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The Flexibility Premium of AI: A Skills-Based Remote Work Analysis and Implications for the Gender Divide

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Abstract

In the midst of rapid AI growth, persistent gender disparities in tech, and the global shift to remote work, this study investigates whether in-demand AI skills offer a non-monetary premium of flexibility, which may be appealing for women in the workforce. The research employs a mixed-methods, skills-based approach, combining qualitative interviews with women in AI and a quantitative analysis of online job vacancies which leverages a large language model.

To understand the value of flexibility for women in the field, the research includes interviews of women with AI skills, uncovering the high value they place on remote work and how their skillset enables such flexibility. This finding informs a quantitative analysis of remote work in online job vacancies. Using a fine-tuned large language model, it extracts remote work offerings from job postings to investigate whether AI skills offer increased remote work benefits. This analysis reveals that AI skills do offer a remote work premium, with variation across industries and AI subfields. Notably, the varying levels of remote work align closely with trends in AI job growth, highlighting a relationship between remote work benefits and demand for talent.

This analysis provides a new understanding of remote work trends using a skills-based approach, providing evidence on the remote work benefits that in-demand AI skills can provide. This can have significant implications for women's representation in the AI field and may help address the disproportionate work-life demands women often face.

Contents

1 Introduction

In recent years, the field of Artificial Intelligence has seen substantial growth, particularly as the generative AI boom has revolutionized industries and created new careers. The pace of this growth means that the demand for talent is not being met (Tamayo et al., 2023). Of particular concern is the significant gender disparity that persists in tech roles and the AI workforce (Baird et al., 2023). This is significant not only in terms of gender inequality but also for concerns of biases in AI systems developed by homogenous teams (Leavy, 2018). As AI becomes increasingly prevalent and disruptive, ensuring diversity in its development will be essential.

Meanwhile, the global shift to remote work advanced by the COVID-19 pandemic has now redefined working model norms. A focal question is on the future of work, specifically how and whether remote work will persist. Additionally, remote work offers promising benefits for women, as it offers flexibility that can address some of the barriers women face in balancing careers and outside responsibilities (Hsu & Tambe, 2021a; LinkedIn Economic Graph, 2022). However, remote work can also have drawbacks by reinforcing gender roles and blurring work-life boundaries (Chung & van der Horst, 2020; Shirmohammadi et al., 2022; Sullivan & Lewis, 2001).

The prevalence of remote work among AI roles and its benefits for women in the field remains to be studied. This thesis aims to bridge this knowledge gap through a mixed-methods approach. First, it involves in-depth interviews with women possessing AI skills to understand their preferences regarding work flexibility. These interviews provide valuable insights into the perceived benefits, challenges, and overall value of remote work in AI roles from the perspective of women in the field.

Second, it employs a large dataset of nearly ten million online job vacancies for a quantitative analysis on the prevalence of remote work for AI-related positions. Leveraging a fine-tuned Transformer model, it classifies job postings to accurately identify remote work opportunities in job descriptions from the dataset. This approach using novel natural language processing methods allows for a more nuanced and accurate analysis of remote work trends in the AI field. The analysis provides a comprehensive view of the current state of remote work opportunities in the AI job market. It also evaluates the relationship between remote work and job demand to reveal whether high-growth industries, occupations, and AI subfields offer a higher premium of remote work.

By combining these methodologies, this research seeks to answer several key questions:

RQ1: What are the flexibility preferences of women with AI skills, and how valuable is remote work?

RQ2: Do AI jobs offer increased benefits of remote work?

RQ3: To what extent is remote work associated with the demand and growth of AI jobs?

2 Literature review

2.1 The AI skills shortage

Labor markets have largely been facing an increasing skills gap (U.S. Chamber of Commerce Foundation (USCCF), 2024). This has been advanced by the COVID-19 pandemic, which accelerated digitalization and increased the pressure on companies to use technology and data (OECD, 2023). As such, there is a high demand for talent which cannot match this growth. For instance, education systems cannot keep up with the rapid technological transformation to prepare new talent for these jobs (Collins & Halverson, 2018; Stephany, 2021). A talent shortage survey found that 75% of U.S. employers reported difficulties in finding skilled talent in 2023, with IT & Data being the most sought technical skillset (Manpower Group, 2023).

The rapid advancement of generative AI has introduced particular demand for AI skills (Tamayo et al., 2023). A report from the World Economic Forum found that executives believed with increased AI implementation, 40% of the workforce would need to reskill (Tulchinsky, 2024). Further, skill shortages have found to be the biggest barrier in implementing AI (Salesforce, 2024). Squicciarini and Nachtigall (2021) revealed an increase in AI jobs in Canada, Singapore, the U.K., and the U.S., with demand across all sectors and increasing roles requiring multiple AI skills. Moreover, Gonzalez Ehlinger and Stephany (2023) revealed that AI-related positions often demand a broader and more diverse skill set compared to other jobs. Above technical skills, complementary skills, such as socio-emotional skills, leadership and problem-solving, are consistently in demand for AI jobs in the U.S. (Borgonovi et al., 2023).

Alekseeva et al. (2021) highlight a growing demand for AI skills across sectors, with the highest concentration in IT, engineering, scientific, and management roles. This is particularly reflected in wage premiums offered for AI skills compared to positions without AI skills in several analyses (Alekseeva et al., 2021; Gonzalez Ehlinger & Stephany, 2023; Green & Lamby, 2023). Gonzalez Ehlinger and Stephany (2023) show variation in wage offerings across different AI domains, with skills in natural language processing, for instance, offering higher compensation than those in robotics. Thus, even within AI, certain skillsets are more valued than others.

2.2 The shortage of women in AI

While there is a talent gap in AI more generally, the issue is particularly pronounced in terms of gender. The technology field has long been dominated by men; in the technology, information, and media industry in 2022, women represented 39% of the workforce (Baird et al., 2023; LinkedIn Economic Graph, 2022). The gap also increases with increased seniority: women in Software and IT hold 46% of entry level roles, 35% of manager roles, and 25% of C-suite roles (LinkedIn Economic Graph, 2022).

In the field of AI, women comprised only 33% of AI workers in the U.S., indicating that men dominate the field by a 2:1 ratio with a larger gap than in the broader technology field (Baird et al., 2023). The World Economic Forum also reported that fields requiring disruptive technical skills are more likely to have a larger gender gap. For Cloud Computing, Engineering, and Data and AI, women comprise only 14%, 20%, and 32% of the workforce, respectively (World Economic Forum, 2023). Stathoulopoulos and Mateos-Garcia (2019) also found that less than 14% of AI research paper authors were women.

The importance of workforce diversity in AI is not only important to close the broader gender gap in labor force participation, but also to address biases in AI (Romei & Strauss, 2024). If AI and machine learning models are allowed to learn from data without controls, these technologies can perpetuate or even worsen biases and discriminatory practices (Cachat-Rosset & Klarsfeld, 2023; Leavy, 2018; Zhao et al., 2017). Moreover, those who design and develop AI can transfer their own biases into these systems (Cachat-Rosset & Klarsfeld, 2023; West et al., 2019). Additionally, leaders for initiatives on bias in AI are more likely to be female, and those who experience biases are better able to recognize and address them (Leavy, 2018). While digital gender gaps have largely been studied in terms of technology users, Klinger and Svensson (2023) argue that the disparity begins with those who make the technology. Contributors to the gender gap among technology creators include a masculine culture and stereotype of the technology sector, a lack of role models and female colleagues, and a work culture that is incompatible with family responsibilities (S. Kahn & Ginther, 2017; Klinger & Svensson, 2023).

Crucially, as some roles become obsolete and others are created with the advent of AI, the representation of women in new, fast-growing jobs can determine the future of gender equality as they make up an increasing proportion of the labor market (World Economic Forum, 2021). Of the highest-growing roles identified by the WEF, women made up less than 25% of AI Specialists and less than 35% of Data Scientists. Notably, none of the top growing roles with gender parity were AI-related roles. The Global Gender Gap Report in 2020 also found that the gender gap cannot be explained by a shortage of talent; rather, there are talent pools that have been overlooked (World Economic Forum, 2020). Worse, growing roles with the largest gender gaps are the roles with the highest salaries, and women are more likely to be employed in roles that will be automated (Averkamp et al., 2024; Chernoff & Warman, 2020; World Economic Forum, 2021).

The issue of gender equality in the overall workforce is already a well-documented and pervasive global issue. According to the ILO, only 49% of women worldwide participated in the labor force in 2023; in the United States, the number was 57% (International Labour Organization, 2024). Women are not only underrepresented, but also earn less and work less hours than men (Blau & Kahn, 2017; Maraziotis, 2024; Olivetti & Petrongolo, 2016). In particular, the wage gap increases substantially when workers are in their late 20s and early 30s, as men's wages experience high growth and women's wages stagnate (Parodi et al., 2018). Additionally, women are most impacted by labor market conditions; Lara and Baird (2024) found that when labor market tightness declines, less women are hired into leadership.

A primary contributor to this inequality is the disproportionate caregiving responsibility often shouldered by women. Berniell et al. (2023) indicate that motherhood often leads to reduced employment rates for women and shifts towards more flexible but potentially less secure or advancement-oriented occupations. Parodi et al. (2018) show that while the gender wage gap is 10% before the birth of the first child, it widens significantly thereafter, with men earning three times the hourly wage of women by the time the child reaches 20 years of age. This is particularly significant for women with high education, whose wages would have otherwise progressed had they not changed to part-time work. Beyond childbirth, the wage gap may be further exacerbated by tendencies to work in less profitable companies, negotiate less for higher salaries, and prioritize family-friendly occupations over higher-paying roles (Parodi et al., 2018).

Another primary reason for the lack of women in technology is that less women enter the tech industry or pursue STEM fields. This is partially attributed to the fields already being male-dominated, with a lack of role models or advice encouraging women to enter the field (Owusu Addae, 2023; PwC, 2023). Thus, the lack of women in the field is a self-perpetuating cycle as women continue to drop out of the workforce due to a lack of support and incompatibility with the work culture, and younger women are not encouraged to pursue this field.

2.3 Improving gender equality and the role of remote work

However, the gender gap in technology appears to be decreasing: the share of women in tech jobs increased from 31% to 35% in the U.S. from 2019 to 2023 (Bureau of Labor Statistics, 2024; Gourani, 2024). Further, the gap decreased in the U.S., U.K., and the European Union from 2020 to 2024 (Romei & Strauss, 2024; Women in Tech, 2022). In particular, the share of women in AI began to rise after 2019, from near 26% to 33% (World Economic Forum, 2023). The decrease in the gender gap in tech jobs has been attributed to increased demand for these jobs, better policies for gender equity and increasingly normalized flexible working (Romei & Strauss, 2024; Women in Tech, 2022). Furthermore, now other sectors, such as banking and consumer goods, are increasingly needing tech talent, which is argued to increase the proportion of women in tech (Romei & Strauss, 2024). According to a head of equality, diversity and inclusion at a recruitment group, these companies aim to recruit diverse talent and struggle to find candidates with the necessary skills (Romei & Strauss, 2024). Companies have adopted strategies to improve diversity, focusing on flexible work arrangements and inclusive language in job descriptions (Owusu Addae, 2023).

M. E. Kahn (2022) notes that remote work can contribute to gender equality in the job market, providing increased flexibility. Indeed, there is promising evidence that remote work is benefiting women: data from LinkedIn showed that women are 24% more likely to apply for remote positions than men (LinkedIn Economic

Graph, 2022). In a survey of over 13,000 women, remote work and control over work hours were the second and third most important benefits, following only healthcare (Field et al., 2023). Additionally, according to a report by Meta, those accepting remote positions were more likely to be women (Williams, 2022). Bustelo et al. (2023) found that higher-earning women were most willing to pay for flexible work arrangements which include remote work. Maraziotis (2024) found that flexible work arrangements had a positive effect on women's convergence of working hours to men, particularly for full-time, more educated workers and for ages between 30 and 45. Moreover, research from Wharton showed that for technical and managerial jobs at technology startups, jobs changed from in-person to remote single-handedly increased female applicants by 15%, underrepresented minority applicants by 33%, and total applicants by 17% (Hsu & Tambe, 2021b). In addition, S. Fuller and Hirsh (2019) previously found that remote work decreased wage gaps for women across most education levels.

Goldin and Katz (2011) revealed that in top-earning occupations, the gender gap was largely explained by the cost of flexibility and job interruptions. However, they found that the penalties for family-related amenities have decreased in many fields, particularly in health-related occupations and the technology sector. In summary, the flexibility of remote work can help women, particularly those who are highly educated and in high-earning roles, to remain in their jobs. It can enable them to succeed in roles in which they are skilled, rather than having to leave work or change to working part-time (Women in Tech, 2022).

2.4 Remote work as a flexibility benefit

Remote work falls under the umbrella of workplace flexibility. The literature on workplace flexibility refers to flexible work arrangements in terms of where, when, and how work is conducted (Allvin et al., 2013; Brulin et al., 2023; Ray & Pana-Cryan, 2021; Shifrin & Michel, 2021). Specifically, workplace flexibility has been defined by Hill et al. (2008, p. 152) as "the ability of workers to make choices influencing when, where, and for how long they engage in work-related tasks". Remote work, either part-time or full-time, is an operationalization of flexibility in *where* to work (Brulin et al., 2023; Hill et al., 2008). According to a study by Ray and Pana-Cryan (2021), the most common flexibility benefit in the U.S. was flexibility in work location. Meanwhile, types of time-based flexibility include being able to take time off for personal needs, or leave flexibility, and the flexibility to choose working hours, or schedule flexibility (Ray & Pana-Cryan, 2021)

As remote work has become increasingly commonplace, it is increasingly seen as a job benefit similar to healthcare (Lee, 2023). Building on this theory, remote work can be examined in terms of bargaining between workers and employers, as remote work is considered a form of non-monetary compensation that can attract talent (Lee, 2023). This view of remote work and its benefits for employees and employers builds on the review by 1081481 (2024). As organizations compete for scarce AI talent, the ability to offer flexible work arrangements such as remote work could become a crucial factor in attracting and retaining AI workers. Other non-monetary benefits including vacation time and healthcare were already shown to increase through 2022 in a tight labor market (OECD, 2023).

2.5 Remote work benefits for employees

Remote work has several advantages for workers. These can include perceived autonomy, reduced work-family conflict, increased job satisfaction, lower stress levels, work-life balance, and increased engagement and productivity; thus, it is associated with improved health and well-being (Antunes et al., 2023; Gajendran & Harrison, 2007; Kossek et al., 2014; Olawale et al., 2024; Ray & Pana-Cryan, 2021). Shifrin and Michel (2021) also found flexible work arrangements (FWA) including remote work to be associated with increased physical health and decreased absenteeism.

Shifrin and Michel (2021) use resource theories to explore the connection between flexible work options and employee well-being. According to Personal Resource Allocation Theory, individuals must decide how to allocate their personal resources when balancing personal and worklife demands (Allen et al., 2013; Grawitch et al., 2010). If individuals have sufficient resources to meet these demands and have control over their distribution, they will experience positive outcomes (Grawitch et al., 2010). Flexibility can therefore allow employees, with heterogeneous life demands, to control their resources (Allen et al., 2013; Grawitch et al., 2010; Shifrin & Michel, 2021). Specifically, flexible work arrangements can enable individuals to allocate their time and energy more efficiently, thus reducing time and energy strain across these demands (Allen et al., 2013; Grawitch et al., 2010; Shifrin & Michel, 2021; Voydanoff, 2004). The demand-control model also supports the idea that job control can reduce stress and work-family conflict by helping address work demands (Brulin et al., 2023; Grönlund, 2007; Karasek, 1979).

