-64)
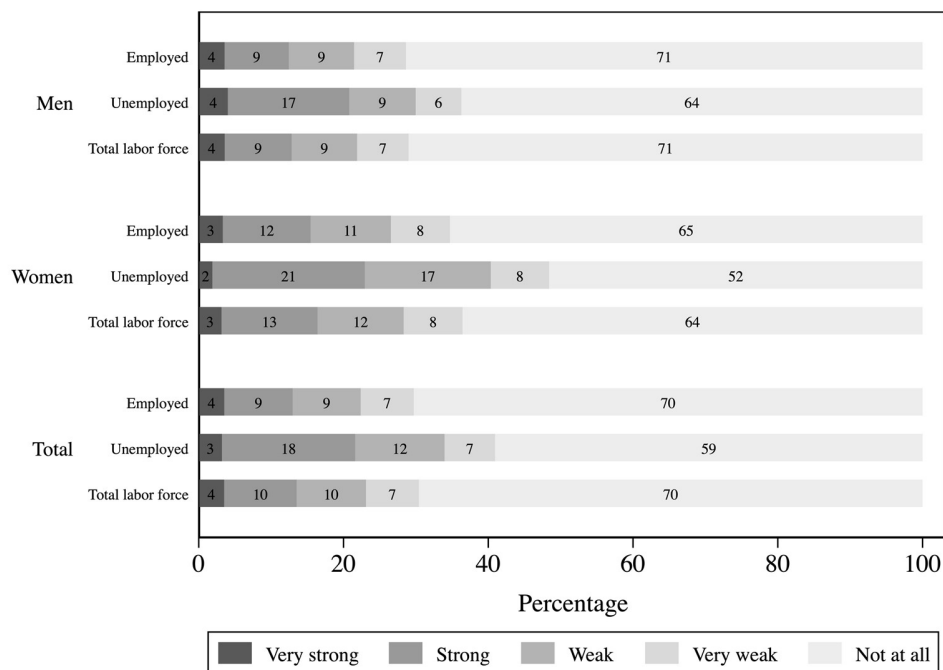
Source: Authors' calculations based on ELMPS 2023.

Exploring the supply of computer skills among the currently employed, we examine if any differential computer skills reporting stems from the type of employment (

Figure **12**) or the occupation (Figure 14). First, in line with their high prevalence of using computers and the internet (Figure 2), public sector workers and formal wage workers in the private sector were substantially more likely than other workers to report strong or very strong computer skills in 2023 and the least likely to report having no skills at all. For the public sector, the distribution of computer skills is similar between men and women, with 25 percent reporting having strong/very strong skills, compared to 13 percent of all workers on average. However, for formal private sector wage work, the distribution of skills is strongly skewed for women: two-fifth (40 percent) of women employed in formal private wage employment reported having strong or very strong computer skills, compared to only a quarter of their male counterparts. Looking at private wage employment overall, women are still more likely than men to have strong or very strong skills, albeit to a lesser extent than formal private wage employment (19 percent of women compared to 12 percent of their male peers)

The lowest prevalence of strong or very strong computer competencies were among informal private wage workers outside of establishments (3 percent), followed by unpaid family workers (4 percent), and the self-employed (5 percent).

This distribution of skills by type of employment further contributes to explaining why unemployed women were more likely than employed women to have strong and very strong computer skills. It is because the type of jobs that employ strong or very strong computer skills, is either contracting (such as public sector jobs whose share in women's employment shrank from 51 in 2012 to 37 in 2023[11]) or have very limited share in the labor market for women (such as formal private sector wage work representing 6 percent of women's employment). This suggests that the unemployed women, mostly educated with higher computer skills, are queuing for good jobs that match their qualifications and skills. The analysis of skills required by jobs, below, also confirms the same result.

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[11] See Appendix Figure 1.

Figure 12 Distribution (in percentage) of levels of computer skills by type of employment and sex (ages 15-64)

Men

Type	Very strong	Strong	Weak	Very weak	Not at all
Public	8	17	11	8	56
Total private wage	3	9	9	8	71
Formal private wage	6	20	10	10	55
Informal private wage inside est.	4	10	10	8	68
Informal private wage outside est.	1	2	9	7	81
Employers	1	6	9	7	76
Self-Employed	2	4	6	4	85
Unpaid family work	1	4	10	6	79
Total	4	9	9	7	71

Women

Type	Very strong	Strong	Weak	Very weak	Not at all
Public	6	19	16	12	48
Total private wage	3	16	11	8	61
Formal private wage	7	33	17	9	35
Informal private wage inside est.	2	13	12	9	64
Informal private wage outside est.	2	5	4	6	83
Employers	2	4	13	6	76
Self-Employed	1	3	6	3	87
Unpaid family work	0	1	5	4	90
Total	3	12	11	8	66

Total

Type	Very strong	Strong	Weak	Very weak	Not at all
Public	7	17	13	9	53
Total private wage	3	9	9	8	70
Formal private wage	6	21	10	10	52
Informal private wage inside est.	4	11	10	8	67
Informal private wage outside est.	1	2	8	7	81
Employers	2	6	10	7	76
Self-Employed	1	4	6	4	86
Unpaid family work	1	3	8	5	84
Total	4	9	9	7	70

Percentage

Legend: Very strong, Strong, Weak, Very weak, Not at all

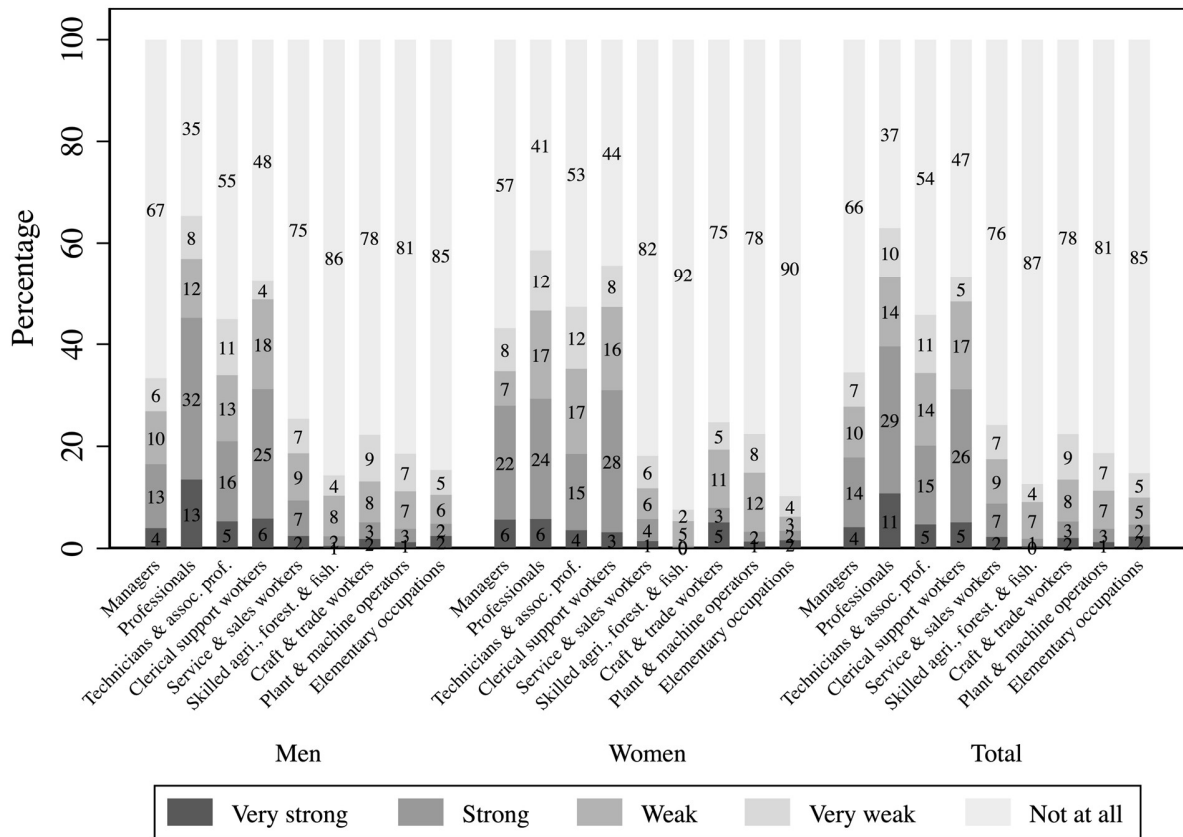Source: Authors' calculations based on ELMPS 2023.

