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Wage Disparities and Overeducation among Norwegian Business Graduates

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by

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Abstract

This research aims to investigate the comparative advantages of pursuing a master's degree in business ("Siviløkonom") over a bachelor's degree in terms of business-related proficiencies and professional outcomes among Norwegian graduates. Moreover, it seeks to examine gender disparities in these outcomes and scrutinize the dynamic nature of wage disparities over time. By utilizing cross-sectional data from Statistics Norway (SSB) and employing robust econometric techniques, this study endeavors to measure the occurrence of overeducation by analyzing salary differentials between individuals holding bachelor's and master's degrees in the field of business.

The findings underscore substantial wage disparities among business graduates, even after controlling for various factors. Specifically, business graduates with a master's degree enjoy an average wage premium of 24.52% compared to their counterparts with solely a bachelor's degree, thus indicating the enduring advantages of pursuing advanced education. Furthermore, pronounced gender disparities in wages are observed, with women earning 19.52% less than their male counterparts, irrespective of educational attainment. However, female master's graduates demonstrate a significantly higher average wage in comparison to female bachelor's graduates, thereby implying a reduction in the incidence of overeducation. The study also uncovers that wage differentials between business graduates with bachelor's and master's degrees tend to widen as individuals accumulate work experience, thus suggesting a positive correlation between higher educational attainment and increasing earnings gaps. Moreover, the study finds that wage disparities between master and bachelor business graduates vary across sectors, with higher-salary sectors showing larger gaps, favoring master's degree holders, while lower-salary sectors exhibit smaller differentials.

The study contributes valuable insights regarding the benefits of a master's degree in business and the presence of wage disparities. However, it is imperative for future research to delve into the nexus between wages and skills, explore variations across diverse educational institutions and sectors, and investigate the factors that contribute to occupational disparities experienced by females in low-paid sectors.

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1 Introduction

Educational participation has changed dramatically and rapidly during the past three decades. Particularly, one finds major shifts in higher education and substantial rises in the number of men and women in the workforce who possess a university degree. One of the most well-documented facts in labor economics is that individuals with a greater level of education receive higher wages and hold more prestigious jobs than those with a lower level of education. Nonetheless, as the average educational level of the labor force has grown, there are signs that the occupational structure of the labor market lacks the potential to absorb the growing number of educated employees into typical graduate employment. The literature refers to this condition as overeducation, which is the degree to which an individual obtains a higher level of education than is necessary for their specific occupation (McGuinness, 2006).

Overeducation may be detrimental to the economy, the business, and the individual. On a macroeconomic scale, national welfare may be lower than it would be if the abilities of all overeducated employees were fully employed in the economy (McGuinness, 2006). Furthermore, it is possible that tax money is being squandered on providing individuals with non-productive education. Tsang (1987) suggests that, at the level of the business, overeducation relates to decreased productivity. Studies examining the effects of overeducation have revealed that overeducated people earn less than those with occupations corresponding with their degrees, resulting in decreased job satisfaction (Dolton & Silles, 2008; Tsang, 1987). There have also been reports of greater turnover rates among overeducated employees, indicating that companies employing such people are more likely to incur losses on training, recruiting, and screening (Alba-Ramírez, 1993; Sloane et al., 1999). According to McGuinness (2006), there is also the probability that initially well-matched employees in the economy will be downgraded in the labor market, if not entirely eliminated, as overeducated people migrate into lower-level occupations.

Overeducation is more widespread in labor markets when the average degree of education of employees is high, as is typical in developed nations. Thus, this paper investigates the educational discrepancy in a developed nation and its impact on

wage disparities. We use a quantitative approach assessing the effect of overeducation on employees' wages in the economic and administrative sector using cross-sectional data for Norway over the period 2002 to 2021. In Norway, the tertiary attainment rate is high. From 2016 to 2021, the percentage of individuals holding a university degree in Norway increased from 32.2% to 36.0% (SSB, 2022). It is evident that Norway has pursued a "high-skill approach" that combines high participation in higher education with an active role for the welfare state as an employer (Esping-Andersen, 1999). Differentiation of higher education may also play an important role. As higher education increases in Norway, its institutional characteristics, such as the distinction between bachelor's and master's degrees, may become more significant in elucidating the phenomenon of overeducation (Barone & Ortiz, 2011).