One report showed that employees increasingly desire remote work, finding that 62% would accept a 10% or larger pay cut to access flexibility of remote or hybrid work (Owl Labs, 2023). Other studies have found workers across demographics to be willing to take a 7% pay cut to have remote work benefits (Barrero et al., 2021; Nagler et al., 2022).

In addition to the evidence of remote work reducing gender gaps, Flabbi and Moro (2012) found that women, particularly those with higher education, tend to value job flexibility more highly. Grönlund (2007) also revealed that in jobs with high demands and high control, the level of work-family conflict experienced by women was comparable to that of men.

However, the effects of remote work are not always positive. Shirmohammadi et al. (2022) conducted a literature review to examine whether it was still seen as desirable after the pandemic. Using person-environment fit theory (Edwards et al., 1998; Hesketh & Gardner, 1993), they found that there are some discrepancies following the imposition of remote work by COVID-19. This includes increased work intensity and working late, a lack of adequate workspaces, and increased demands of housework and care.

Additionally, flexible arrangements may also have pitfalls by reinforcing traditional gender roles. It can erode the boundaries between work and life and increase women's childcare and home responsibilities (Chung & van der Horst, 2020; Hilbrecht et al., 2008; Ray & Pana-Cryan, 2021). Studies found that housework and childcare was mainly conducted by women both before and during the pandemic; however, mens' home and childcare responsibilities did increase when working from home (Chung et al., 2021; Del Boca et al., 2020).

Moreover, prior research has highlighted that flexibility can carry a gendered stigma, including a femininity stigma for men and increased discrimination for women utilizing flexible work arrangements (Chung et al., 2021; Munsch, 2016; Rudman & Mescher, 2013). Women may also experience less advancement from less visibility at work, or not being able to put in long hours (Chung & van der Horst, 2020; S. Fuller & Hirsh, 2019; Richardson & Kelliher, 2015). Particularly in cultures where long hours are rewarded and work-life boundaries are blurred, women may suffer if they do not have the capacity to extend their hours (Chung & van der Horst, 2020; Lott & Chung, 2016).

To ensure that flexibility does not reinforce the expectation that women should bear the double responsibility for caregiving while maintaining their careers, flexibility must be normalized for all employees, regardless of gender (LinkedIn Economic Graph, 2022). A primary recommendation to improve the gender gap in tech includes investing in care and equal leave benefits for both women and men (World Economic Forum, 2023). Further, the effect of flexibility can depend on the degree of gender egalitarianism in a society; those with higher levels of gender equality tend to promote flexible work arrangements and remote work (Jia et al., 2024).

2.6 Remote work benefits for employers

Remote work can have several benefits for organizations. First, it can offer cost savings. For instance, analyses have found that it can reduce office rents and provide annual savings of $11,000 per remote employee due to reduced expenses on real estate, electricity, absenteeism, turnover and productivity (Barrero et al., 2021; Global Workplace Analytics, n.d.). Additionally, it can provide access to a broader talent pool. Prior research found that online talent platforms can help address the matching problem between jobs and employees, where employers struggle to find the talent they need (Manyika et al., 2015). This can be further addressed by searching a larger talent pool that extends beyond geographical boundaries. Organizations in high-paying areas are increasingly finding employees in lower-cost areas, and skills required for remote jobs are similar for the same jobs requiring in-person work (Lightcast & Labs, 2023). This can expand the talent pool, enhancing diversity and skill availability (Kho et al., 2024; Watson, 2023). Increasing diversity in the workforce can increase creativity and result in more innovation and better problem solving (Kho et al., 2024). Additionally, remote work has long been seen as a competitive advantage to attract and retain talented workers (Eversole et al., 2012; Morgan, 2014; Shirmohammadi et al., 2022). Studies have shown that flexibility policies are highly valued by employees as a whole and increase job satisfaction, retention, and productivity (Antunes et al., 2023; Olawale et al., 2024). Remote work can also allow employers to access and retain specialized skillsets that are more difficult to find while promoting flexibility and inclusivity (Kho et al., 2024). The value of these benefits for retention has been demonstrated in recent data: full-time in-person employees were more likely to change companies than remote or hybrid workers (26% vs. 17%) (Owl Labs, 2023).

However, findings on the productivity impacts of remote work are mixed. Some have found that after adjusting to remote and flexible work, employers and employees returned to similar levels of productivity as pre-pandemic times (Bloom, 2020; McPhail et al., 2024; NSW Innovation and Productivity Council, 2020). In a study on work-from-anywhere arrangements, Choudhury et al. (2021) found increases in productivity in highly skilled work. Importantly, productivity gains from remote work are likely not fully reflected in traditional measures as they do not consider savings on commuting (Barrero et al., 2021). However, research has suggested that remote work may lead to more siloed communication and may result in less innovative ideas (Lin et al., 2023; Yang et al., 2022). Lee (2023) suggests that remote work's effects on productivity may vary depending on task complexity and the employee's work environment. Thus, remote work can also imply costs for employers (Flabbi & Moro, 2012).

Nonetheless, there is evidence that organizations continue to see remote work as a competitive advantage. According to a Talent Shortage Survey, in response to the present skills gap, 57% of organizations said they planned to offer more flexibility on when and where employees work; this was the top strategy over increasing wages, targeting new talent pools, and offering bonuses (Manpower Group, 2023). Additionally, research on organizations found that 75% found flexibility in terms of place and time to be a competitive advantage, and 80% stated it was essential to succeed in the future (Copeland, 2023).

2.7 Remote work trends

The prevalence of remote work has evidently increased and become a subject of attention following the surge due to COVID-19. As discussed above, this can have substantial impacts from productivity to labor force inequalities. Survey data in the U.S. found that a fourth of workdays would continue to be done remotely following the pandemic, which is a fivefold increase from before the pandemic (Barrero et al., 2021). Hansen et al. (2023) showed that increased remote work remained at high levels through 2023. Moreover, the U.S. has the largest amount of remote workers, with 6.9 million in 2023 (Lightcast & Labs, 2023)

Demand for remote work has also grown, by nearly 400% from 2016 to 2022 (Lightcast & Labs, 2023). Moreover, workers living in a different state from their workplace in the U.S. increased 40%, and working for organizations outside the U.S. increased 36% (Lightcast & Labs, 2023). Research also indicates that a substantial portion of the workforce now prefers flexible work arrangements, with many favoring a hybrid model that combines remote and in-office work (Alexander et al., 2021; Barrero et al., 2021). In addition to the sudden imposition of alternative work arrangements by the pandemic, other factors that drive flexible work models can include economic pressure, technological advancements, increased worker preferences for flexibility, and increasing dual-career families and single parents (Bidwell, 2013; Kalleberg, 2012; Spreitzer et al., 2017).

Most analyses on remote work have focused on worker and employer surveys, and those examining job vacancy data have largely utilized keyword searches to identify remote work (Hansen et al., 2023). These papers have examined remote work in terms of digital preparedness (Adrjan et al., 2021) and feasibility (Bai et al., 2021) and included analyses on the U.K., Germany, and Austria (Bai et al., 2021; Bamieh & Ziegler, 2022; Draca et al., 2022). Recently, a new methodology was developed by Hansen et al. (2023) and proposed for other remote work analyses (1081481, 2024), employing a large language model to more accurately identify nuanced remote work offerings in job descriptions. The analysis by Hansen et al. (2023) included an examination of remote work trends across occupations, companies, and space. They found that despite an overall trend of increased remote work, its adoption is uneven across these entities (Hansen et al., 2023). Even within similar sectors and occupations, there are substantial differences in the prevalence of remote work offerings (Hansen et al., 2023). As such, additional factors could be at play. One factor that has yet to be examined is skills and particularly AI skill demand, as there is limited research on levels of remote work on a skills level.

2.8 A skills-based approach

A focus on skills has received increasing attention as technical fields rapidly develop (Lightcast, 2023). It is particularly relevant to address talent gaps and the lack of female labor force participation, especially in a fast-growing field such as AI. Skills-based hiring considers candidates' competencies and abilities above experience and education, which can included candidates who may not have traditional qualifications but have the skills to perform the job (Agovino, 2024). Skills have been found to be the best predictor of job performance, more than five times that of education and two times that of experience (Hunter & Hunter, 1984).

Many highlight that the half-life of skills is becoming shorter, requiring continuous upskilling, especially in the AI field with a shortage of skilled talent (Agovino, 2024; Tamayo et al., 2023). IBM, for instance, has adopted this approach to hire candidates with AI skills (Agovino, 2024). According to LinkedIn, a skills-based approach grows talent pools ten-fold and foster inclusion for underrepresented minorities (LinkedIn Economic Graph, 2023). For instance, in roles lacking female representation, it can increase the amount of women in the talent pool by 24% more than for men.

The U.S. Chamber of Commerce Foundation also promotes this approach, as it can provide organizations increased access to talent and more opportunities for job seekers (U.S. Chamber of Commerce Foundation (USCCF), 2024). It can address skill gaps and workforce diversity issues, particularly in tight labor markets where employers may relax degree and experience requirements to focus on skills (J. Fuller et al., 2022). This has been seen in tight labor markets for IT jobs, which are known to have imbalanced supply and demand (J. Fuller et al., 2022). To effectively implement this approach, skill taxonomies are essential (Santa Maria, 2023). They help reduce the gap between talent needs and qualified candidates by clearly delineating skills-based job requirements (Lightcast, 2023; Santa Maria, 2023).

It is therefore relevant to approach job vacancy data from a skills perspective. This approach, defined as "bottom-up", differs from a top-down approach that defines jobs by sectors or industries (Gonzalez Ehlinger & Stephany, 2023; OECD, 2023). Instead, jobs can be classified based on their required skills and tasks. This can identify jobs that require specific skills beyond those that would have been identified by occupations, and excludes jobs within technical occupations, for instance, that do not actually require those skills (Gonzalez Ehlinger & Stephany, 2023). Several analyses on AI jobs have used a skills-based approach to identify these jobs (Alekseeva et al., 2021; Borgonovi et al., 2023; Gonzalez Ehlinger & Stephany, 2023; Squicciarini & Nachtigall, 2021). However, none to-date have examined this in relation to remote work.

This thesis contributes to the literature on multiple dimensions. First, it is the first study to my knowledge to investigate remote work trends on on the basis of AI skills. Adopting a skills-based approach in analyzing remote work can unveil trends for jobs that require AI skills across industries and occupations. Additionally, it adds to evidence on the benefits of remote work for women specifically working in AI. While many studies have been conducted on female labor force participation and women's flexibility experiences more generally, there is little that delves into the preferences and experiences particularly for women with AI skills. Given the talent shortage and the concerning lack of diversity in AI, it is particularly important to uncover trends and preferences in this field. Furthermore, this research is one of only a few newer studies that have employed a large language model to more accurately extract remote work offerings from online job vacancies. It demonstrates the value of an alternative data source to examine labor market trends and the value of an LLM to extract non-monetary benefits such as remote work.

Given the aforementioned literature, I investigate the following hypotheses:

H1: Remote work is a highly valued benefit for women in AI.

H2: Jobs with AI skills offer higher levels of remote work than non-AI jobs.

H3: The premium of remote work for AI jobs is higher for industries, occupations, and subfields with high growth.

3 Data and methodology

3.1 Data: Online job vacancies

This analysis utilizes a comprehensive dataset of online job vacancies provided by Lightcast, a labor analytics firm which provides scraped data from online job postings. It includes nearly all online job vacancies including those posted by employers, job boards, and job vacancy aggregators (Hansen et al., 2023). For the purposes of this study, a random sample of 10 million job postings was selected. The dataset spans U.S. data from January 2019 through December 2023 and includes detailed information such as job descriptions, industry classifications, occupations, and requested skills, education, and experience levels. It excludes internships to focus on career-oriented positions, as they often have different structures, expectations, and flexibility offerings compared to regular jobs. This results in a final sample of 9,826,238 job postings. I compared the industry and occupation composition of the dataset to national proportions to examine the representativeness of the U.S. labor market, as it is possible that some jobs may be over-represented in online vacancies. With limited exceptions, the dataset largely aligned with the data from the Bureau of Labor Statistics, as shown in Appendix B.

Lightcast's skills taxonomy provides the backbone for the skills analysis (Lightcast, 2023). This taxonomy classifies tens of thousands of unique skills and tags each job posting with the specific skills requested. To identify AI-related jobs, I employed and verified a list of AI skills developed and recently updated by the Burning Glass Institute, a research organization focusing on the future of work and skills which provided the Lightcast data for this thesis. Following the methodology established by previous research on online job vacancy data, a job was categorized as an AI position if it contained at least one AI skill from this list (Acemoglu et al., 2022; Alekseeva et al., 2021; Gonzalez Ehlinger & Stephany, 2023). As found in prior literature, a higher threshold would substantially reduce the number of postings by over half (Gonzalez Ehlinger & Stephany, 2023).

To provide a more nuanced understanding of the AI job landscape and examine trends for particular areas of AI, the skills are further categorized into distinct subfields. The complete list of skills used to classify AI jobs, along with their respective groupings, can be found in Appendix A.

3.2 Interviews

To guide an analysis on job flexibility, with an emphasis on remote work and its benefits for women in AI roles, it is crucial to understand women's lived experiences in this field. Particularly as remote work can offer benefits but also hindrances for women, it is valuable to hear from women themselves to understand their perspectives. To align with the focus on the AI labor market in the U.S., I conducted interviews with ten women working in the U.S. who possess AI skills.

The objectives of the interview were to 1) identify the most valued flexibility benefits for women with AI skills and whether this includes remote work; 2) understand how it is beneficial to them; and 3) understand whether they feel their skills give them the flexibility to work remotely.

The interviewees ranged in age from their mid-20s to early 40s. Their roles included data scientists, data science managers, AI researchers, software engineers, consultants, and research analysts. Additionally, their workplaces ranged from large technology companies and small start-ups to banking and international organizations. 40% of the interviewees actively had caretaking responsibilities. Another 30% stated it was a present consideration for the near future, and 30% were early-career professionals for whom it was not top of mind. This permitted a variety of perspectives on remote work for women at different stages in life. The insight into the most important aspects of flexibility for women confirms the focus on remote work and the relevance of examining remote work trends for women in AI.

3.3 Remote work analysis

The next challenge was to classify remote work from the online job vacancy (OJV) data. As job descriptions can present remote work options in numerous ways, traditional dictionary methods often fall short. The Lightcast data provides a remote work field for select job postings from its scraped data, but it is only available for 11% of the job postings. Thus, Hansen et al. (2023) developed a fine-tuned BERT model, known as the Working-from-Home Algorithmic Measure (WHAM), to classify remote work in online job vacancies. This model was developed to analyze remote work trends and has been discussed in other investigations into remote work (1081481, 2024). The WHAM model builds on DistilBERT (Sanh et al., 2020), a more efficient variant of the BERT model (Devlin et al., 2019). This model balances performance with computational efficiency, making it suitable for processing large volumes of job postings. Such language models that leverage contextual understanding can be a useful tool to identify benefits in job descriptions. In particular, self-attention, which provides the basis for large language models such as BERT, can consider which words should receive the most attention in the surrounding context, allowing the models to determine more nuanced meanings of texts (Vaswani et al., 2023).