This distribution of skills by type of employment is matched by an analysis of computer skills occupations (

Figure **13**). Occupations that usually constitute a large part of wage work outside of establishments, or own-account work12 are associated with the lowest rates of strong and very strong computer skills.   For example, service and sale workers, workers in elementary occupations, agriculture, forestry, and fishery skilled workers or trade and craft-related workers reported very limited rates of strong/very strong computer skills in 2023. In contrast, among the most high-paid occupations, professionals, mostly concentrated in formal jobs either in public or private sectors, had the highest prevalence of strong or very strong computer skills (40 percent). There is a strong gender disparity for the 'professionals' occupational group where more men than women reported having strong or very strong computer skills (45 percent vs. 30 percent). This is likely due to the gendered patterns of employment within this occupational group, where men and women are concentrated in jobs requiring a different set and nature of 'strong/very strong' computer skills, as examined below in Figure 14. In contrast, more female managers (28 percent) than male managers (17 percent) reported on average to have strong or very strong computer skills in 2023. This could be due to a variety of reasons. The first could relate to the gendered occupational structure within the managers group, where women tend to be concentrated in managerial positions requiring stronger set of skills than men. Other reasons could relate to a potential discrimination in the higher-level occupations where women need to show more skills than men to work in these jobs, or higher confidence levels among women in those positions.

Interestingly, following professionals, clerical support workers have the second highest rate of strong or very strong computer skills (at 31 percent for both men and women), in line with client information workers being one of the top occupations using the internet.

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[12] See Assaad et al. (2022) for more details on the occupational structure by type of employment.

Figure 13 Distribution (%) of levels of computer skills by occupation and sex (ages 15-64)

Source: Authors' calculations based on ELMPS 2023.

We explore in more detail occupations at the three-digit level with the highest proportion of workers with strong or very strong computer skills in Figure 14. There is an occupational difference between men and women in terms of computer skills. For men, software and applications developers and analysts were the most likely to have such competencies, with 93 percent of them having strong or very strong computer competencies. The rate of strong computer skills in the following five top occupations is much lower than the top occupation (software developers) and ranged between 77 percent for electrotechnology engineers to 67 percent for architects. As for women, finance professionals had the highest rate of strong computer skills (at 64 percent). Also, women working as other health professionals were the second most likely to have strong computer skills, but at much lower rates than their male counterparts (44 percent vs. 74 percent). This is a consistent pattern through many common occupations between men and women, where the rate of those reporting strong skills is higher among men than among women for some occupational groups (such as client information workers, primary school and early childhood education teachers, etc.).

Taken all together, these findings suggest a complex gendered patterns of perceived technology proficiency and jobs. The lower self-reported skills among women in general may result from implicit gender bias. This bias involves the unintentional or societal attribution of gender-based characterization to tasks, actions or norms, influencing self-assessment. In this context, computer skills are often perceived as having a 'masculine' attribute, affecting how women evaluate their own proficiency. It may also be the result of lower participation of women in STEM fields and lower computer skill levels to a gender divide in ownership of digital devices. As for the observed higher prevalence of computer skills among women among the unemployed, it might reflect a self-selection among the most educated women with higher computer skills, to queue for jobs that are more adequate to their set of skills. Future research should delve deeper into these dynamics to elucidate underlying factors driving these trends and their implications for gender equality in technological proficiency across different employment profiles and occupations in the economy.

Figure 14 Occupations with the highest proportion of workers with strong or very strong computer skills by sex in 2023
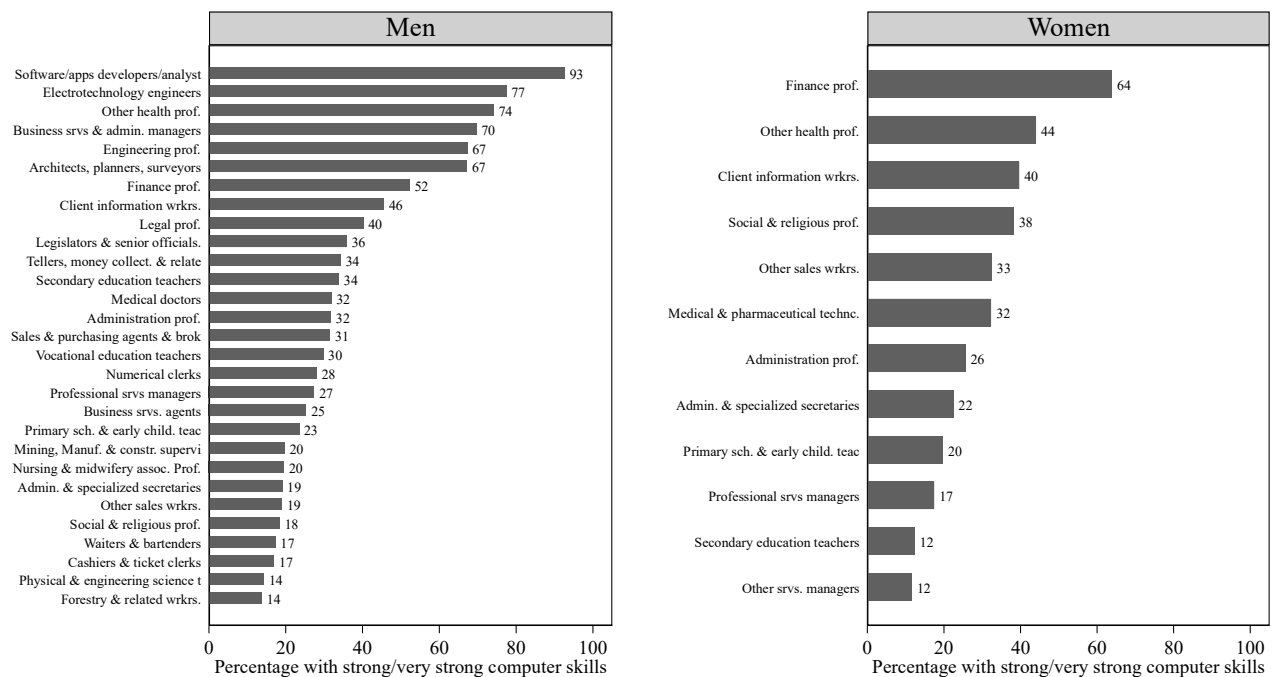
Source: Authors' calculations based on ELMPS 2023.
Notes: The figure shows occupations a the three-digit level with higher-than-average proportion of workers with strong or very strong computer for men and women respectively. We calculated the average proportion of workers with strong or very strong computer competencies at the three-digit level occupation, conditional on a sample size of 30 workers and above in each occupation.