The current study aims to investigate the degree to which the Norwegian economic master graduates holding the protected title "Siviløkonom", compared to individuals with only a bachelor's degree in business, improve their business-related abilities and achieve professional advantages in terms of salary. The study will also investigate the returns in terms of gender.

The paper contributes to the current body of knowledge in several ways. First, it corresponds to the literature on the impact of overeducation on wage returns. The majority of research focuses on developed nations, and the comprehensive examination of overeducation has led to the conclusion that overeducated employees earn less than others with the same degree of education who have employment commensurate with their level of education. However, overeducated professionals earn more than their non-overeducated coworkers in the same occupation. Second, recent developments in the overeducation literature in Norway provide pertinent empirical evidence. These studies demonstrate that overeducation is evident in the Norwegian labor market, indicating the necessity to analyze this phenomenon. In addition, the number of individuals holding a university degree in Norway is steadily increasing. Thus, the research contributes to the current knowledge in developed countries by analyzing the effect of rising tertiary education levels on earnings.

The subsequent sections of this research paper are structured in the following manner. Chapter 2 provides a comprehensive exploration of the study's contextual background. It encompasses a meticulous examination of empirical evidence concerning overeducation, its temporal dynamics, and the presentation of pertinent theoretical perspectives aimed at elucidating the underlying drivers of overeducation. Moving forward, Chapter 3 introduces the dataset utilized for the analysis accompanied by a thorough discussion of their inherent limitations and the consequent challenges entailed in interpreting the obtained results. Chapter 4 expounds upon the methodological approaches employed. In Chapter 5, the findings derived from the analysis are unveiled and discussed. Finally, Chapter 6 serves as the culmination of this research, offering a comprehensive synthesis of the study's insights, concluding remarks, and their broader implications.

1.1 Limitations and prerequisites

Our primary data collection tool in this study was Microdata.no, a recently developed statistical programming tool jointly created by the SSB (Statistics Norway) and the NSD (Norwegian Centre for Research Data). While Microdata.no offers a wealth of significant demographic information pertaining to the Norwegian population, it possesses certain limitations as a programming tool. One notable constraint was the absence of a comprehensive set of analytical tools, which posed a hindrance to the utilization of this web-based programming tool for our research purposes. Microdata.no is still being developed, and there are several analytical tools that we were unable to employ.

An additional limitation of this study pertains to the inability to directly measure acquired skills and competencies resulting from work experience and education. These measurements would have provided valuable insights for comparing the actual benefits of education, particularly considering claims made by some scholars that master programs in business might fail to adequately align with the evolving demands of the business world. Such criticisms highlight concerns regarding the program's perceived theoretical nature, dissemination of incorrect information, utilization of ineffective teaching methodologies, and consistent failure to meet expectations (Bruce & Schoenfeld, 2006). While the present study offers general findings concerning the comparison between bachelor's and master's degrees, a

more profound understanding of the underlying reasons behind these results would potentially necessitate a qualitative research approach.

Another limitation of the study pertains to the comparison between business graduates with a bachelor's degree and those with a master's degree. When conducting a comparative analysis of business graduates' salaries with differing degrees, it becomes imperative to account for the presence of confounding variables that can impact the observed outcomes. Particularly noteworthy is the existence of variations in characteristics and motivations between individuals pursuing a master's degree and those concluding their education with a bachelor's degree. These divergences, which are not directly associated with overeducation, wield a substantial influence on salary outcomes. For instance, individuals opting to pursue a master's degree often manifest attributes such as heightened ambition, a stronger dedication to their field of study, and an increased drive for career advancement. Such characteristics can lead to augmented efforts in acquiring relevant work experience, engaging in networking endeavors, and proactively pursuing career opportunities. Conversely, individuals completing their education with a bachelor's degree may harbor dissimilar priorities, motivations, or constraints, which consequently engender disparate career trajectories and salary outcomes.