Currently, the model identifies whether remote work is offered in any capacity, whether fully remote or hybrid. The researchers fine-tuned the model through a two-step process: first, by predicting masked words in text sequences from job postings, and then by training on a dataset of 10,000 job descriptions each labeled by three evaluators. Through this approach, they developed a highly accurate model with an F1 score of 0.97 and an accuracy of 0.99. It showed a notable improvement from seven other methods, including dictionary methods and GPT, performing five times as well as GPT-3. Unlike other methods, it achieved a low false positive rate, addressing a common issue particularly seen in post-pandemic job postings: a field for remote work may be listed in the job description even if it is negated (Hansen et al., 2023). Because of this, dictionary methods show an overestimated level of remote work after the pandemic due to the increased negated mentions of remote work (Hansen et al., 2023). The model also sees large gains compared to simpler methods due to the large size of the training data (Hansen et al., 2023). Given that this model was also trained and validated on recent Lightcast job vacancy data, it is a valuable method to apply to the present dataset with high accuracy. I therefore employ this model to classify whether a job offers remote work in my sample. I further validated the WHAM model's classifications against the Lightcast remote classifications and found an accuracy and F1 score of 94%.

Using the remote work classifications, the analysis examines AI skill demand and remote work trends over time, across industries and occupations, for different AI subfields and compared to salaries. Additionally, to further analyze the probability of remote work given AI skills and control for other factors, I ran a series of logistic regressions with remote work as the binary dependent variable. I first ran a baseline model with only AI skills as the independent variable. Subsequently, I added fixed effects for year, occupation, and industry, and additional controls for education and experience to control for other factors that may influence remote work. The final model can be specified as:

$$logit(P(RW_i = 1)) = \beta_0 + \beta_1 AI_i + \gamma Year_i + \delta Ind_i + \theta Occ_i + \beta_2 \mathbf{Edu}_i + \beta_3 \mathbf{Exp}_i + \epsilon_i \quad (1)$$

In this model, $logit(P(RW_i = 1))$ represents the log-odds of the probability that job i is performed remotely. AI_i represents a binary variable for whether job i is an AI job. γ, δ, θ, β_2, and β_3 are vectors of coefficients for the added fixed effects and controls.

Additionally, as one explanation for increased remote work for AI jobs could be that such jobs are more easily done from home, I added a control for jobs that are teleworkable. To identify such jobs, this study utilizes the methodology developed by Dingel and Neiman (2020), which was also discussed by Hansen et al. (2023) and 1081481 (2024). This approach involves a systematic mapping of occupations from the O*NET database, maintained by the U.S. Department of Labor, classifying the feasibility of telework for each occupation based on two surveys released by O*NET. By linking this mapping to the granular O*NET codes in the online job vacancy data, it becomes possible to categorize jobs according to their remote work potential. Thus, controlling for this binary factor allows the models to reveal the effect of AI skills beyond the feasibility of performing the job remotely.

To uncover the dynamics within industries and occupations, I ran several models on individual industry-occupation subsamples with varying levels of AI penetration to examine the effect of AI skills within these particular entities. I examined occupations that could feasibly be done from home, including Computer and Mathematical, Business and Financial Operations, Management, and Office and Administrative Support Occupations (see Figure C.2 for AI penetration levels). The models included year fixed effects and controls for education, experience, and whether the job is teleworkable. Lastly, to reveal the effects for specific AI subfields, I also ran logistic regressions using the above model specification, but for each AI subfield as the binary independent variable instead of the overall AI classification.

4 Results

4.1 Interviews

The interviewees consistently emphasized the critical importance of flexibility in both their professional and personal lives. The overarching definition of flexibility that emerged focused on two central dimensions: flexibility of time and place. Figure 1 displays the types of flexibility benefits that were mentioned as most valuable to the interviewees. Respondents were allowed to rank two dimensions equally. Remote work and leave flexibility, or the ability to attend to personal obligations during the day, emerged as the most crucial, mentioned by an overwhelming 90% of respondents. Those who did not consider remote work or leave flexibility a top priority were young professionals without caretaking considerations.

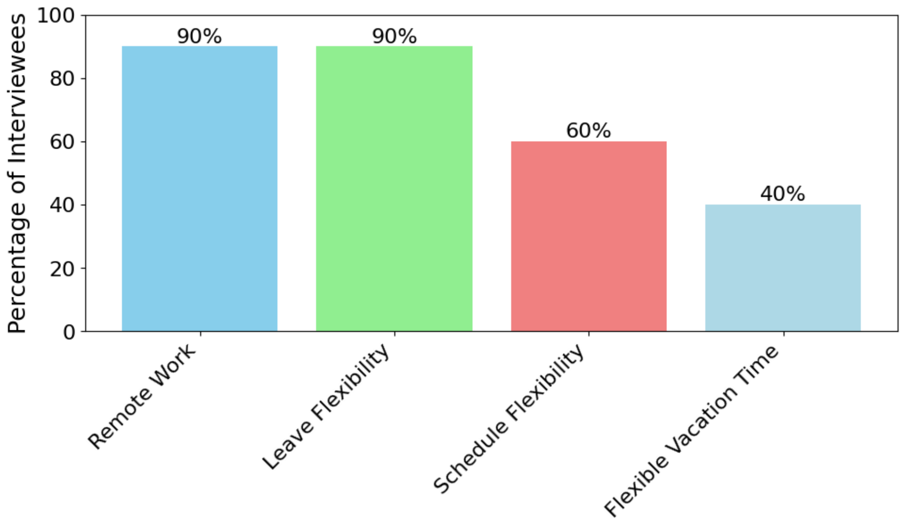

Figure 1: Percent of interviewees mentioning each flexibility benefit as a top priority

Those who discussed remote work as an essential component emphasized its positive impact on their quality of life and ability to balance work and personal responsibilities. Remote work was particularly important for maintaining proximity to family: spending working hours with loved ones nearby or being able to travel to spend time with family. Several interviewees also stressed the importance of having the choice of where to work - whether in person, from home, or elsewhere. Furthermore, remote work enhances their quality of life by reclaiming time that would otherwise be spent commuting, and enables healthier habits such as preparing meals at home.

Leave and schedule flexibility often complemented remote work, as interviewees with remote work options felt that it gave them more control over their schedule and the ability to attend to personal demands. For instance, it gave them the ability to pick children up from school, attend appointments, and take care of family when needed. The majority expressed a preference for an output-focused work culture, where they could organize their own work in terms of place and time as long as tasks were completed. Further, they believed the nature of their technical work facilitated this. Though many respondents acknowledged that remote work can cause blurred boundaries between work and life, all of them believed remote work to have an overall positive impact.

The willingness to trade pay for increased flexibility was notable among the interviewees, as shown in Figure 2. A significant 60% of respondents indicated they would accept up to a 20% pay cut in exchange for remote work flexibility. An additional 30% were open to smaller pay cuts of 5-10%. Two interviewees in particular had faced a choice between a job with higher pay or a job that was fully remote, and chose the job that was fully remote. This underscores the high value placed on remote work, often outweighing higher compensation for its positive impact on work-life balance in addition to cost savings. Future considerations for flexibility, such as anticipated caretaking responsibilities, were also highlighted as increasingly important factors in career decisions: those anticipating this stated that they would prioritize remote work above all else when choosing a job.

In a discussion of job descriptions, 70% of interviewees mentioned a strong preference for clear, tangible information about flexibility and remote work policies. Several respondents made a strong point that companies that are transparent and include substantial information on flexibility and benefits in the job description are likely to be prioritize flexibility. Meanwhile, those with less information and transparency are less likely to be flexible. Companies and jobs that demonstrate support for flexibility through clear and empathetic policies were largely considered more attractive.

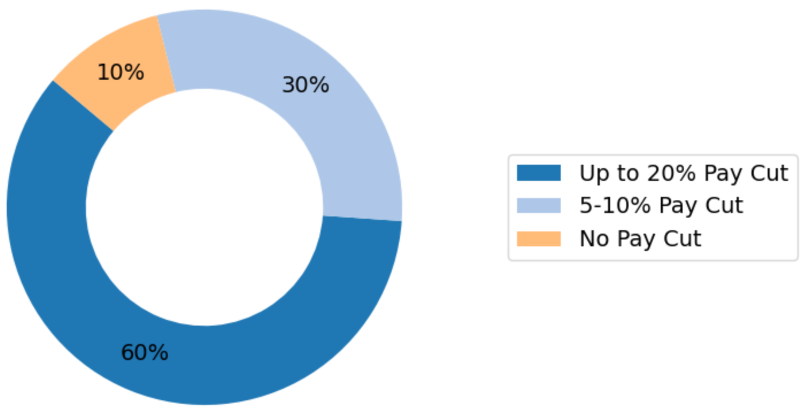

Figure 2: Percent of interviewees willing to take a pay cut for remote work flexibility

Several interviewees pointed out that the feasibility of completing their work remotely and their workplace culture facilitated remote work. However, opinions varied on company cultures that allow remote work. For instance, one argued that the agile nature of startups and the high demand for scarce tech talent enables more flexibility and remote work. Meanwhile, another argued that startups require more in-person work due to their fast-paced, innovative culture. Overall, the tech industry was noted to offer more remote work compared to other sectors.

The interviews also revealed a belief that technical skills, particularly in AI and related fields, can enable flexibility. 80% of respondents indicated that their in-demand skills could provide significant leverage in negotiating flexible work arrangements. Nevertheless, the majority of respondents did not feel they had actively used their in-demand skills to negotiate additional benefits, as these were often already offered. One interviewee mentioned that she did not need to negotiate because data science jobs already offer high flexibility given the high demand. Most interviewees believed, however, that these skills would give them bargaining power if needed in future situations. One noted that AI skills can be a bargaining tool particularly for smaller organizations that are trying to attract talent and have less rigid organizational norms. Another interviewee shared that although her company transitioned to being majority in person, she was able to negotiate remote work and move countries to be with her family. Yet another interviewee stated that as a minority in her industry and with her skillset, large companies are willing to provide exceptional benefits to retain this talent.

Importantly, several participants highlighted that flexibility should be offered and promoted to workers across genders. Nonetheless, they acknowledged that considering the realistic situation for women in the labor force, flexibility is particularly important for women, being more affected by caretaking responsibilities. One interviewee said “When you ask women, we are always thinking about flexibility. When you ask men, it is not always a consideration.” 6 of the participants said they would leave or consider looking for another job if they lost the remote work flexibility they currently have.

4.2 AI job demand

To precede the remote work analysis, an analysis of AI jobs from the OJVs reveals a changing trend in AI job growth. As seen in Figure 3, jobs with AI skills have seen more pronounced changes than the overall job market. Following a drop in growth in 2020 during the pandemic, jobs rose significantly by up to 160% from 2020 to 2022. However, they then saw a notable drop by 2023, returning to near-2019 levels. Non-AI jobs also increased in 2021 and 2022 and dropped in 2023, though they remained at a higher level compared to 2019.

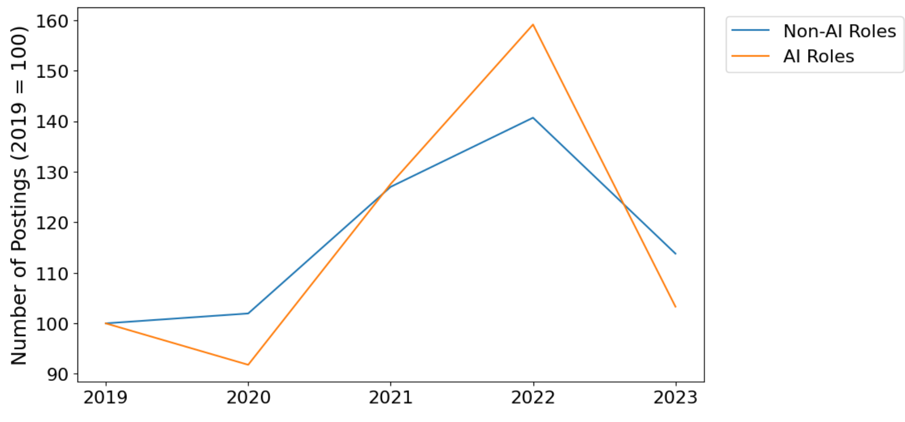

Figure 3: Job growth per year for AI and non-AI roles, indexed to 2019

Figure 4 displays the percent of AI jobs in the dataset within each U.S. industry, as designated by the North American Industry Classification System (NAICS). The Information industry, which largely encompasses major technology companies, has the highest proportion of AI jobs with nearly 5%. The next two highest industries, Professional, Scientific, and Technical Services and Finance and Insurance, drop to 3.5%, followed by Manufacturing.

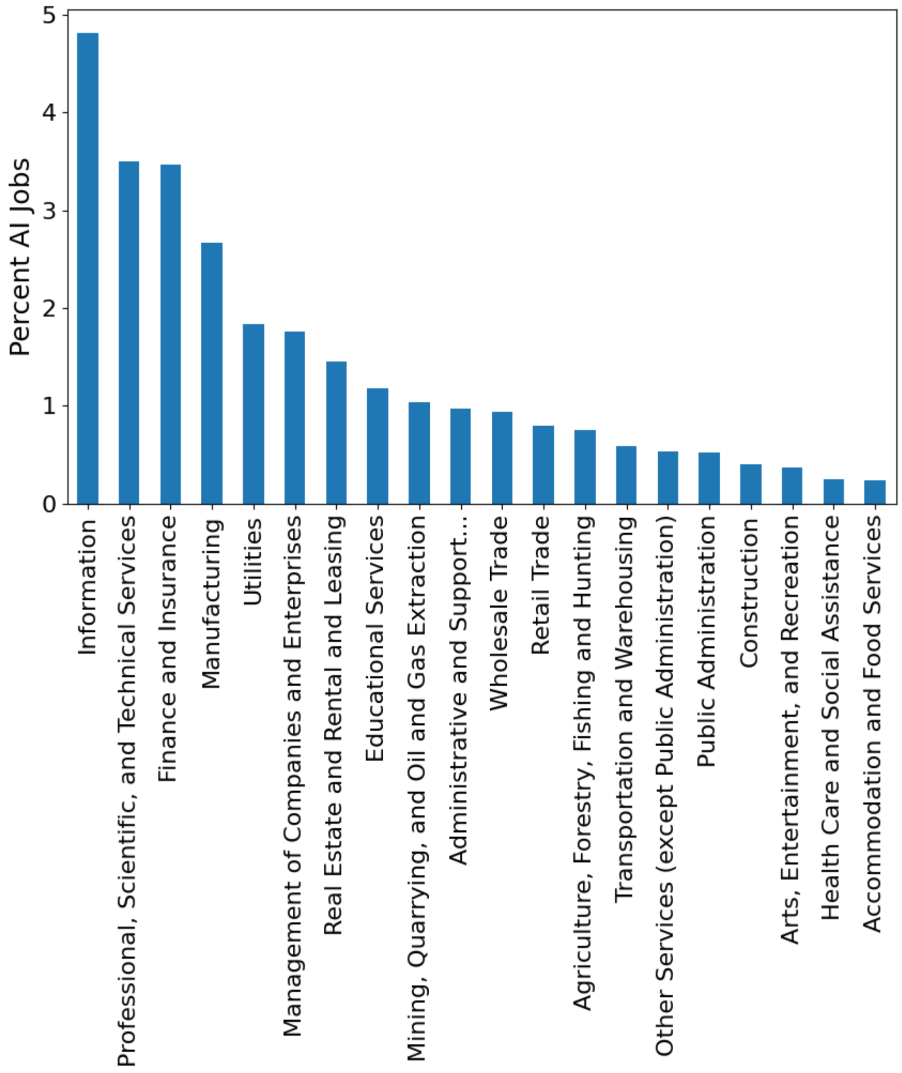

Figure 4: Percent of AI jobs in U.S. industries

Meanwhile, Figure 5 displays U.S. industries by the level of AI job growth from 2019 to 2023. This paints a different picture: Educational Services has the highest growth in AI jobs, while Information is in the lower half.