To further understand which type of computer skills is most prevalent, ELMPS 2023 includes information on a battery of different computer skills, spanning from basic skills like the use of digital services or word processing or spreadsheet skills; medium skills, like the use of digital tools to create content; high skills like setting up and protecting computer systems, computer systems programming or solving computer programs. These questions were administered to those who reported having some computer skills, whereas those who had no skills at all were not asked these questions. Figure 15 shows that basic computer skills were the most common skills, with the highest percentage of workers with strong/very strong skills. These are the use of spreadsheets (Excel) where 32 percent of workers reported having strong/very skills, the use of application interface, and the use of electronic services. However, the least common skills were computer systems programming, maintenance and management of ICT, which represent high-level skills.

Figure 15 Distribution (%) of levels of computer skills by type of computer skill and sex, among employed individuals, (ages 15-64)
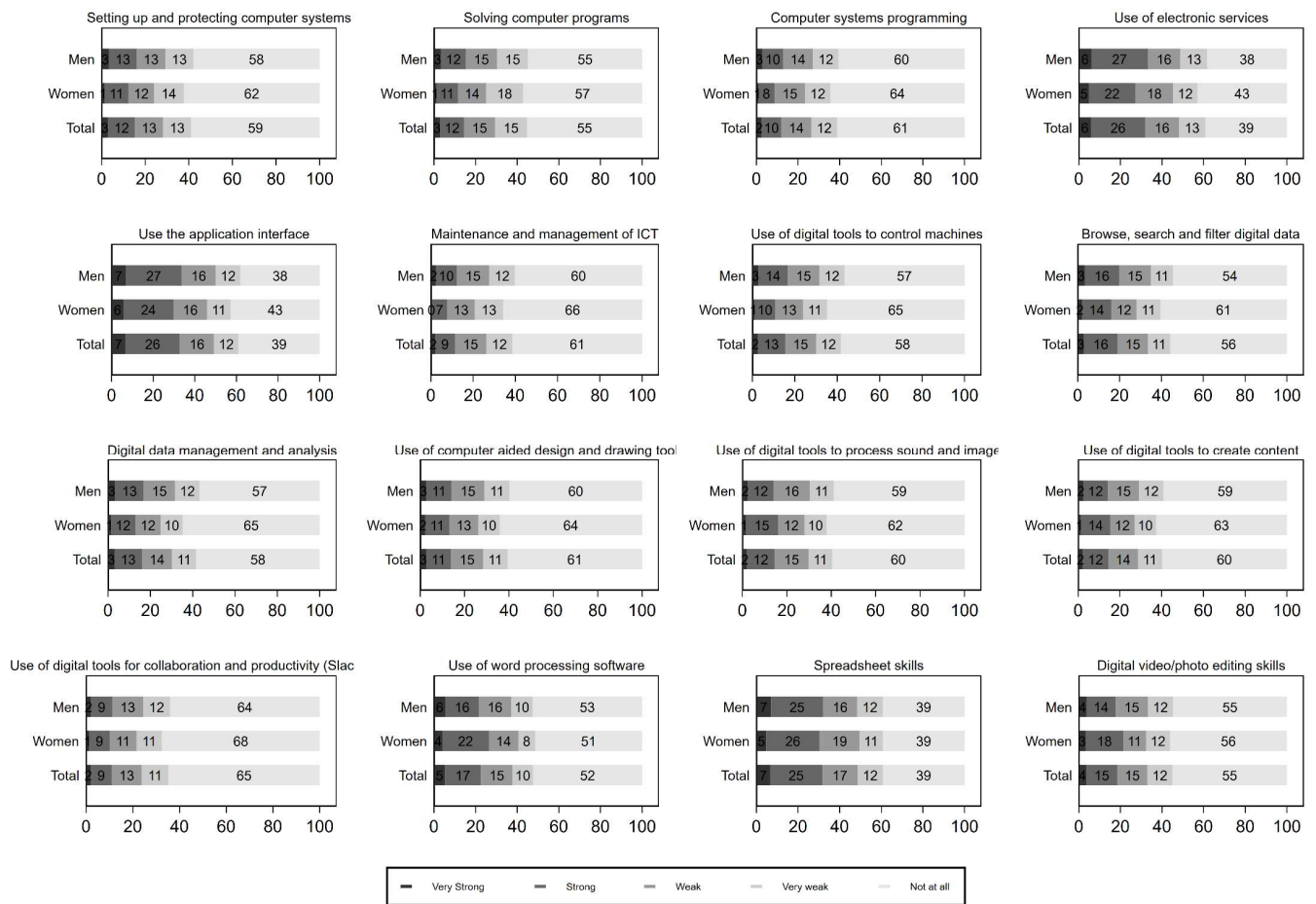
Source: Authors' calculations based on ELMPS 2023.