2 Literature Review

According to some researchers, overeducation has grown increasingly common in recent years because of an increasing supply of highly educated employees and a restricted number of occupations that demand their talents (Lu & Hou, 2020; McGuinness & Sloane, 2011; OECD, 2022a). Others contend that overeducation is a passing trend that will fade as the job market responds to shifting skill demands (Büchel & Mertens, 2004; Quintini, 2011). Regardless, empirical evidence indicates that the initial employment experience can have a substantial and enduring effect on an individual's career trajectory, and being overeducated may impede one's prospects for future work (De Santis et al., 2022). Battu et al. (1999) conducted an 11-year longitudinal analysis of the job histories of two cohorts of university graduates in the United Kingdom, revealing that overeducation was not a transitory circumstance. Instead, their findings suggest a trend where individuals initially

secure employment that requires a degree, but subsequently transition into positions where the value of their degree is diminished.

In this part, international and national empirical evidence on overeducation will be presented. We will examine the evolution of overeducation over time, in addition to the factors that have propelled its evolution. Secondly, we will examine pertinent theories that might contribute in explaining why overeducation exists and provide an overview of the main perspectives on the labor market and evaluate the coherence of each perspective in light of the existence of overeducation in the labor market.

2.1 The size and development of overeducation

The history of overeducation may be traced back to the middle of the twentieth century, when education levels in many developed nations began to rise significantly (Schofer & Meyer, 2005). Economist Richard B. Freeman performed in the 1970s one of the initial studies on overeducation. According to the findings of Freeman's (1976) study, a sizable number of Americans were overeducated for their employment, which related to decreased work satisfaction and wages. The number of overeducated individuals has increased since the 1970s, and the proportion of overeducated employees varies greatly among nations, ranging from 4% in Korea to over 30% in Spain and Greece (OECD, 2022b). Today, nearly one out of four workers in the OECD are over-qualified on average (OECD, 2011).

This section examines the evolution of overeducation since the 1970s. In addition, we will discuss some of the driving forces underlying this development. After that, we will examine overeducation in Norway as well as overeducation among Norwegian “Siviløkonomer”.

2.1.1 Overeducation in an international context

The issue of overeducation has become a growing concern for many developed countries since the 1970s. In the United States, the proportion of college graduates employed in non-college-related occupations surged from 13% in the 1970s to over 25% in the 2010s (OECD, 2019). Similarly, the United Kingdom observed an increase in the percentage of graduates working in non-graduate positions, escalating from 10% in the early 1990s to over 20% in the 2010s (Scherer and

Chevalier, 2019). During the 1980s and 1990s, the issue of overeducation persisted in several countries, albeit at a slower pace. For instance, the European Union recorded a surge in the proportion of higher-educated workers who were overqualified for their jobs, rising from 5% in the early 1990s to 9% in the early 2000s (Eurostat, 2017).

The trend of overeducation has been accelerating since the early 2000s, particularly among younger employees in several countries. In Europe, the proportion of young people aged 25-34 who were overeducated for their employment rose from 28% in the early 2000s to 35% in 2010 and further increased to 37% in 2019 (European Commission, 2020). There are significant variations in the prevalence of overeducation between EU nations, with southern and eastern Europe recording notably high rates. Greece, Cyprus, and Malta had the highest proportion of overeducated employees, with 55%, 54%, and 51%, respectively, in 2019. Similarly, the OECD reported that overeducation persists as a problem in its member nations (OECD, 2020). The average share of tertiary-educated employees who were overqualified for their jobs was 29% in 2018, with significant variations across countries. Spain and Greece had the highest proportion of overeducated employees with tertiary education, with 43% and 41%, respectively, while Finland and Norway had the lowest proportions, with 16% and 18%, respectively. The prevalence of overeducation in Europe and several developed nations remains a significant issue.

It is commonly assumed that overeducation is not an issue in developing countries due to a lack of adequate training opportunities (ILO, 2020). However, this assumption is flawed, as individuals may receive training but still struggle to find employment that matches their skill level. This mismatch between worker qualifications and job requirements leads to reduced productivity, as individuals are unable to utilize their full skill set in their current employment. In fact, there is a significant mismatch between the educational qualifications and labor market demands in developing countries, which is revealed by the fact that approximately 26% of the Mexican labor force exhibited overeducation in 2017, while around 40% of employed tertiary graduates did not work in their specific field of study (OECD, 2017). Similarly, Costa Rica has experienced a significant increase in the prevalence of overeducation, with the overeducation rate rising from 12% in 2000

to 23% in 2011 (Sam, 2018). These findings suggest that overeducation is also becoming a pressing issue in a growing number of emerging economies.