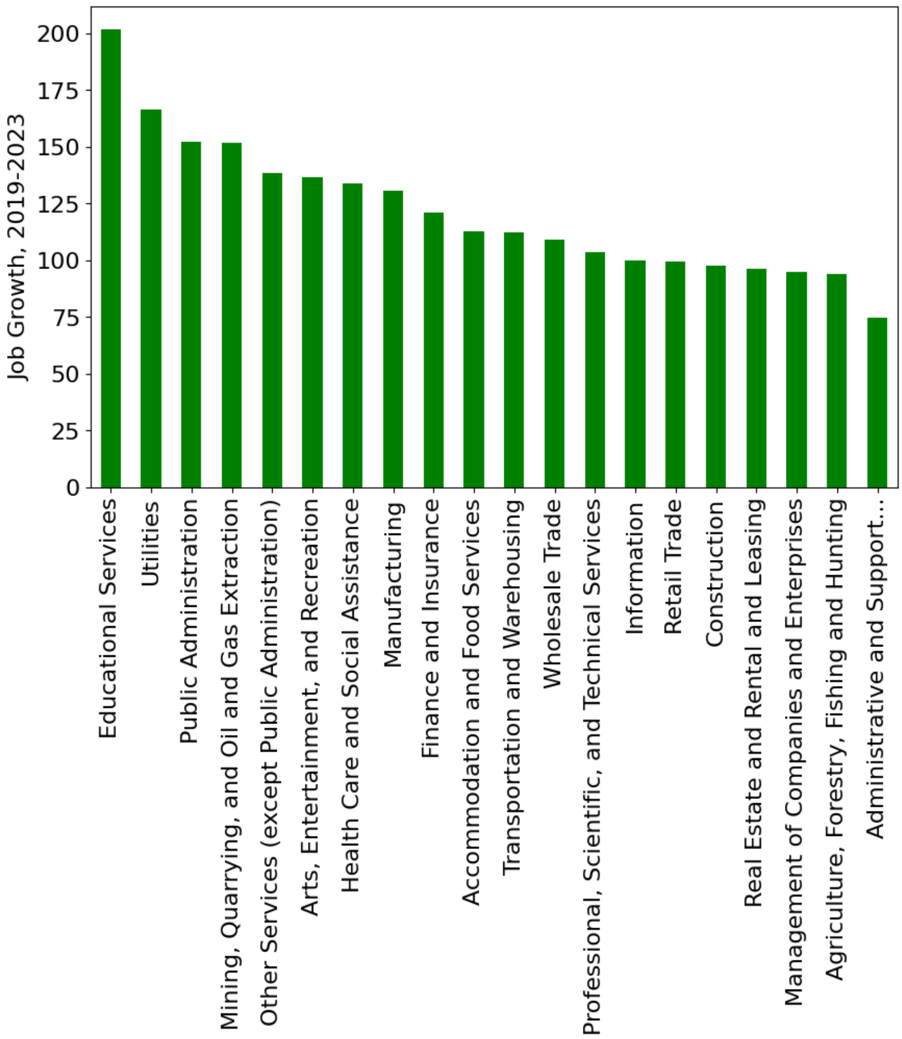

Figure 5: AI job growth per industry (% growth from 2019 to 2023)

4.3 Remote work

4.3.1 AI vs. non-AI roles

Generally, jobs with AI skills offer notably more remote work, with 24.4%, compared to 8% for non-AI jobs (Figure 6). As shown in Figure 7, over time the gap changes. In 2019, both job types had between 3 and 5% remote work; by 2022, AI jobs reached 35% remote while non-AI jobs were only near 10%. The increasing gap stagnated, however, in 2023, with remote work slightly declining for both categories.

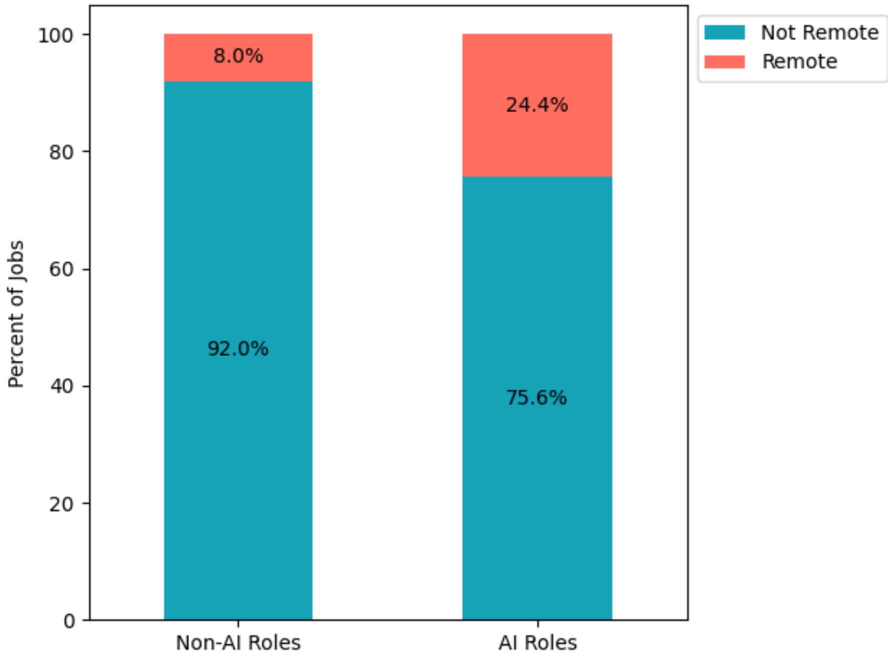

Figure 6: Percent remote jobs for all AI and non-AI roles

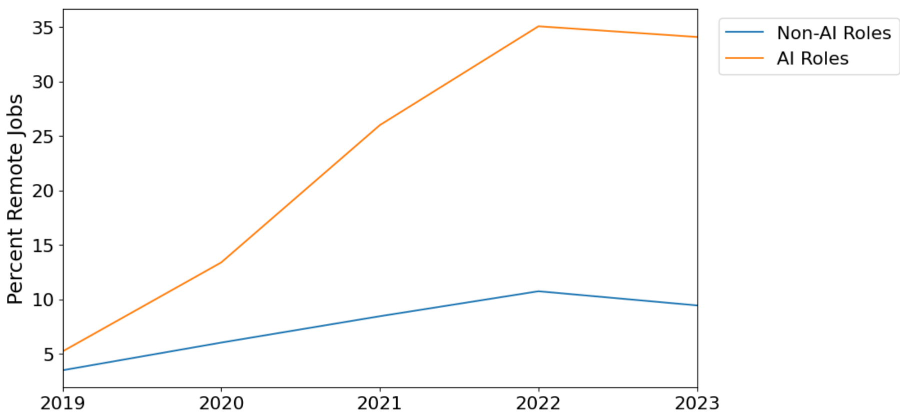

Figure 7: Percent remote jobs within AI and non-AI roles from 2019 to 2023

The logit regressions also offer significant evidence for this pattern, even with multiple controls. Table 1 shows the results for stepwise logit regressions with remote work as the binary dependent variable. With no controls added, the baseline model shows that AI skills are highly significant, and the log odds of remote work increase by 1.3 for AI jobs compared to non-AI job. This gives an odds ratio of 3.67, meaning AI roles are about 3.67 times more likely to be remote than non-AI roles. Subsequent models added fixed effects for year, occupation, and industry. The coefficients for the year dummies are shown, reflecting the pattern seen over time with each year increasing the probability of remote work until 2023. Adding year and occupation had

Table 1: Logit regression models for remote work

	Dependent variable: Remote Work				
	Baseline	(1)	(2)	(3)	(4)
AI Role	1.317***	0.423***	0.341***	0.238***	0.210***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Year (ref: 2019)					
2020		0.711***	0.730***	0.746***	0.748***
		(0.005)	(0.005)	(0.005)	(0.005)
2021		1.137***	1.162***	1.185***	1.189***
		(0.005)	(0.005)	(0.005)	(0.005)
2022		1.397***	1.434***	1.451***	1.451***
		(0.005)	(0.005)	(0.005)	(0.005)
2023		1.323***	1.381***	1.399***	1.395***
		(0.005)	(0.005)	(0.005)	(0.005)
Education (ref: None listed)					
Associate degree				-0.050***	-0.151***
				(0.006)	(0.006)
Bachelor's degree				0.403***	0.254***
				(0.003)	(0.003)
High school or GED				-0.373***	-0.424***
				(0.004)	(0.004)
Master's degree				0.479***	0.368***
				(0.008)	(0.008)
Ph.D. or professional degree				0.542***	0.489***
				(0.011)	(0.011)
Experience (ref: None listed)					
0 years					0.059***
					(0.009)
1-2 years					0.160***
					(0.004)
3-5 years					0.417***
					(0.003)
6-10 years					0.435***
					(0.005)
11-20 years					0.476***
					(0.010)
const	-4.123***	-3.288***	-4.674***	-4.770***	-4.869***
	(0.002)	(0.008)	(0.014)	(0.014)	(0.014)
Fixed Effects					
Industry	No	No	Yes	Yes	Yes
Year	No	Yes	Yes	Yes	Yes
Occupation	No	Yes	Yes	Yes	Yes
Observations	9826238	9826238	9826238	9826238	9826238
Pseudo R^2	0.006	0.133	0.164	0.172	0.175

Note: standard errors in parentheses *p<0.1; **p<0.05; ***p<0.01

the largest reduction on the effect size of AI skills, and increased the r-squared from 0.6% to 13.3%. Nonetheless, it did not eliminate the significant effect of AI skills. Education and experience also proved to be significant factors for remote work, with higher education and experience having higher probabilities of remote work. With all controls added, the effect of AI skills was still significant, and AI roles were 1.23 times more likely to offer remote work than non-AI roles. The final model explained 17.5% of the variation in remote work, indicating a relatively strong fit for a logistic regression in this field. The regression was also run on a smaller subsample of the data and showed similar effects, with a coefficient of 0.273 significant at the .01 level with all controls added. The results are available in Table D.1.

Table 2 shows additional model specifications. The first is a model with an added control for teleworkable occupations. In this model, the effect of AI skills is still significant at the .01 level with a coefficient of 0.320. The second model shows the results for a regression run on only teleworkable jobs and again, AI skills were significant with similar magnitude to that seen in the models with all jobs. The complete stepwise models for this specification can be found in Table D.3.

4.3.2 Remote work across industries and occupations

The gap in remote work persists within industries. Figure 8 compares remote work percentages between AI and non-AI roles across U.S. industries. In all sectors, jobs requiring AI skills were more likely to offer remote work options. AI jobs had a high percentage of remote work even in less remote-friendly sectors such as Accommodation and Food Services and Arts, Entertainment, and Recreation. Meanwhile, in more remote-friendly sectors like Information and Professional, Scientific, and Technical Services, there was still a gap of at least 5 points between AI and non-AI roles.

Similarly, across occupations, AI roles consistently had more remote work offerings. The gap was highly pronounced in occupations such as Arts, Sales, and Administrative Support. In Arts occupations, for instance, remote work was over three times as likely for AI jobs. In Management occupations, remote work was over twice as likely for AI jobs. Though smaller, the gap also persisted for highly remote-friendly fields like Computer and Mathematical occupations.

Figures 10 and 11 show the coefficients for logit models run on individual industry-occupation samples. Figure 10 shows industries with lower levels of AI job growth,

Table 2: Additional logit model specifications

	Dependent variable: Remote Work	
	Control for Teleworkable Jobs	Teleworkable Subset
AI Role	0.320***	0.202***
	(0.008)	(0.008)
Teleworkable	1.450***	
	(0.003)	
Experience (ref: None Listed)		
0 years	0.045***	-0.018
	(0.009)	(0.011)
1-2 years	0.183***	0.141***
	(0.004)	(0.004)
3-5 years	0.468***	0.314***
	(0.004)	(0.004)
6-10 years	0.465***	0.359***
	(0.005)	(0.005)
11-20 years	0.484***	0.367***
	(0.011)	(0.012)
Education (ref: None Listed)		
High school or GED	-0.409***	-0.393***
	(0.004)	(0.005)
Associate degree	-0.149***	-0.261***
	(0.007)	(0.008)
Bachelor's degree	0.282***	0.109***
	(0.003)	(0.004)
Master's degree	0.344***	0.084***
	(0.008)	(0.010)
Ph.D. or professional degree	0.476***	0.300***
	(0.012)	(0.015)
const	-5.754***	-4.014***
	(0.013)	(0.018)
Fixed Effects		
Industry	Yes	Yes
Year	Yes	Yes
Occupation	No	Yes
Observations	9069800	3914310
Pseudo R^2	0.171	0.092

Note: standard errors in parentheses *p<0.1; **p<0.05; ***p<0.01

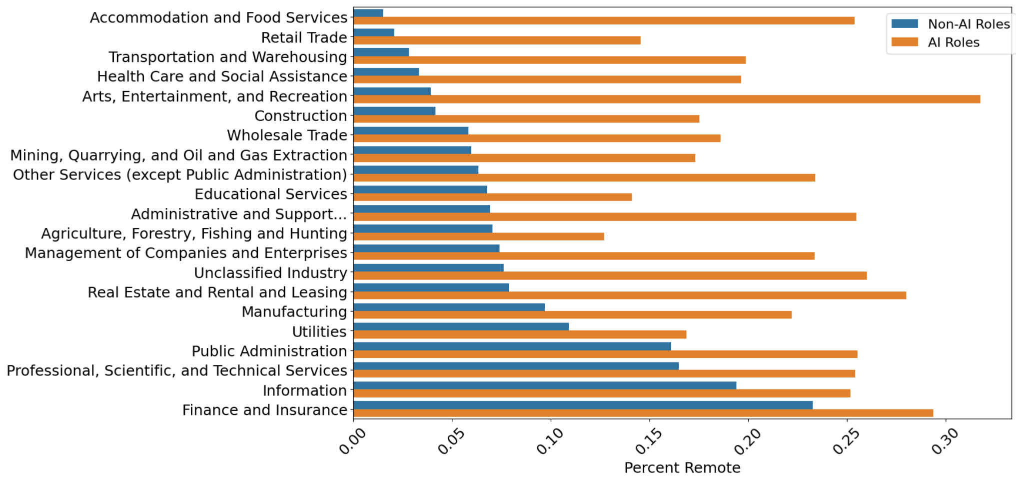

Figure 8: Percent remote jobs by industry and skillset

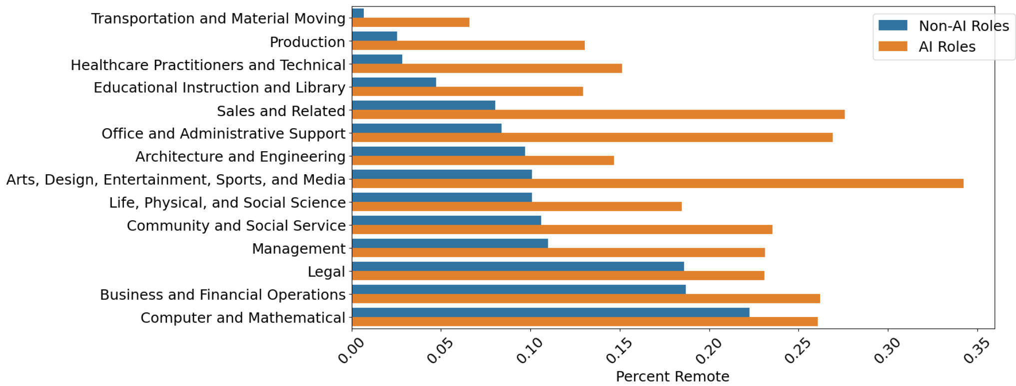

Figure 9: Percent remote jobs by occupation and skillset

while Figure 11 shows those with higher levels of growth. The patterns differ across industries; in high-growth industries, like Manufacturing and Educational Services, AI skills increase the probability of remote work across all occupations. In low-growth industries, like the Information industry, it does not always increase the likelihood. Notably, there is a similar pattern across occupations; in Office and Administrative Support occupations, AI skills often have the highest effect on the probability of remote work, while it is the lowest for Computer and Mathematical occupations.