Figure 16 Distribution (%) of levels of computer skills by type of computer skill and sex, among workers with strong and very strong computer skills (ages 15-64)
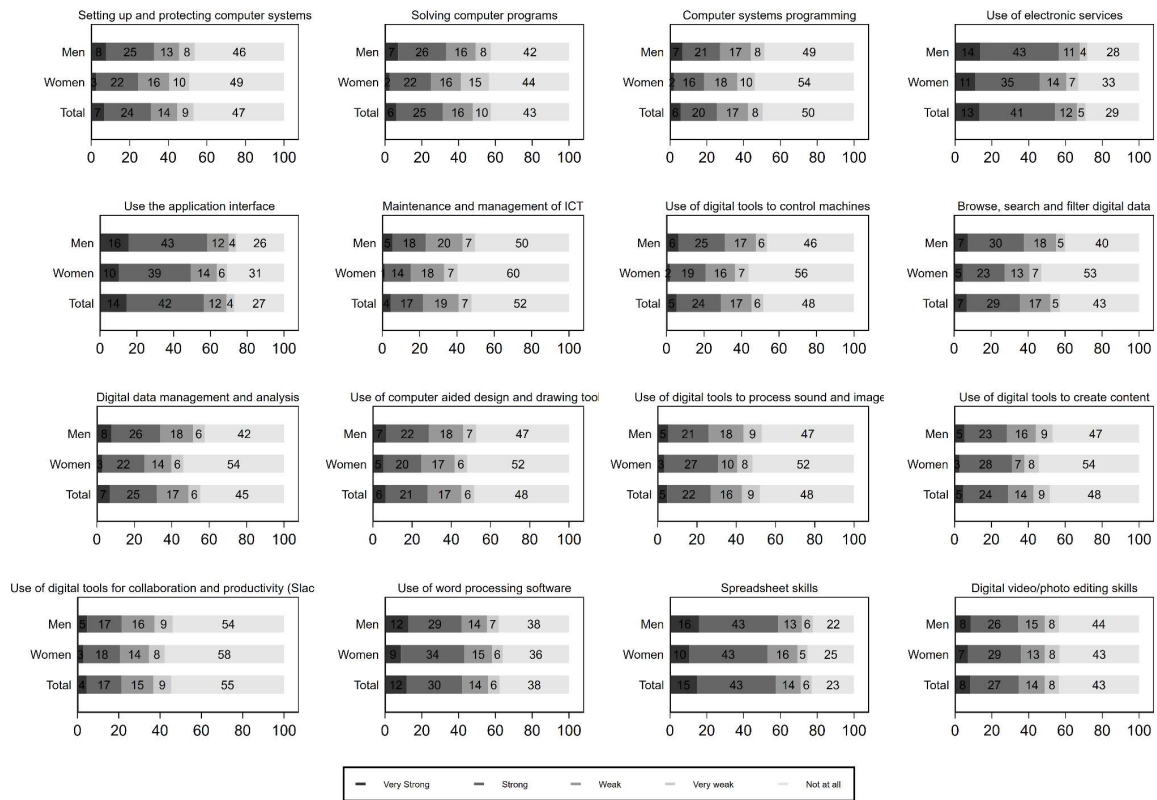
Source: Authors' calculations based on ELMPS 2023.

Among those who reported having strong or very strong computer skills, the analysis of specific computer skills in

Figure **16** shows that the use of spreadsheet skills is again the most prevalent type of computer skills, with more than half (58 percent) reporting strong or very strong competencies in 2023. The use of application interface is the second most common computer skills (56 percent) and the use of digital services (54 percent). Strong proficiency in the use of word processing software were reported by 42 percent of those having strong computer skills, and that in browsing, searching and filtering digital data as well as digital video/photo editing skills was reported by 36 percent and 35 percent, respectively. The least common skills are maintenance and management of ICT and the use of digital tools for collaboration and productivity (21 percent had strong or very strong proficiency in both skills).

4.2   Working in jobs requiring computer skills

In addition to the supply of computer skills that is based on self-assessment of one's own skill, we examine what workers report regarding the need for computer skills in their jobs. The latter can be considered as a more objective measure of computer skills requirements in the labor market.

Figure **17** reveals that job requirement in terms of computer skills is matching self-perception or self-assessment of computer skills. Around 12 percent of the currently employed work in jobs requiring computer skills in 2023. This matches the share of the labor force (13 percent) who reported proficiency in computer skills. Again, employed women seem to be more concentrated in jobs requiring computer skills (15 percent), relative to men (12 percent).

However, there has been a surprising downward trend in the percentage of workers in jobs requiring computer skills, between 2018 and 2023, after an increasing trend between 2012 and 2018. Namely, 15% of workers were in jobs requiring computer skills in 2012, which rose to 18% in 2018, but dropped back to 12% in 2023. While this downward trend is observed for both men and women, the drop is much more pronounced among women (15 percent in 2023, down from 24 percent in 2012) than among men (12 percent in 2023, down from 16 percent in 2012).