2.1.2 Overeducation among business graduates in a global context

In a global context, the Master of Business Administration (MBA) is a widely recognized degree among business graduates, particularly in the United States. The MBA program provides a rigorous academic curriculum that combines theoretical and practical training in the fields of business or investment management (Kagan, 2022). The degree is perceived globally as a key path to senior executive positions and is designed to equip graduates with a comprehensive understanding of the fundamental principles and practices of general business management functions (Mazza et al., 2005). The proliferation of management and management education in Europe and other parts of the world can be attributed to the growth of MBA programs (Mazza et al., 2005). MBA graduates can make more than twice as much as those without an MBA, and the degree can lead to increased management abilities, career advancement, and wide business insights (Zhao et al., 2006; Cameron, 2008; Temtime and Mmereki, 2011). However, the MBA program has received criticism in recent years for failing to keep up with the demands of the business world (Bruce & Schoenfeld, 2006). Despite these benefits, the primary argument against MBAs is that the knowledge and skills taught in MBA programs are too theoretical and do not adequately correspond to practitioners' needs (Baruch, 2009). While some argue that an MBA is crucial for advancing to senior management roles (Manning and Dimovski, 2007), the proportion of directors with an MBA degree serving on the boards of top corporations is relatively low, and having an MBA is not always accompanied by greater financial benefits (Ng et al., 2008). When considering the issue of overeducation among MBA degree holders, the available evidence indicates a consistent excess of graduates in comparison to the demand within their respective occupations (Habibi, 2015). Specifically, it has been found that a minimum of 30% of such graduates in America remain overeducated even after a decade since their graduation. These findings prompt us to critically examine the actual returns on a master's degree in terms of the opportunities, career trajectories, and salary prospects it affords. Considering this phenomenon within the context of Norway, it becomes essential to delve deeper into the factors that contribute to the observed patterns and variations.

2.1.3 Overeducation in Norway

The number of students enrolled in universities in Norway remained relatively stable until the late 1980s, lingering around 40,000 since the mid-1970s (Aamodt & Stølen, 2003). However, between the late 1980s and the mid-1990s, university enrolment increased significantly, before reaching a plateau. Today, Norway boasts a remarkable educational achievement as it ranks among the top countries with a significant proportion of its populace holding tertiary qualifications. In the last ten years, overall enrolment in higher education in Norway has increased by 30% (OECD, 2018). Nonetheless, the rapid expansion of the education sector has created a condition where there is a surplus of highly educated individuals. As of the early 2010s, Norway's tertiary education attainment rate was above the OECD average, with 47% of those aged 25-34 having attained this level in 2011, compared to the OECD average of 39% (Vera-Toscano & Meroni, 2020).

Based on a report submitted to the Norwegian government, it has been found that a majority of individuals who possess higher education qualifications in Norway are able to obtain employment that is relevant to their field of study. Furthermore, employers express a high degree of satisfaction regarding the level of competence exhibited by these candidates (Regjeringen, 2021; OECD, 2018). Furthermore, Kompetansebehovsutvalget (KBU) confirms that graduates with higher education qualifications are consistently successful in obtaining employment that is both suitable and advantageous to their professional aspirations (Regjeringen, 2021). In a similar vein, these candidates can fulfill the expectations of their employers to a significant extent. Thus, despite the substantial increase in the number of individuals in Norway obtaining a master's degree or equivalent over the past decade, there has been no corresponding rise in the proportion of such degree holders who remain overeducated six months after completing their education (Støren et al., 2014). Nevertheless, the issue of overeducation remains prevalent in Norway. The subsequent paragraphs will address some of the underlying factors contributing to this phenomenon.