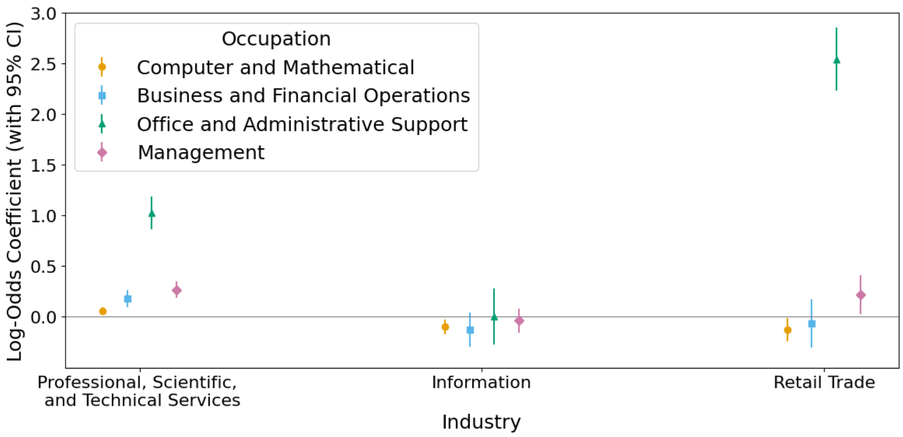

Figure 10: AI skills coefficients for log odds of remote work for industries with lower AI growth

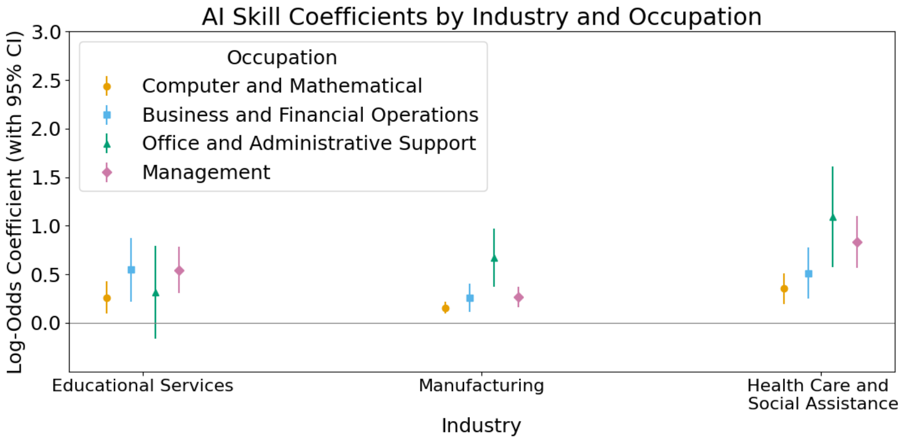

Figure 11: AI skills coefficients for log odds of remote work for industries with higher AI growth

4.3.3 Remote work across AI subfields

Figure 12 displays the percent of remote work within AI subfields. All subfields show an increase in remote work offerings from 2019 to 2022. Most subfields maintained their ranking compared to others, with variation for Speech and Audio Processing, Responsible AI, and Natural Language Processing, which rose more than others. The spread across subfields increased from 2020, with the majority of subfields reaching above 30% remote. Computer Vision and Analytics have the lowest percentage of remote jobs in recent years. Speech and Audio Processing experienced the most dramatic rise, from under 5% remote in 2019 to nearly 60% in 2023, though the number of jobs in this field was lower than most other fields. Other fields like Machine Learning, Natural Language Processing, and Cloud AI/ML Services also saw substantial increases in remote work, settling between 35-40% remote by 2023.

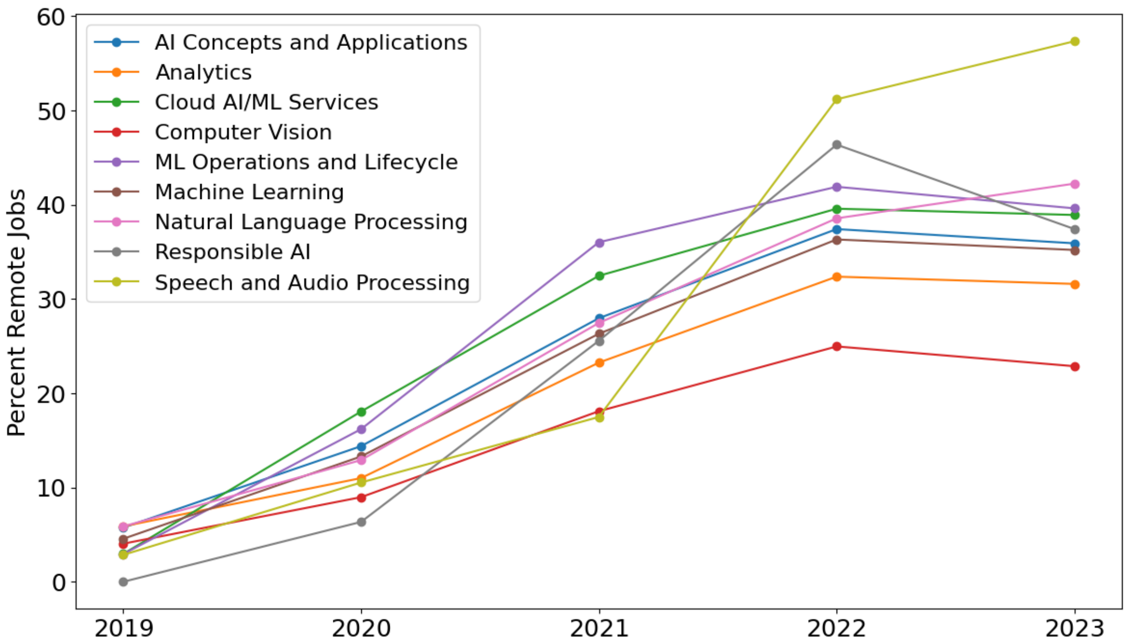

Figure 12: Percent remote jobs per AI subfield

Figure 13 shows the job growth for each AI subfield indexed to 2019, which is highly aligned to the levels of remote work seen in Figure 12. ML Operations and Lifecycle had the highest growth. This subfield also had the highest percent of remote work in 2021 and was in the top 3 in 2022 and 2023. Responsible AI also grew substantially in 2022, when it also saw the second highest percentage of remote jobs. Cloud AI/ML services was also in the top 3 fastest growing subfields and among the top subfields with remote work. Meanwhile, Analytics, Computer Vision, and Machine Learning had both the lowest growth and lowest proportions of remote work. The raw number of jobs per 1000 OJVs for each AI subfield can be found in Figure C.1.

Figure 14 shows that salaries have varying trends across subfields. ML Operations had one of the highest proportions of remote work and also the highest median

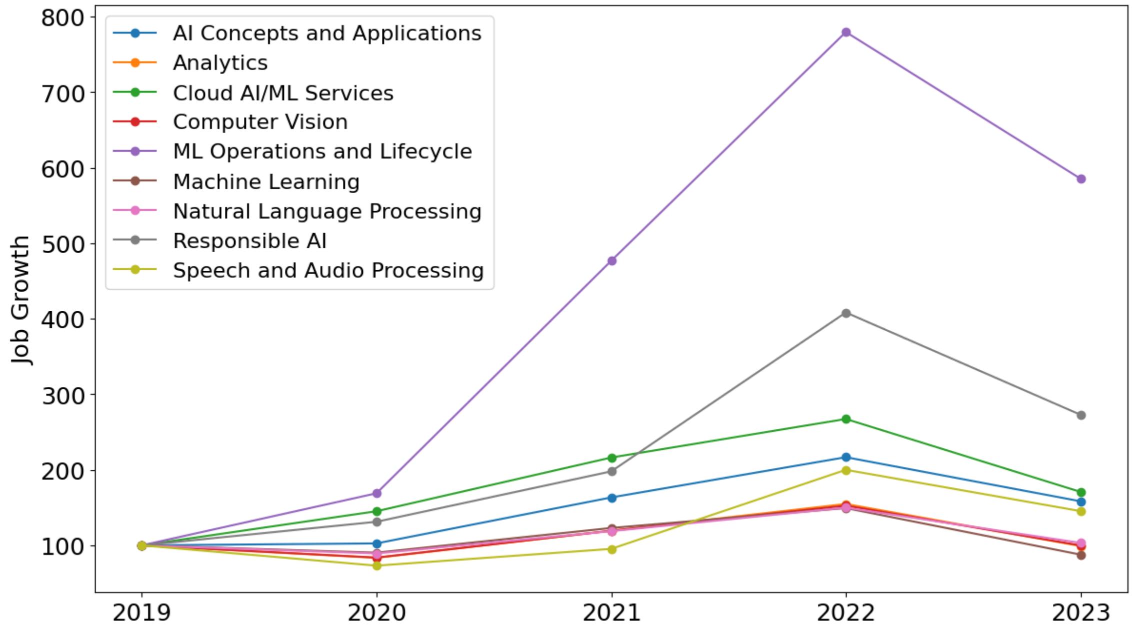

Figure 13: Job growth for AI subfields since 2019

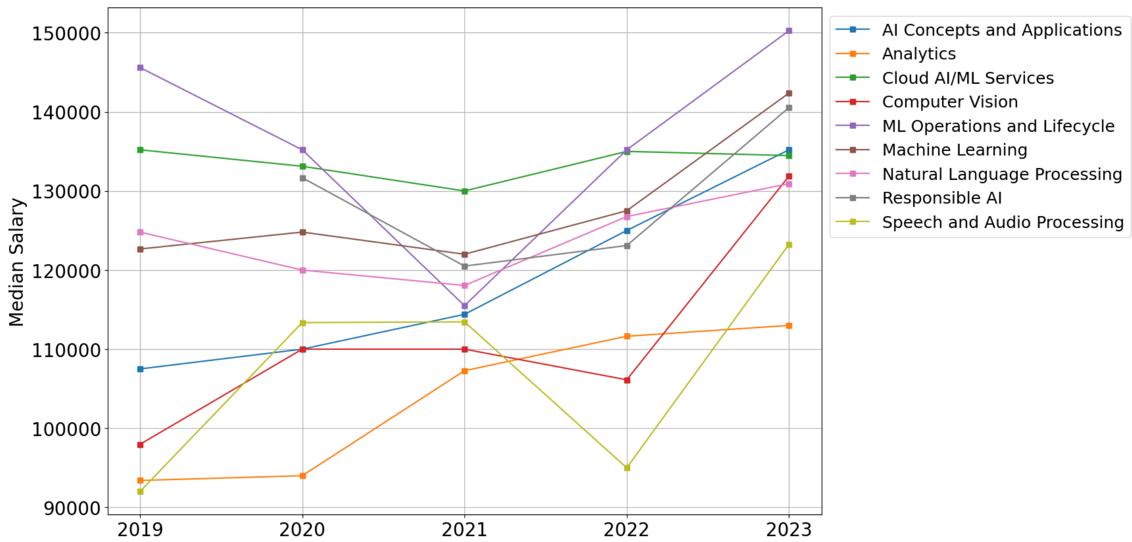

Figure 14: Median salary by AI subfield

salary in most years, though this dipped in 2021. Cloud Services also had some of the highest levels of remote work and some of the highest salaries in most years, with both falling in rank in 2023. AI Concepts and Applications remained in the middle of the group for both remote work levels and salaries, while Analytics and Computer Vision had some of the lowest salaries and levels of remote work.

Figure 15 also shows similar patterns between the number of jobs for the subfield per 1000 OJVs, and the percent of remote jobs within that subfield. Most subfields show an increase in demand from 2020 to 2022, followed by a sharp drop in 2023. Meanwhile, they also show an increase in remote work through 2022, followed by stagnation or decline in 2023 with the exception of NLP and Speech and Audio Processing.

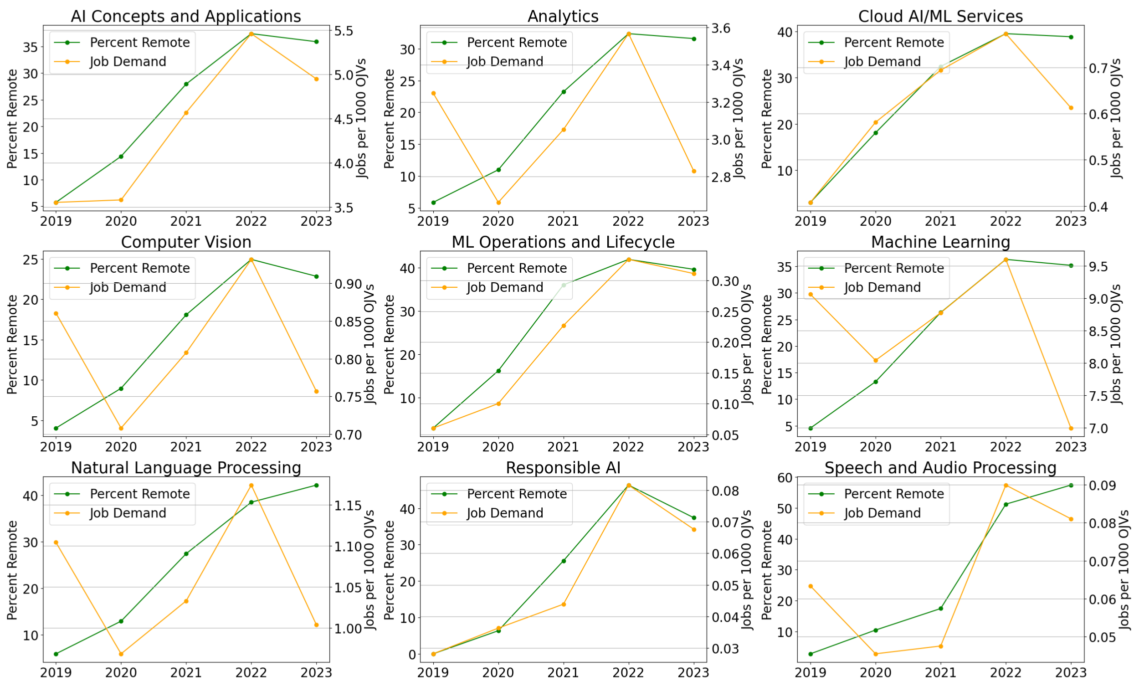

Figure 15: Percent remote jobs vs. job demand for AI subfields

Lastly, Figure 16 displays the results for the logit models run with each AI subfield as the independent variable, including all controls. All AI subfields positively and significantly increased the probability of remote work with the exception of Computer Vision. It also shows that the effects vary across different subfields. Following the patterns seen above, ML Operations and Lifecycle and Speech and Audio Processing had the largest effects, followed by AI Concepts and Applications and Responsible AI.