Figure 17 Percentage of workers in jobs requiring computer skills in 2012, 2018 and 2023 by sex (Employed last 3 months, ages 15–64)
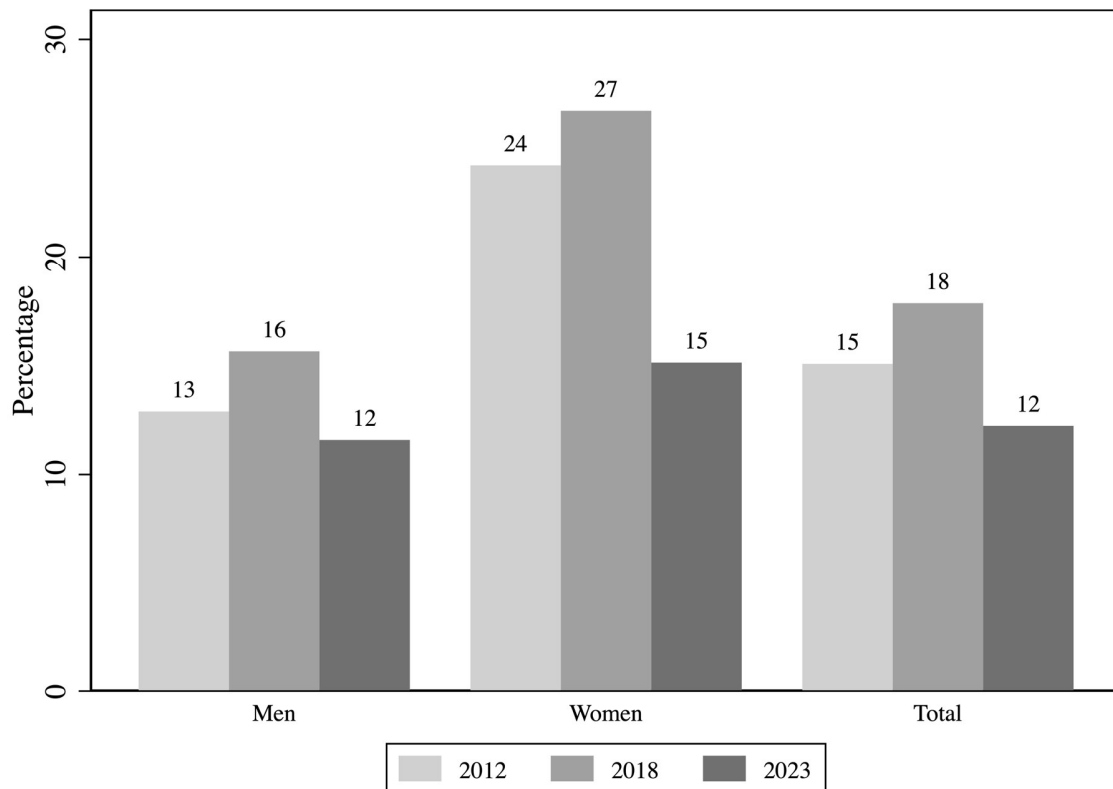
Jobs requiring computer skills decreased across all occupations between 2018 and 2023. Figure 18 shows that managers, professionals, and clerical support workers saw their job requirement in terms of computer skills fall the most during the 2018-2023 period, after increasing during the 2012-2018 period. These three occupations were the most intensive in computer skills; and thus were the main drivers of why computer skills requirement first increased between 2012 and 2018, then declined between 2018 and 2023. In addition, this trend is only observed for men. For women, the drop in computer skills required by the job was cross-cutting across different occupations. These results call for further research to understand reasons why jobs are presumably requiring computer skills at a lower rate over time, and to what extent this drop cuts across all types of computer skills. It may be that jobs are less intensive over time in basic computer skills, but more intensive in higher-level skills. It is also likely due to the shift away from computers at work to much broader use of the internet, and new forms of technology such as Artificial intelligence.
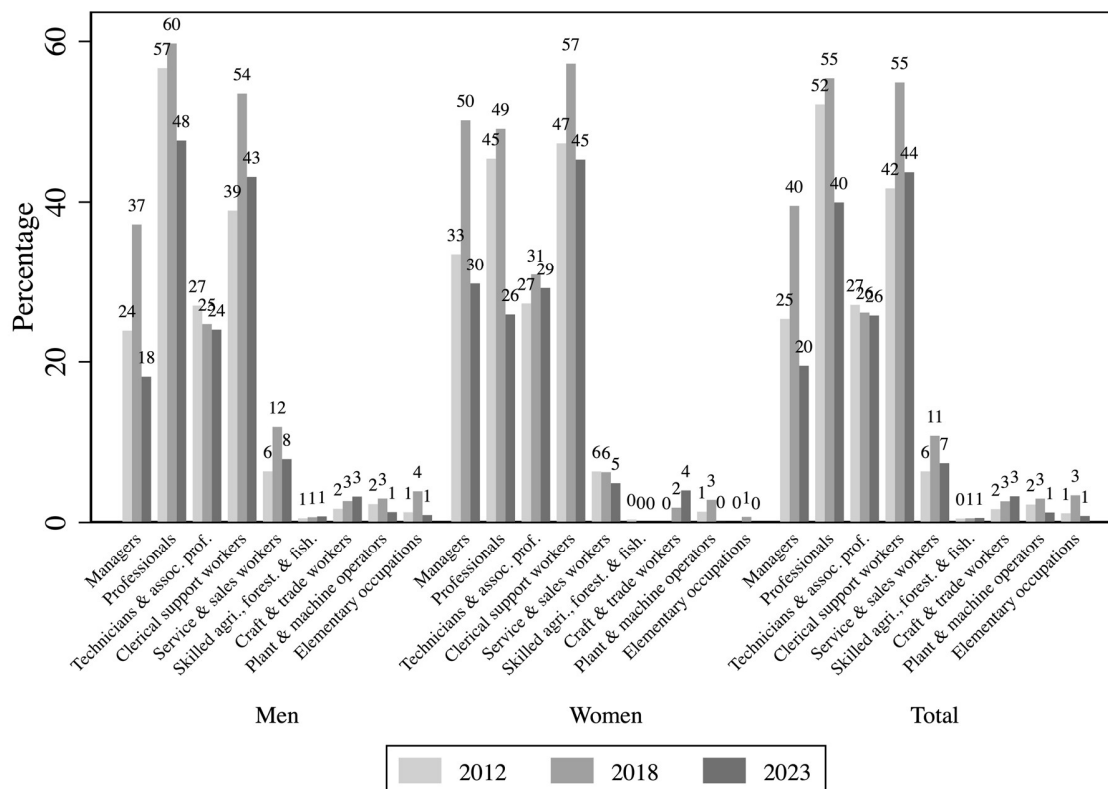
Figure 18 Percentage of workers in jobs requiring computer skills in 2012, 2018 and 2023, by occupation and sex (Employment last 3 months, ages 15-64)

The analysis of occupations, at the three-digit level, with the highest computer skills requirement (in Figure 19) matches closely the analysis of occupations with the highest proportion of workers with strong or very strong computer that is based on self-perception of computer skills levels. The occupations that require computer skills the most are the same ones where workers also report having strong or very strong computer skills. For instance, electrotechnology engineers, finance professionals, client information workers, are the top three occupations with the highest requirement of computer skills for men (70-71 percent of male workers in these occupations report that their jobs require computer skills). For women, finance professionals, other health professionals, and client information workers were the most likely to report working in jobs requiring computer skills.

Figure 19 Occupations (at the three-digit level) with the highest requirement of computer skills in 2023, employed during the last 3 months, ages 15-64.

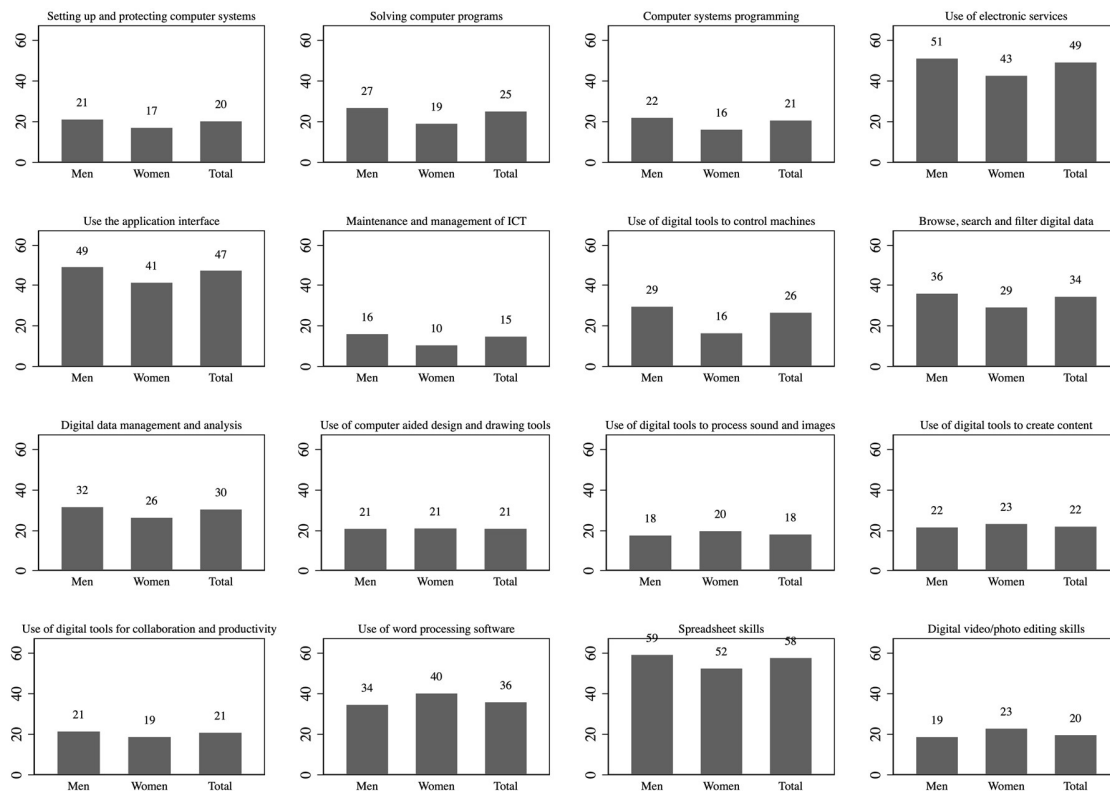| Men		Women	
Electrotechnology engineers	71	Finance prof.	68
Finance prof.	70	Administration prof.	47
Client information wrkrs.	70	Other sales wrkrs.	45
Business srvs & admin. managers	68	Admin. & specialized secretaries	43
Managing directors & chief exec.	61	Medical doctors	42
Engineering prof.	58	Client information wrkrs.	40
Architects, planners, surveyors	55	Other health prof.	38
Other health prof.	53	Medical & pharmaceutical techne.	30
Administration prof.	50	Professional srvs managers	22
Cashiers & ticket clerks	46	Primary/early child. teachers	16
Numerical clerks	45		
Professional srvs managers	45		
Legislators & senior officials.	41		
Sales/purchasing agents/brokers	39		
Legal prof.	38		
Tellers, money collect. & relate	36		
Admin. & specialized secretaries	35		
Nursing & midwifery assoc. prof.	27		
Secondary education teachers	26		
Material recording/trsprt clerks	22		