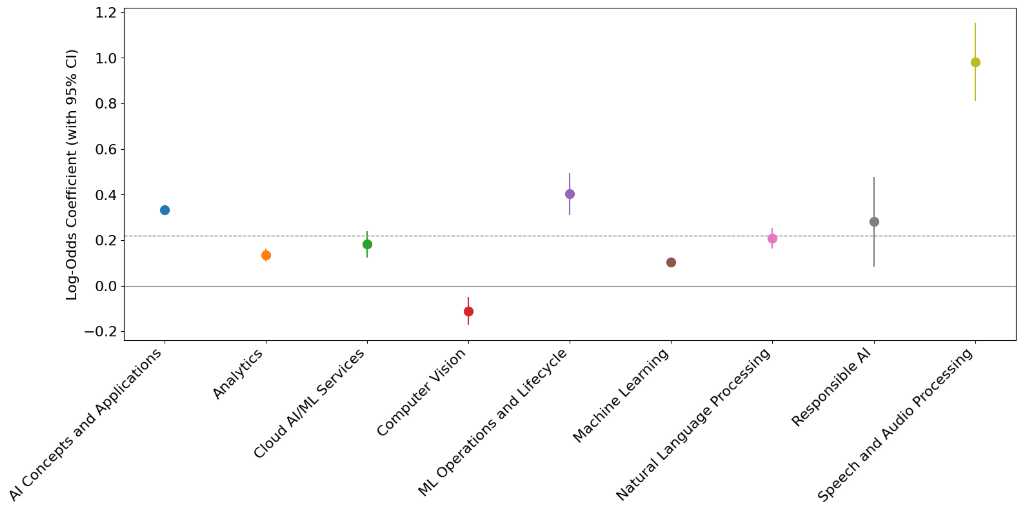

Figure 16: AI subfield coefficients for log odds of remote work

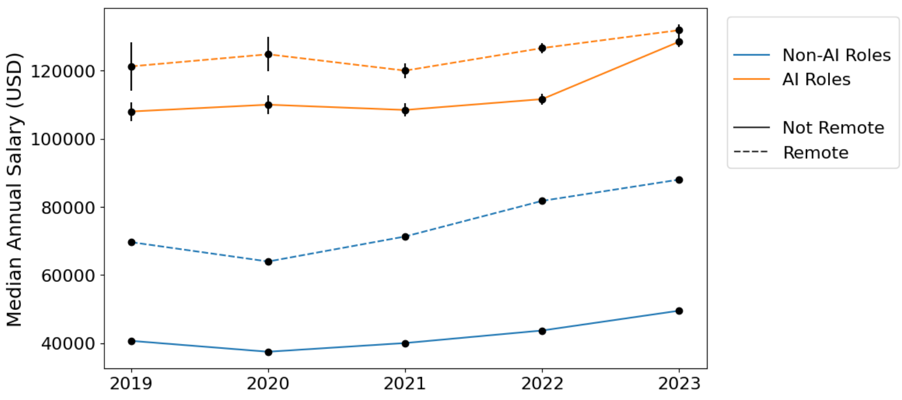

Figure 17: Salary by remote work for AI and non-AI roles

4.3.4 Remote work vs. salary premiums

Figure 17 illustrates the median annual salaries from 2019 to 2023, comparing jobs with AI skills to those without, and further differentiating between those with and without remote work. The data confirms that jobs requesting AI skills consistently earn substantially higher salaries than those without such skills. Furthermore, remote work is associated with higher median salaries across both groups. However, the median salary saw a larger increase for non-remote AI jobs in 2023, reducing the gap between remote and non-remote AI salaries.

5 Discussion

5.1 Principal findings

5.1.1 The value of remote work for women in AI

The findings of this study provide compelling evidence for the prevalence of remote work for AI jobs and the value of remote work for women working in AI. The interviews aligned strongly with the literature on the components of workplace flexibility, as interviewees defined flexibility in terms of time and place. This is in line with the conceptualization by Hill et al. (2008), extending its application to the AI field. The interviewees revealed that remote work is particularly highly valued and facilitates both leave and schedule flexibility as defined by Ray and Pana-Cryan (2021).

The overwhelming emphasis on remote work as a critical component of job satisfaction and work-life balance highlights its importance for women in technical roles, especially those with caretaking considerations. The preferences for women in AI aligned with the broader literature on the benefits of remote work for women (Field et al., 2023; Hsu & Tambe, 2021b; LinkedIn Economic Graph, 2022). Regarding Chung and van der Horst (2020)'s discussion on the potential implications of flexible work for gender equality, the findings show that the positives of remote work outweigh the negatives for women in AI.

The interviews also showed that this benefit can have significant implications for women's career choices, as many respondents indicated a willingness to take a lower salary or leave their job to gain the remote work benefits they value. This aligns with the findings of Barrero et al. (2021) and Nagler et al. (2022) on workers' willingness to accept pay cuts for remote work benefits, but suggests that women in AI are willing to accept larger pay cuts (up to 20%) than that found in studies across demographics (7%).

Additionally, all respondents believed that their field and technical skills gave them the ability to have more opportunities for remote work. In particular, the belief that these benefits were offered to retain scarce talent aligns with reports on companies' strategies to retain talent (Lee, 2023; Owusu Addae, 2023). These findings drove the focus of the analysis on remote work flexibility, with evidence that it is one of the most highly valued benefits for women in AI. They support both H1 and H2 from the perspective of women in the field.

5.1.2 Changing AI job demand trends

The analysis of job vacancy data revealed a changing landscape in AI job demand, characterized by significant growth through 2022 followed by a decline in 2023. The surge in demand likely resulted from accelerated digital transformation and the AI boom that followed the pandemic (OECD, 2023; Tamayo et al., 2023). The subsequent stabilization and decline in 2023 suggests a market adjustment, aligning with significant downsizing particularly in the tech industry (Sherif, 2024). This analysis provides updated information on AI growth through 2023, revealing a new trend as previous job vacancy analyses did not include 2023 data (Alekseeva et al., 2021; Gonzalez Ehlinger & Stephany, 2023). Additionally, it shows that AI jobs have particularly grown outside the Information industry, in sectors such as Education and Utilities.

5.1.3 Remote work in AI vs. non-AI jobs

The remote work analysis consistently corroborates H2, showing that jobs with AI skills offer more remote work than non-AI jobs. This finding extends the work of Hansen et al. (2023) on remote work trends by specifically focusing on AI skills. This is a key insight using a skills-based approach that is relevant for jobs in an in-demand field (LinkedIn Economic Graph, 2023; McKinsey and Company, 2022; U.S. Chamber of Commerce Foundation (USCCF), 2024). The change in remote work over time was more notable for AI roles than non-AI roles, with substantial increases even after pandemic lockdown periods. By the end of 2023, AI remote jobs were at far higher levels than non-AI jobs.

Furthermore, the regression analysis confirms that the presence of AI skills significantly increases the likelihood of a job offering remote work, providing further support for H2. This was true even when controlling for factors such as industry, occupation, education level, and whether a job is teleworkable, suggesting that the remote work premium associated with AI skills goes beyond the inherent nature of the work. This also shows that skills have explanatory power for non-monetary compensation such as remote work, building on Deming and Kahn (2018)'s finding that job skills have explanatory power for monetary compensation.

Focusing on specific industries and occupations, the data continued to show higher levels of remote work for AI roles, indicating that the overall difference in remote work is not driven by a single industry or occupation. The gap was particularly pronounced in sectors where AI jobs are less common, yet still existent in those that are more remote-friendly. However, AI skills did not significantly increase the odds of remote work for all individual industries and occupations in the regression models, suggesting that they have a stronger effect in some industries and occupations than others. Thus, there is support for H2 when examining the entire labor market, as AI jobs generally saw increased levels of remote work. However, it is only partially supported when examining the effect in individual industry-occupation entities.

5.1.4 Remote work and labor market demand

The findings also suggest that remote work may be linked to the demand in the labor market, providing support for H3. The increase in remote work even two years following the pandemic indicates that drivers beyond health concerns determined remote work policies. Changes in remote work show a clear correlation with patterns of growth for AI skills, with increases through 2022 followed by declines in 2023. Further, they show signs of stagnation or decline at the same time as the job market begins to contract.

This aligns with the theory that with high job growth, companies may experience increased difficulties in finding talent as the supply may not be able to keep up with the demand (Collins & Halverson, 2018; Manpower Group, 2023; Stephany, 2021). Thus, as the AI sector experienced rapid expansion and remote work was increasingly seen as a job benefit, employers may have increased remote work options as a competitive advantage to attract and retain scarce talent in a tight labor market. As demand for labor declined and employers had less incentives to retain talent, employers may have had more leverage to require workers to come into the office (Owl Labs, 2023). This may be due to the costs of remote work, including employer wariness about siloed communication, productivity, innovation, and coordination costs (Gibbs et al., 2023; Lee, 2023; Lin et al., 2023; Ringel, 2021; Yang et al., 2022).

5.1.5 Remote work vs. demand across industries and subfields

The differing impacts of AI skills on the probability of remote work for various industries and occupations may also depend on the variation of remote work as well as the labor market tightness within these entities. This contributes to the literature on the uneven adoption of remote work across sectors and occupations (Hansen et al., 2023), examining the specific role of AI skills.

For instance, in the Information industry, AI skills did not increase the likelihood of remote work when controlling for other factors. This industry has a high baseline of remote work and the highest concentration of AI talent with lower growth than other industries (CBRE, 2023). The decline in OJVs in this industry reflects known labor market trends. The sector has had one of the largest decreases in hiring rates from 2018 to 2024 (Kantenga, 2024), and was one of three industries to have negative job growth in 2023 (Institute, 2024). It also had one of the lowest levels of labor market tightness compared to the pre-pandemic averages across industries (Ghayad, 2023). Additionally, many workers have been displaced to other industries, with an increase in the transition rate from 57% to 65% from 2022 to 2023 (Ghayad, 2023). The top three industries these workers moved to were Professional Services, Financial Services, and Manufacturing.

Meanwhile, other industries, particularly those with high AI growth, see a starker difference in remote work for AI jobs. In Manufacturing, AI jobs improved the odds of remote work even for Computer and Mathematical Occupations. This industry was ranked above the Information sector for the top industries demanding AI roles, and was one of the top three industries demanding AI talent worldwide (Kimbrough et al., 2023). Additionally, disruptive tech skills were more important in this industry than, for instance, the retail industry (Ghayad, 2023). Further, it has seen a 30% change in skills demanded from 2015 to 2022, and most of the top 10 skills demanded in 2022 were new skills such as Python (LinkedIn, 2022). Thus, sectors with rapidly growing demand for AI skills may provide a larger premium of remote work, particularly as it may be more difficult to find talent with those skills. This further supports H3. Moreover, the occupation with the lowest AI penetration (Office and Administrative Support) saw the highest effect for AI roles on remote work, which may suggest that the more scarce these skills are, the larger the effect may be on remote work.

The analysis across AI subfields provides additional support for H3. The data showed that AI subfields with the highest growth also had the highest levels of remote work. The similar alignment with salaries suggests that skills with higher wage premiums within AI also offer a higher premium of remote work. This aligns with Gonzalez Ehlinger and Stephany (2023)'s finding that different AI subfields offer varying wage premiums. It suggests that even within AI jobs, certain skills with higher growth may offer more remote work, which may attract needed talent to keep up with growth.

5.1.6 Wage premiums and remote work premiums

The comparison to salaries also highlights the monetary premium placed on AI expertise in the job market and an even higher premium among those with remote work opportunities. The AI wage premium aligns with prior evidence for this (Alekseeva et al., 2021; Gonzalez Ehlinger & Stephany, 2023; Green & Lamby, 2023). It reflects the labor market dynamics discussed above, as the high demand for AI skills is reflected through monetary compensation.

Using a model where workers and firms engage in bargaining over both wages and job flexibility, which imply costs for employers, Flabbi and Moro (2012) found that the wage differential between flexible and non-flexible jobs is heterogeneous. It is not directly related to the cost of flexibility due to search frictions in the labor market. The high demand for AI skills suggests significant search frictions, which could result in a complex relationship between remote work and wages. The wage differences for remote jobs may therefore not directly reflect the costs for employers, and employers may offer flexibility without decreasing compensation.

Interestingly, the wage gap between remote and non-remote AI jobs narrowed in 2023, despite both categories seeing an overall increase in median annual salary. This suggests a shift in the market, and may align with the decrease in remote roles and changing demand over this period, where employers may have adjusted remote work benefits and compensation with the contracting job market.

Despite decreasing demand in 2023, AI salaries continued to increase. Additionally, remote AI jobs still offered higher salaries than non-remote AI jobs throughout the observed period. This persistent premium suggests that employers continue to place a high value on AI skills, and offer an even higher premium when the job also offers remote work. However, the narrowing wage gap between remote and non-remote AI jobs warrants future attention to determine if this trend continues or stabilizes.

5.2 Implications

5.2.1 Contribution to literature

This analysis offers a valuable contribution to the remote work literature, as remote work has not been previously studied on the basis of AI skills. As employment increasingly shifts to skills-based hiring, an analysis of skills-based remote work is ever more relevant. Though there is substantial literature on AI skills, remote work, and job vacancy data individually, this is the first study to examine remote work in job vacancies as it relates to AI jobs and demand. The findings reveal that high-growth AI skills may provide increased opportunities for remote work. As the unprecedented imposition of remote work following the pandemic becomes a normalized job benefit, it is of increasing importance to understand how remote work will be adopted to shape the future of work. This is particularly relevant for one of the highest-growing fields that is revolutionizing the world of work.

5.2.2 Methodological contribution

This research also demonstrates the value of using a fine-tuned large language model to measure labor market trends, which is a novel method only recently introduced by Hansen et al. (2023). This method has been shown to be an improvement over traditional dictionary methods used in the past. Additionally, the research uses an alternative data source offering large-scale coverage of online job vacancies. This provides more data points than traditional methods and offers a unique level of detail including job descriptions, industry and occupation classifications, and requested education levels, experience, and skills, among others (Hansen et al., 2023). The value of this data is reflected in the growing body of literature employing it, including labor force reports by major organizations such as the OECD (Borgonovi et al., 2023; Green & Lamby, 2023; Squicciarini & Nachtigall, 2021).

5.2.3 Implications for the AI gender divide

The research not only shows the role of in-demand AI skills for remote work, but highlights the potential impacts to address the substantial gender gap in AI labor force participation. The interviews revealed that remote work is highly valued by women in AI, especially those with caretaking responsibilities, making the prevalence of remote work in AI jobs significant from a gender perspective. This could help address barriers that have historically limited women's labor force participation, making AI careers more attractive and accessible to women.

Access to remote work could reduce career interruptions, which is particularly relevant for women who face disproportionate challenges in balancing career and personal responsibilities (Berniell et al., 2023). It might further encourage more women to invest in developing these skills, which could contribute to improved gender diversity in an occupation that has been historically male-dominated (Owusu Addae, 2023). Moreover, if more women are retained in tech jobs, it may inspire future women to pursue these careers with more role models in the field (Owusu Addae, 2023). Increased remote work opportunities could also increase diversity in the AI workforce, which can have substantial implications for preventing and addressing biases in AI (Cachat-Rosset & Klarsfeld, 2023; Leavy, 2018; West et al., 2019; Zhao et al., 2017). This can also benefit employers by expanding the much-needed talent pool and including diverse perspectives that can foster better creativity and decision-making (Kho et al., 2024).

The observation that female interviewees believed their technical skills could provide them with greater remote work flexibility aligns with the quantitative findings of the remote work benefits of AI. This suggests that women who acquire AI skills may be better positioned to negotiate or find workplace arrangements that suit their needs, with potential impacts on their long-term career trajectories. Yet, the fact that most of them did not believe they had used their skills to negotiate this in the past highlights another challenge. Part of the gender gap in wages has been attributed to women's lower likelihood to negotiate (Parodi et al., 2018); thus, the flexibility premium of AI skills may not be fully realized if women are not empowered to leverage it in negotiations and expectations of job benefits. Additionally, the varying significance of AI skills across different industries and occupations indicates that there may be greater impacts of AI skills on remote work opportunities in some areas than others.

While the potential benefits of remote work for women are substantial, it is also important to consider the potential negative impacts. For instance, the high value placed on flexibility might lead to women being disproportionately hired into remote roles, potentially limiting their visibility or advancement opportunities in some organizational cultures (Chung & van der Horst, 2020; Chung et al., 2021; Lott & Chung, 2016). Further, it can exacerbate the gender gap as women have to balance work and home responsibilities and may have added expectations when they are physically present at home (Chung & van der Horst, 2020). Meanwhile, men are more likely to use flexible work to increase their performance and therefore wages (Chung & van der Horst, 2020). Moreover, there is a risk that flexibility can increase the wage gap, as most interviewees were willing to take a salary cut for flexibility benefits. Nonetheless, the persistence of higher salaries for remote AI jobs suggests that the flexibility premium is not coming at the cost of compensation. Jia et al. (2024) also highlight that offering flexible work does not guarantee it will be implemented by workers. Workers may be disincentivized by a stigma for flexible working, disappearing work-life boundaries, and potential impacts for career progression (Cohen & Single, 2001; Golden et al., 2006; Jia et al., 2024; Smith et al., 2019).

These considerations are essential for developing policies and practices that attract talent and genuinely enhance equality and inclusion in the AI workforce. It is crucial to note that flexibility should not be advanced with the notion that women should primarily bear the responsibility of caretaking. On the contrary, the increased prevalence of remote work could reduce the femininity stigma associated with flexible work as it becomes a more normalized work model (Chung et al., 2021; Rudman & Mescher, 2013). Notably, women experience less work-family conflict when a larger proportion of coworkers work from home, and are more sensitive to this than men (van der Lippe & Lippényi, 2020). Further, employers must advance workplace cultures and policies that foster work-life balance and do not penalize remote work (Villamor et al., 2023). It is also crucial for this benefit to be offered at all levels so women can continue to progress in their careers (Women in Tech, 2022). Jia et al. (2024) highlight that employers should promote and support flexible work arrangements (FWAs), increase employee control over work, and provide services that facilitate FWA adoption. They also emphasize the importance of considering organizational culture, noting that feminine cultures which prioritize work-life balance can promote greater FWA utilization. Policies and cultures that promote the adoption of flexibility benefits for both genders would be most impactful in advancing equity in the labor force. Thus, if the decrease in remote work continues, women may suffer the largest consequences.

Information on remote work trends can help employees, employers, and policymakers alike understand the direction of remote work practices, particularly in high-growth fields like AI. From a policy perspective, it can highlight areas for intervention, particularly with policies that promote equitable benefits of remote work and reduce the stigma for flexible arrangements. For employees, especially women and those with caregiving responsibilities, this knowledge can inform career decisions and negotiations for flexible work arrangements. For employers, offering transparent flexible work benefits can be key to attract and retain more diverse talent. This is particularly true as job descriptions with clear information on remote work models and flexibility are more attractive for women and suggest a flexible work culture. Transparent flexibility benefits in job descriptions can also allow potential candidates to focus on positions that align with their needs.

5.3 Limitations and future directions

Though the study offers valuable insights into AI job demand and remote work benefits that can be beneficial for women, there are limitations to consider. First, the study primarily relies on online job vacancy data from Lightcast. While it is a valuable and substantial source of data on the labor market, it only considers the supply of jobs posted online (Gonzalez Ehlinger & Stephany, 2023). Thus, it may exclude certain jobs and does not represent the final outcome of job benefits, including negotiations for remote work that may take place. Further, not all information is stated in job descriptions, so workplace flexibility and conditions of remote work may ultimately differ from what is presented in a job posting. Additionally, online job postings represent new job offerings rather than the present state of the labor market and include intentions for the future; thus, they may not align with current patterns of employment (Hansen et al., 2023).

Furthermore, the qualitative insights are based on interviews with ten women in technical roles. While these interviews provide valuable perspectives, the sample size was limited by the scope and time frame of the thesis and thus the generalizability of the findings is limited. Though an effort was made to include women across different company types, roles, locations, backgrounds, and stages of life, the sample may not fully represent the diversity of perspectives across different demographics, career stages, and geographic locations.

This study also focused on the U.S. job market due to the scope of the research and the data availability. Thus, the findings may not be generalizable to other countries with different labor market dynamics or cultural attitudes towards remote work. Nonetheless, I recognize the importance of conducting research on other regions, particularly under-researched regions such as the global south. Though not feasible in this research, the methods presented provide a promising opportunity to apply them to other world regions, particularly as they employ online job vacancy data and large language models as an alternative to more formal labor market data when it may not be available.

Importantly, while the study demonstrates correlations between AI skill demand and remote work, it cannot establish causal relationships. Factors not accounted for in the analysis could be influencing both the demand for AI skills and the offering of remote work, which should be considered when interpreting the results. Moreover, the data only provides information on job demand, while supply data was not available. Future research would benefit from this data to identify areas that are most in need of talent supply.

Additionally, while the findings suggest that AI skills offer flexibility benefits that could benefit women, the actual impact for women in the labor force cannot be established. Brulin et al. (2023) highlight that different perceptions of flexible work may impact experiences with work-life interference, and such perceptions of flexibility and interference may differ across gender. To further explore the implications for female labor force participation and work-life balance, future research could explore whether the remote work premium in AI jobs is leading to increased female representation in the field over time. Studies could also provide insight into how women's career trajectories in AI evolve in response to these benefits. Additionally, they could investigate whether the remote work trends observed up to 2023 continue or evolve as the AI job market matures.

Lastly, this study focused on remote work as the interviews showed it was the most valued benefit which could also offer time-based flexibility, and it could be accurately classified in the data. While other flexibility benefits, such as leave and schedule flexibility, have been identified as highly important for women, there is not yet a validated and accurate model to identify these benefits from job vacancies. Further, these benefits can be more subjective and open to interpretation in job descriptions. Training a model to classify the data was beyond the scope of this research and there was not sufficient labeled data for training and evaluation. This underscores the value of a fine-tuned model such as the WHAM model to classify online job descriptions on non-monetary benefits. I tested the feasibility of using several large language models to classify other types of flexibility, and the findings on a small sample of job descriptions aligned with human evaluations. Future research could develop a fine-tuned model trained on a larger sample of human-labeled job postings to identify time-based flexibility benefits for a similar analysis.

6 Conclusion

Using a mixed-methods approach, this study provides compelling evidence for the prevalence of remote work among AI jobs, with significant implications for women in the field. The interviews with women in AI showed the substantial value they place on remote work to help balance their work and life responsibilities. Further, the use of a large language model to classify remote work shows the potential of novel LLMs to extract nuanced information from job descriptions for large-scale labor market analyses.

The quantitative analysis reveals that AI jobs consistently offer more remote work opportunities, even when controlling for factors such as industry, education, experience, and occupations' feasibility of telework. This premium of remote work also appears to align to demand for these skills. The impact of AI skills is more pronounced in some industries than others, particularly those with rapidly increasing demand for AI jobs such as manufacturing. It also varies across AI subfields, following similar patterns as the growth and median salary in these subfields.

Importantly, the higher incidence of remote work in AI jobs could help address barriers that have limited women's participation in the field, making AI careers more attractive and accessible to women. Bridging the qualitative and quantitative results highlights the potential for remote work to promote gender diversity in AI. These valuable insights highlight areas for future investigation, such as studies on how remote work trends in AI impact women's representation and career trajectories over time.

Both AI and remote work are relatively new and rapidly evolving phenomena in labor markets. As they continue to mature, understanding current trends and future directions is essential. They can inform employee, employer, and policymaker decisions, as these trends can have substantial impacts for female labor force participation and inclusive work environments. Understanding the implications of remote work is crucial for a future of work that fosters diversity, particularly for a workforce that develops the technologies that are reshaping the ways we work and live.

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7 Appendices

A AI skills

Machine Learning: 'AI/ML Inference', 'Anomaly Detection', 'Apache MXNet', 'Apache Spark', 'Artificial Neural Networks', 'Autoencoders', 'Automated Machine Learning', 'Collaborative Filtering', 'Convolutional Neural Networks', 'Decision Tree Learning', 'Deep Learning', 'Deep Learning Methods', 'Dimensionality Reduction', 'Ensemble Methods', 'Feature Engineering', 'Feature Extraction', 'Feature Learning', 'Feature Selection', 'Generative Adversarial Networks', 'Gradient Boosting', 'Hyperparameter Optimization', 'K-Means Clustering', 'Keras (Neural Network Library)', 'Long Short-Term Memory (LSTM)', 'MLflow', 'Machine Learning', 'Machine Learning Algorithms', 'Machine Learning Methods', 'Machine Learning Model Monitoring And Evaluation', 'Machine Learning Model Training', 'Naive Bayes Classifier', 'OpenCV', 'Predictive Modeling', 'Principal Component Analysis', 'PyTorch (Machine Learning Library)', 'PyTorch Lightning', 'Random Forest Algorithm', 'Recurrent Neural Network (RNN)', 'Reinforcement Learning', 'Scikit-Learn (Python Package)', 'Supervised Learning', 'Support Vector Machine', 'TensorFlow', 'Torch (Machine Learning)', 'Transfer Learning', 'Transformer (Machine Learning Model)', 'Unsupervised Learning', 'Variational Autoencoders', 'Xgboost'

Natural Language Processing: 'BERT (NLP Model)', 'Chatbot', 'Conversational AI', 'GPT-3 (NLP Model)', 'Hugging Face (NLP Framework)', 'Hugging Face Transformers', 'Language Model', 'Large Language Modeling', 'Machine Translation', 'NLTK (NLP Analysis)', 'Named Entity Recognition', 'Natural Language Generation', 'Natural Language Processing (NLP)', 'Natural Language Understanding', 'Question Answering', 'Semantic Search', 'Sentiment Analysis', 'SpaCy (NLP Software)', 'Text Classification', 'Text Mining', 'Topic Modeling', 'Word2Vec Models'

Responsible AI: 'Artificial Intelligence Risk', 'Ethical AI', 'Explainable AI (XAI)', 'Uncertainty Quantification'

AI Concepts and Applications: 'Applications Of Artificial Intelligence', 'Artificial Intelligence', 'Artificial Intelligence Development', 'Artificial Intelligence Systems', 'ChatGPT', 'Expert Systems', 'Generative Artificial Intelligence', 'Intelligent Virtual Assistant', 'Pattern Recognition', 'Recommender Systems'

Analytics: 'Advanced Analytics', 'Predictive Analytics', 'Prescriptive Analytics', 'Cloud AI/ML Services': 'AWS SageMaker', 'Amazon Lex', 'Azure Cognitive Services', 'Azure Machine Learning', 'Pyspark'

Computer Vision: 'Computer Vision', 'Contextual Image Classification', 'Image Analysis', 'Image Generation', 'Image Recognition', 'Image Segmentation', 'Machine Vision', 'Object Detection', 'Object Recognition', 'Optical Character Recognition

(OCR)', 'Pose Estimation'

ML Operations and Lifecycle: 'AIOps (Artificial Intelligence For IT Operations)', 'MLOps (Machine Learning Operations)', 'ModelOps'

Speech and Audio Processing: 'Speech Processing', 'Speech Synthesis', 'Text-To-Speech', 'Voice Assistant Technology'

Other: 'Dialogflow (Google Service)', 'Document Classification', 'Quantization', 'Sensor Fusion'