Percentage

Source: Authors' calculations based on ELMPS 2023. Notes: The figure shows occupations a the three-digit level with higher-than-average proportion of workers reporting that their job requires strong or very strong computer for men and women respectively. We calculated the average proportion of workers in jobs requiring strong or very strong computer competencies at the three-digit level occupation, conditional on a sample size of 30 workers and above in each occupation.

We examine the most prevalent type of computer skill among 16 types of computer skills, among workers in jobs requiring a computer skill (as in Figure 20). These questions on the type of computer skills required was only available in the 2023 wave and not available in the 2012 and 2018 waves, therefore it is not possible to examine the time trend in the requirements of specific computer skills. Figure 20 confirms that, in 2023, the most demanded type of skills jobs was the use of spreadsheets (58 percent among jobs requiring computer skills), followed by digital services (49 percent), the use of application interface (47 percent), word processing software (36 percent), and browsing, searching, filtering digital media (34 percent).

Figure 20 The rate of computer skills that jobs require, by type of computer skills and by sex, employed in the last 3 months whose job requires a computer skill, ages 15-64.

Setting up and protecting computer systems
Men 21, Women 17, Total 20

Solving computer programs
Men 27, Women 19, Total 25

Computer systems programming
Men 22, Women 16, Total 21

Use of electronic services
Men 51, Women 43, Total 49

Use the application interface
Men 49, Women 41, Total 47

Maintenance and management of ICT
Men 16, Women 10, Total 15

Use of digital tools to control machines
Men 29, Women 16, Total 26

Browse, search and filter digital data
Men 36, Women 29, Total 34

Digital data management and analysis
Men 32, Women 26, Total 30

Use of computer aided design and drawing tools
Men 21, Women 21, Total 21

Use of digital tools to process sound and images
Men 18, Women 20, Total 18

Use of digital tools to create content
Men 22, Women 23, Total 22

Use of digital tools for collaboration and productivity
Men 21, Women 19, Total 21

Use of word processing software
Men 34, Women 40, Total 36

Spreadsheet skills
Men 59, Women 52, Total 58

Digital video/photo editing skills
Men 19, Women 23, Total 20

Source: Authors' calculations based on ELMPS 2023.

5. Digital platforms

This section focuses on the use of digital platforms among the employed in the last three months. We consider digital platform workers those who answered yes to finding work, opportunities, or gigs through a digital platform, but also those who answered what digital platform or apps they used to find their work, as well as those who answered yes to the employment detection question about providing services through a digital platform or app or using social media or a website to market/sell products/services in the last three months.

Among the employed, only 0.4 percent, equivalent to 116,000 individuals, found work in their primary job through a digital platform or app, such as Upwork, Uber, Kareem or similar (**Table 1**).[13] The most frequent apps that were used for digital platform work were location-based platforms, such as Uber employing 53 percent of digital platform workers (**Figure 21**), followed by Kareem (19 percent) and Talabat (12 percent).

Table 1 Distribution of workers by whether they work through a digital platform in 2023, employed in the last 3 months, ages 15-64

Work on digital platform	Percent	Sample (N)	Number of individuals
No	99.6	17,695	26,913,462
Yes	0.4	60	116,723
Total	100	17,755	27,030,185

Source: Authors' calculations based on ELMPS 2023.

Figure 21 Digital platforms and apps used to find work among those who worked through digital platforms (ages 15-64)
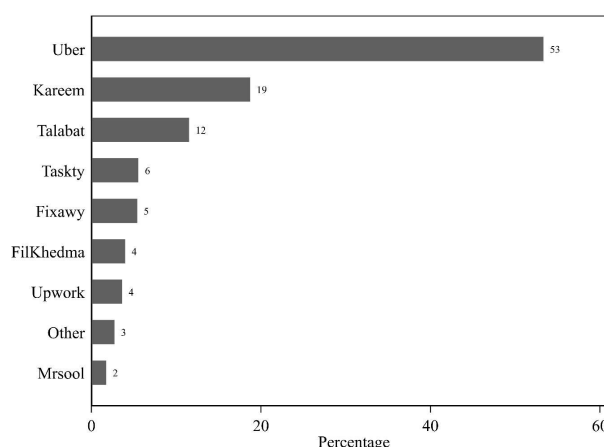
Source: Authors' calculations based on ELMPS 2023. Note: These are not mutually exclusive choices as digital platform workers can be using more than one app.

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[13] It is worth noting that the demand of online freelance labor in Egypt as reported in the Online Labor Index (Stephany et al., 2021) which tracks the number of projects and tasks in real time was around 0.5 percent of all projects around the world, in the last quarter of 2023 when the survey was fielded (see the Online Labour Observatory for more details: http://onlinelabourobservatory.org/oli-demand/. Last accessed October 30th, 2024).

To fully comprehend the incidence of use of digital platforms, we also examine the use of digital platforms among workers with a secondary job. Among the employed population in general, 8 percent had a secondary job in 2023 (Appendix Table 1). Among those employed with a secondary job, only 0.2 percent found work in their secondary job through a digital platform or app (**Erreur ! Source du renvoi introuvable.**).

Table 2 Distribution of workers by whether they work through a digital platform as a secondary job in 2023, employed with a secondary job in the last 3 months, ages 15-64

Work on digital platform as a secondary job	Percent	Sample (N)	Number of individuals
No	99.7	1,634	2,167,752
Yes	0.23	3	5,049
Total	100	1,637	2,172,801

Source: Authors' calculations based on ELMPS 2023.

Lastly, we examine to what extent unemployed individuals would accept work through digital platforms, as reflective of preferences towards gig work. Among the currently unemployed (standard definition with search required), around 11 percent would accept a job as a home-based gig worker and 14 percent would accept a traveling gig worker (**Figure 22**). Compared to other jobs, gig/platform work was associated with the lowest rates in terms of the intent and willingness to work. The highest preference was for a public sector job, in line with the long-standing preference for public sector jobs (Assaad & Barsoum, 2019; Barsoum, 2016). Specifically, 77 percent of unemployed would accept to work in the public sector, followed by administrative assistant jobs (63 percent of unemployed), data entry jobs (51 percent) and customer service (47 percent).

Figure 22 Percentage of unemployed (standard definition) who would like to work on a digital platform in comparison with other jobs by type of job, ages 15-64
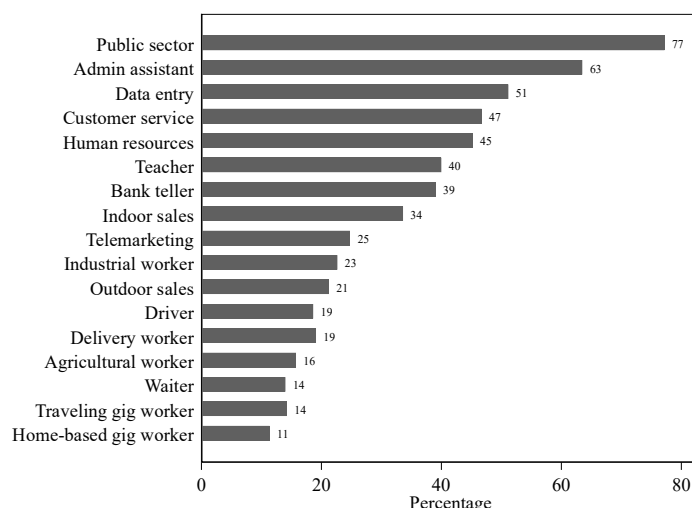
Source: Authors' calculations based on ELMPS 2023.

Since the emergence of digital platform employment, the 2023 wave of the ELMPS represents the first attempt to estimate the number of digital platform workers. But many factors should be taken into consideration when examining these estimates of work through digital platform in 2023. The non-standard nature of work through digital platform may represent challenges for covering some groups of digital platform workers in face-to-face surveys. For instance, on-location platform workers, who are likely ride-hailing or doing food delivery, might be difficult to reach at home for a face-to-face survey (OECD et al., 2023). This can lead to underestimated results. Digital platform work can also be sporadic and of short durations (ILO, 2023b), which make its detection not straightforward. Moreover, as digital platform employment is an emerging and non-standard form of work, difficulties and divergences in understanding the questions related to such work may represent another limitation to fully measuring its extent (OECD et al., 2023).

6. Conclusion

This paper examined the level of adoption of information technology in the workplace and how it changed over time for different types of employment, and for men and women separately. From 2012 to 2023, computer and internet usage among employed individuals remained relatively stable, fluctuating between 20 percent and 21 percent, with a dip in 2018. This decrease is likely attributed to changes in the structure of employment between 2012 and 2018, notably a rise in private informal employment in sectors like construction and transportation, which are typically less reliant on digital tools. Yet, there are signs that patterns in use of technology have substantially evolved in the labor market by 2023, with an almost disappearance of the practice of using computers not connected to the internet, and a surge in the use of the internet through mobile devices such as smartphones, tablets, or laptops. The use of technology also varied by type of employment, with public sector workers and formal private wage workers leading in technology adoption, but also noticeable increases were observed among the self-employed and employers. The results also highlighted a trend of greater technology adoption among employed women, but that men are catching up. There is also a strong sectoral pattern of technology adoption where the highest rates were found in the information and communication technology (ICT) and financial services sectors, where around 70-76 percent of workers used computers or the internet by 2023. Sectors such as construction, and transport saw the least amount of technology usage. This sectoral divide helps explain the dip in overall technology use between 2012 and 2018, as sectors with lower technology adoption grew during that time.

Analyzing whether the use of technology in the workplace had been adopted as a response to COVID-19, only a small share of the workforce was able to transition to remote work, which appears to be a shift mostly led by women in teaching roles. Job stability influenced work adjustments to COVID-19, with public sector employees, being in stable jobs, were most likely to move to remote work.

The analysis of digital/computer skills among employed individuals reveals that public sector workers, both men and women, reported the highest levels of strong or very strong computer skills. The findings highlight a complex relationship between gender, employment status and perceived technological proficiency. Women in working-age (15-64) reported on average lower self-reported skills than men, whereas women in the labor force (whether employed or unemployed) reported higher levels of proficiency in computer skills. Specifically, unemployed women had the highest proficiency in computer skills, relative to both unemployed men, to their employed peers. This highlights that unemployment primarily affects educated women, with higher computer skills, and indicates that the retrenchment of formal jobs whether in the public or private sectors, which are intensive in technology adoption, has contributed to the continuing decline in women's employment rates.

The ELMPS showed to be a reliable instrument to measure digital tasks in the labor market. This is demonstrated by the analysis of top occupations (at the three-digit level) leading in internet usage or with the highest proportion of workers strong/very strong computer skills. These top occupations were mostly either ICT specialists or ICT-task intensive jobs according to the OECD measure in defining digital tasks (ILO, 2023a). For men, these occupations men were electrotechnology engineers, software and application developers and analysis, client information services, finance professionals, business service and administration managers. For women, top occupations leading in technology adoption or computer skills were other health professionals (namely pharmacists), client information services and finance professionals, both of which are ICT-task intensive jobs.

The supply of computer skills, indicated by the percentage of individuals self-reporting proficiency in those skills, matches the share of jobs that require computer skills. Moreover, a surprising downward trend in the percentage of workers in jobs requiring computer skills, although is a counter-intuitive result, indicates that computer skills as a collective is diverse and dynamic. It is likely that declining computer skills at work reflects the decline in use of computers at work, but that new forms of technology have been adopted such as using the internet through mobile devices, or the use of more evolving skills such as Artificial Intelligence. Yet, the most prevalent types of skills, whether self-reported or required by jobs, remain the use of spreadsheet skills, followed by the use of application interface and browse searching.

The paper also investigates the use of digital platforms, which is based on newly added questions to the ELMPS wave. The size of digital platform work is very small at 0.4 percent of the population, and most of it is based on location-based platforms such as Uber and Kareem.
These trends observed in computer and internet usage reflect a dynamic digital landscape in Egypt, shaped by advancing technologies, differentiated adoption across gender and changing work environments.