B OJV industry and occupation composition vs. national statistics

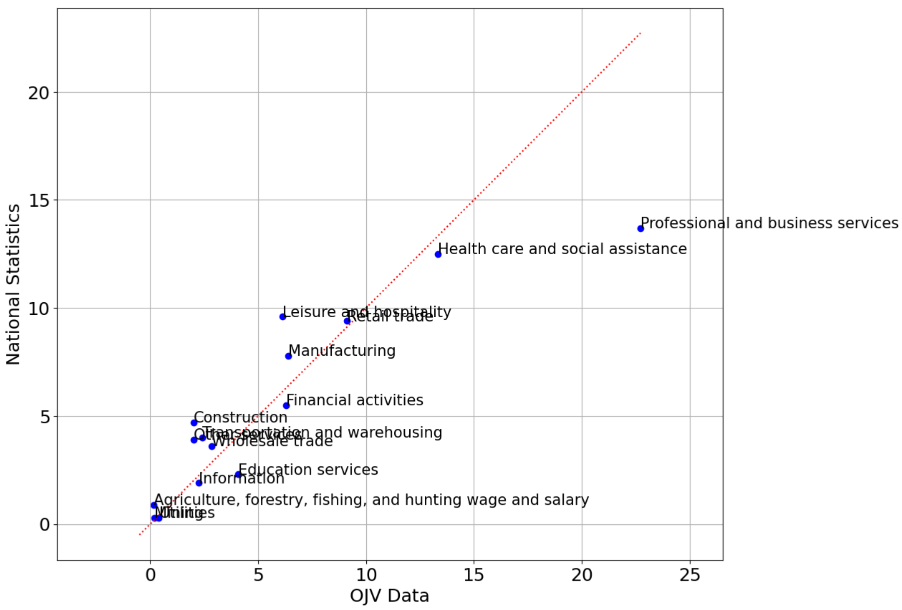

Figure B.1: OJV vs. National Industry Composition

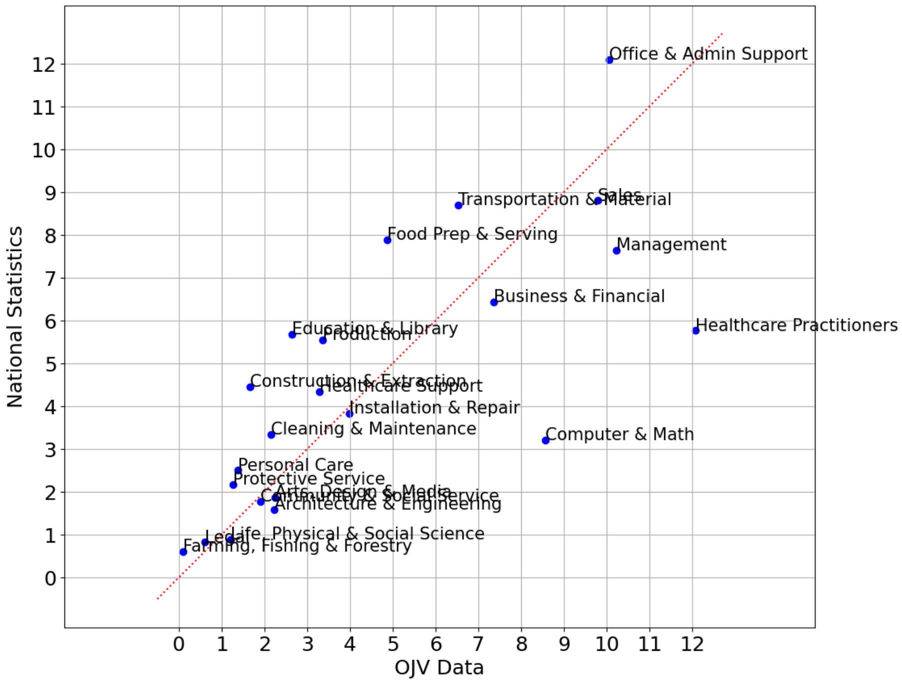

Figure B.2: OJV vs. National Occupation Composition

C Figures

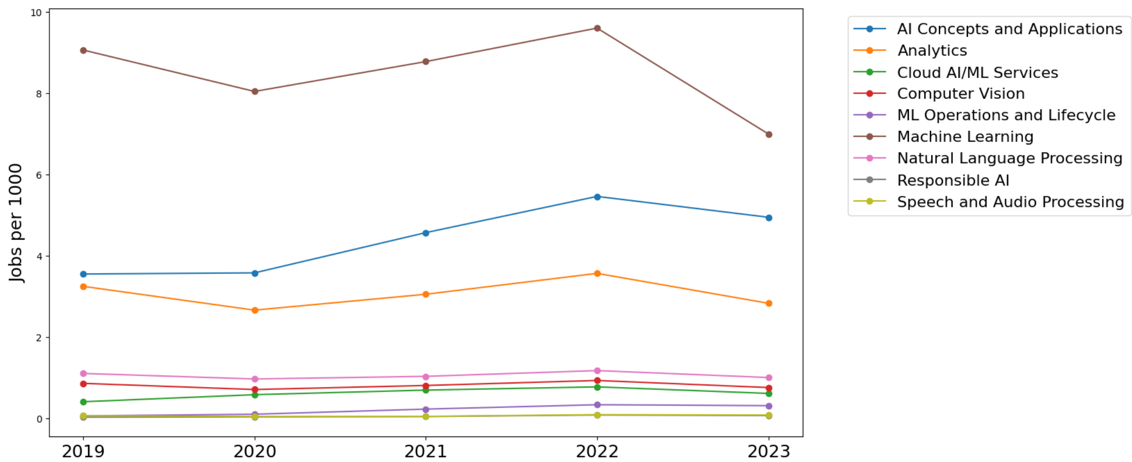

Figure C.1: Jobs by AI Skill Category

Figure C.1 details the job demand trends as jobs per 1000 OJVs for AI subfields from 2019 to 2023. Machine Learning consistently showed the highest number of jobs, followed by AI Concepts and Applications and Analytics. While AI Concepts and Applications and Analytics started at a similar point, the gap increased as AI Concepts and Applications saw more demand. Most subfields experienced a peak around 2022, followed by a decline in 2023 that was particularly pronounced for Machine Learning. More specialized fields like Computer Vision, Responsible AI, Speech and Audio Processing and Natural Language Processing had a lower share of total jobs.

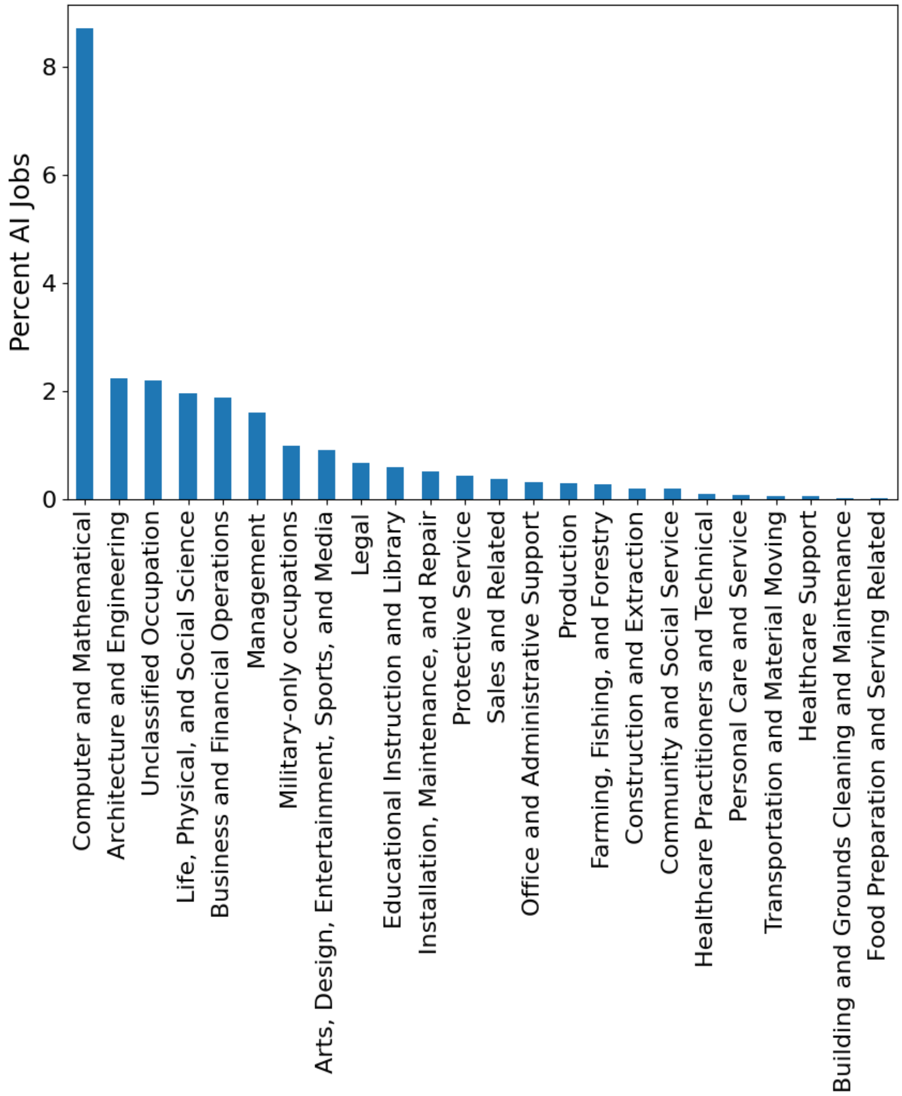

Figure C.2: Percent of AI Jobs in U.S. Occupations

D Regression tables

Table D.1: Logit regression models: Smaller subsample

	Dependent variable: Remote Work			
	(1)	(2)	(3)	(4)
Has AI Skills	0.488***	0.407***	0.304***	0.273***
	(0.068)	(0.069)	(0.069)	(0.070)
0 years				0.073
				(0.085)
1-2 years				0.126***
				(0.036)
11-20 years				0.410***
				(0.101)
2020	0.711***	0.731***	0.749***	0.752***
	(0.054)	(0.055)	(0.055)	(0.055)
2021	1.220***	1.250***	1.276***	1.279***
	(0.050)	(0.050)	(0.050)	(0.050)
2022	1.450***	1.495***	1.509***	1.509***
	(0.048)	(0.048)	(0.049)	(0.049)
2023	1.319***	1.378***	1.398***	1.391***
	(0.050)	(0.051)	(0.051)	(0.051)
3-5 years				0.392***
				(0.034)
6-10 years				0.384***
				(0.045)
Associate degree			-0.120*	-0.215***
			(0.064)	(0.065)
Bachelor's degree			0.398***	0.263***
			(0.030)	(0.032)
High school or GED			-0.430***	-0.478***
			(0.040)	(0.041)
Master's degree			0.532***	0.431***
			(0.075)	(0.076)
Ph.D. or professional degree			0.574***	0.510***
			(0.112)	(0.113)
const	-3.344***	-4.953***	-5.044***	-5.135***
	(0.084)	(0.150)	(0.151)	(0.151)
Fixed Effects				
Industry	No	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Occupation	Yes	Yes	Yes	Yes
Observations	98789	98789	98789	98789
Pseudo R^2	0.133	0.165	0.174	0.177
Note:				*p<0.1; **p<0.05; ***p<0.01

Table D.2: Logit regression models controlled for teleworkable jobs

	Dependent variable: Remote Work	
	(1)	(5)
Has AI Skills	0.718***	0.320***
	(0.007)	(0.008)
Teleworkable	1.889***	1.450***
	(0.003)	(0.003)
0 years		0.045***
		(0.009)
1-2 years		0.183***
		(0.004)
11-20 years		0.484***
		(0.011)
3-5 years		0.468***
		(0.004)
6-10 years		0.465***
		(0.005)
Associate degree		-0.149***
		(0.007)
Bachelor's degree		0.282***
		(0.003)
High school or GED		-0.409***
		(0.004)
Master's degree		0.344***
		(0.008)
Ph.D. or professional degree		0.476***
		(0.012)
const	-3.632***	-5.754***
	(0.003)	(0.013)
Fixed Effects		
Industry	No	Yes
Year	No	Yes
Observations	9069800	9069800
Pseudo R^2	0.099	0.171
Note:		*p<0.1; **p<0.05; ***p<0.01

Table D.3: Logit regression models: Only teleworkable jobs

	Dependent variable: Remote Work				
	(1)	(2)	(3)	(4)	(5)
Has AI Skills	0.672***	0.342***	0.283***	0.228***	0.202***
	(0.007)	(0.008)	(0.008)	(0.008)	(0.008)
0 years					-0.018
					(0.011)
1-2 years					0.141***
					(0.004)
11-20 years					0.367***
					(0.012)
2020	0.720***	0.746***	0.752***	0.762***	0.763***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
2021	1.203***	1.258***	1.273***	1.290***	1.292***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
2022	1.481***	1.547***	1.574***	1.586***	1.585***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
2023	1.373***	1.471***	1.514***	1.528***	1.524***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
3-5 years					0.314***
					(0.004)
6-10 years					0.359***
					(0.005)
Associate degree				-0.180***	-0.261***
				(0.008)	(0.008)
Bachelor's degree				0.226***	0.109***
				(0.003)	(0.004)
High school or GED				-0.348***	-0.393***
				(0.005)	(0.005)
Master's degree				0.171***	0.084***
				(0.010)	(0.010)
Ph.D. or professional degree				0.361***	0.300***
				(0.015)	(0.015)
const	-1.741***	-3.078***	-3.839***	-3.925***	-4.014***
	(0.001)	(0.011)	(0.018)	(0.018)	(0.018)
Fixed Effects					
Industry	No	No	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes
Occupation	No	Yes	Yes	Yes	Yes
Observations	3914310	3914310	3914310	3914310	3914310
Pseudo R^2	0.002	0.066	0.085	0.090	0.092

Note: *p<0.1; **p<0.05; ***p<0.01

Table D.4: AI subfield logistic regressions(models 1-5)
(1) AI Concepts and Applications, (2) Analytics, (3) Cloud AI/ML Services, (4) Computer Vision, (5) ML Operations and Lifecycle

	Dependent variable: Remote Work				
	(1)	(2)	(3)	(4)	(5)
AI Subfield	0.333***	0.135***	0.182***	-0.110***	0.403***
	(0.011)	(0.015)	(0.029)	(0.031)	(0.047)
0 years	0.059***	0.058***	0.058***	0.058***	0.058***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
1-2 years	0.160***	0.160***	0.160***	0.160***	0.160***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
3-5 years	0.418***	0.419***	0.419***	0.419***	0.419***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
6-10 years	0.436***	0.438***	0.439***	0.439***	0.439***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
11-20 years	0.474***	0.480***	0.481***	0.481***	0.480***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
2020	0.748***	0.749***	0.749***	0.749***	0.749***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
2021	1.189***	1.190***	1.190***	1.190***	1.190***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
2022	1.450***	1.452***	1.452***	1.452***	1.452***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
2023	1.394***	1.396***	1.396***	1.396***	1.396***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
High school or GED	-0.424***	-0.425***	-0.425***	-0.425***	-0.425***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Associate degree	-0.152***	-0.152***	-0.152***	-0.152***	-0.152***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Bachelor's degree	0.255***	0.256***	0.257***	0.257***	0.257***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Master's degree	0.374***	0.381***	0.382***	0.384***	0.383***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Ph.D. or professional degree	0.492***	0.500***	0.501***	0.502***	0.501***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
const	-4.867***	-4.868***	-4.868***	-4.868***	-4.868***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Fixed Effects					
Industry	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes
Occupation	Yes	Yes	Yes	Yes	Yes
Observations	9826238	9826238	9826238	9826238	9826238
Pseudo R^2	0.175	0.175	0.175	0.175	0.175
Note:					*p<0.1; **p<0.05; ***p<0.01

Table D.5: AI subfield logistic regressions (models 6-10)
(6) Machine Learning, (7) Miscellaneous, (8) Natural Language Processing, (9) Responsible AI, (10) Speech and Audio Processing

	Dependent variable: Remote Work				
	(6)	(7)	(8)	(9)	(10)
AI Subfield	0.104***	-0.322***	0.209***	0.281***	0.982***
	(0.009)	(0.077)	(0.023)	(0.101)	(0.087)
0 years	0.058***	0.058***	0.058***	0.058***	0.058***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
1-2 years	0.160***	0.160***	0.160***	0.160***	0.160***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
3-5 years	0.419***	0.419***	0.419***	0.419***	0.419***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
6-10 years	0.439***	0.438***	0.439***	0.439***	0.439***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
11-20 years	0.481***	0.480***	0.481***	0.481***	0.481***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
2020	0.749***	0.749***	0.749***	0.749***	0.749***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
2021	1.190***	1.190***	1.190***	1.190***	1.190***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
2022	1.452***	1.452***	1.452***	1.452***	1.452***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
2023	1.396***	1.396***	1.396***	1.396***	1.396***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
High school or GED	-0.425***	-0.425***	-0.425***	-0.425***	-0.425***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Associate degree	-0.152***	-0.152***	-0.152***	-0.152***	-0.152***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Bachelor's degree	0.257***	0.256***	0.257***	0.256***	0.257***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Master's degree	0.383***	0.377***	0.384***	0.380***	0.383***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Ph.D. or professional degree	0.501***	0.496***	0.501***	0.499***	0.501***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
const	-4.868***	-4.868***	-4.868***	-4.868***	-4.868***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Fixed Effects					
Industry	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes
Occupation	Yes	Yes	Yes	Yes	Yes
Observations	9826238	9826238	9826238	9826238	9826238
Pseudo R^2	0.175	0.175	0.175	0.175	0.175

Note: *p<0.1; **p<0.05; ***p<0.01