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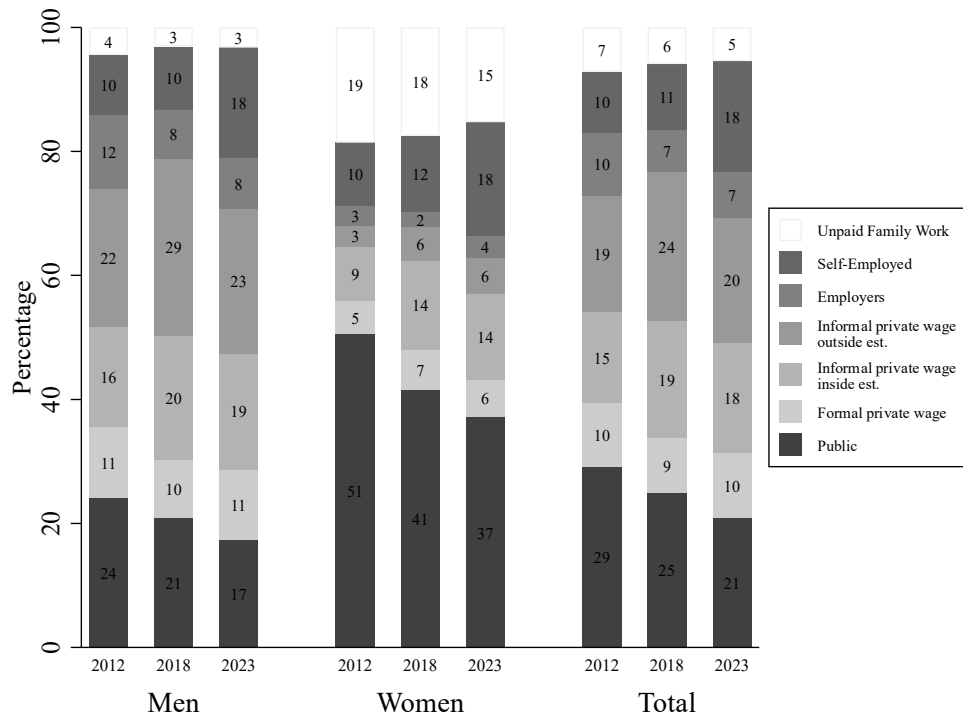
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Appendix

Appendix Figure 1 Structure of employment by type of employment and sex between 2012 and 2023, employment in the previous 3 months, ages 15-64
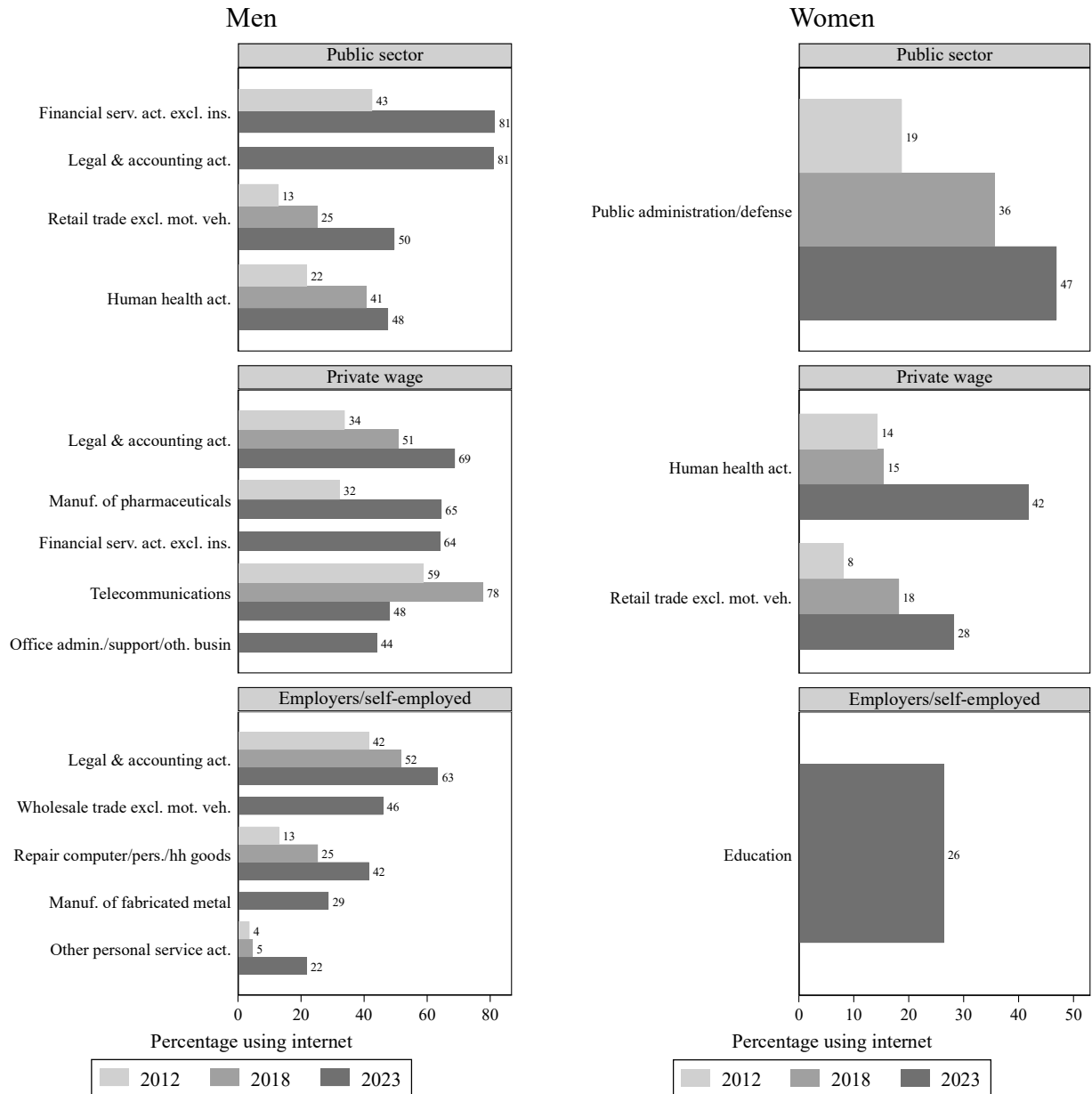

Source: Authors' calculations based on ELMPS 2012, 2018 and 2023.

Appendix Figure 2 Task-intensive occupations according to OECD

Occupation	3-digit ISCO-08	Category
Information and communications technology service managers	133	ICT Specialist
Electrotechnology engineers	215	ICT Specialist
Software and applications developers and analysts	251	ICT Specialist
Database and network professionals	252	ICT Specialist
Information and communications technology operations and user support	351	ICT Specialist
Telecommunications and broadcasting technicians	352	ICT Specialist
Electronics and telecommunications installers and repairers	742	ICT Specialist
Business services and administration managers	121	ICT task-intensive
Sales, marketing and development managers	122	ICT task-intensive
Professional services managers	134	ICT task-intensive
Physical and earth science professionals	211	ICT task-intensive
Architects, planners, surveyors and designers	216	ICT task-intensive
University and higher education teachers	231	ICT task-intensive
Finance professionals	241	ICT task-intensive
Administration professionals	242	ICT task-intensive
Sales, marketing and public relations professionals	243	ICT task-intensive

Source: Annex A3 (ILO, 2023a, p. 54).

Appendix Figure 3 Top economic activities (at the two-digit level) in internet usage by sex and type of employment, employed last 3 months, ages 15-64

Source: Authors' calculations based on ELMPS 2012, 2018 and 2023.

Appendix Table 1 Incidence of secondary job, employed in the last 3 months, ages 15-64

Workers with a secondary job	Percent	Sample (N)	Number of individuals
No	92.01	16,229	25,017,162
Yes	7.99	1,637	2,172,800
Total	100	17,866	27,189,963

Source: Authors' calculations based on ELMPS 2023.

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