The escalation of labor market competition in Norway could be a notable driver of overeducation, whereby employers have progressively raised the educational requirements for positions that were once considered low-skilled (OECD, 2018). This trend is partly due to the increasing demand for skilled workers, driven by

technological advancements and shifts in the economy. Consequently, individuals possessing higher levels of education are increasingly favored for occupations previously held by those with lower educational qualifications. Nonetheless, the increase in demand for skilled labor has resulted in a scenario where individuals pursue education beyond the requirements of their occupation to improve their employability prospects. This trend is particularly evident among younger individuals who are entering the labor market, as they face heightened competition for jobs compared to previous generations due to the expanded pool of graduates and face a greater risk of unemployment (SSB, 2018). In fact, the percentage of low-educated young people in employment or education has declined from 74% in 2008 to 64% in 2018. The labor market has witnessed a reduction in job opportunities that were once prevalent among individuals with lower educational qualifications. Thus, the competition for these jobs has intensified. Industries that traditionally employed a significant proportion of young people with low educational attainment have witnessed a weaker growth rate in terms of the number of employees compared to the average for the entire economy, and the number of employees under 30 years of age has declined. Furthermore, a growing number of individuals who work in industries with lower requirements for formal competence possess university or college-level education.

In Norway, the expansion of the education system might be a driver of overeducation. Norway has a comprehensive and well-developed education system that ensures access to education at all levels. There has been a consistent rise in the number of individuals applying for higher education and the corresponding number of planned study places at educational institutions over the past few decades. Between 2012 and 2022, the number of applicants increased from 117,691 to 133,600, and the number of planned study places rose from 51,252 to 62,500 (Regjeringen, 2023). Furthermore, in the fall of 2020, the number of students enrolled in Norwegian higher education institutions reached a record high of nearly 292,000 (Regjeringen, 2021). This expansion has resulted in a surge of individuals with higher education qualifications, leading to a mismatch between the supply and demand for high-skilled workers in the labor market (OECD, 2014). Additionally, the expansion has triggered an increase in competition for jobs, which has incentivized individuals to pursue higher qualifications to distinguish themselves from other candidates.

Nonetheless, according to the SSB, there is an anticipated rise in demand for college and university educated labor until 2030, with higher education becoming increasingly vital (Støren et al., 2014). This growth is also reflected in the demand for most courses in higher education. Additionally, both the numerical and proportional representation of the workforce equipped with a tertiary degree, specifically a master's degree, is expected to rise during the projection period (Dapi et al., 2016). This shift is attributable to changes in industry composition, particularly the growth of service industries, as well as within-industry changes that favor individuals with tertiary education due to technological advancements. These developments are expected to yield a reduction in overeducation, as the increased alignment between skill demands and supply within the labor market would reduce the extent to which highly educated workers are occupying positions that require skills that are below their educational attainment. Consequently, the enhanced efficiency of the labor market is expected to lead to an increase in employment opportunities for individuals possessing extensive tertiary education.

2.1.4 Overeducation among Norwegian business graduates

Although the MBA has garnered widespread recognition across Europe and Norway, there are specialized degree programs tailored to the local business landscape. The Norwegian "Siviløkonom" program is a protected professional title that requires an extensive five-year course of study in economics and business administration (SNL, 2023). "Siviløkonom" is a prestigious title which is regulated by a rigorous set of standards in Norway. The program's primary focus is on business economics and is specifically designed to address the demands of the Norwegian business industry, emphasizing leadership development, sustainability, and innovation. As "Siviløkonom" holds greater prominence than the MBA in Norway, we have decided to concentrate our research efforts on individuals who have obtained this prestigious title.

The expansion of Norway's education system has resulted in a growing number of students pursuing business administration degrees. Historically, the Norwegian School of Economics (NHH) held a dominant position in offering the "Siviløkonom" program, conferring a sense of prestige on its graduates (Amdam & Kvalshaugen, 2017; Wiers-Jenssen et al., 2014). Consequently, most graduates

secured desirable initial employment opportunities upon completing their studies (Kvålshaugen & Amdam, 2014). It was not until the 1980s that other universities and colleges were granted permission to grant the “Siviløkonom” designation. However, since the 1970s, other universities and colleges across the country have established programs in response to the demand for economic education (Wiers-Jenssen et al., 2014). This development may have contributed to a potential decline in the exclusivity of the “Siviløkonom” designation. Presently, there are 15 institutions offering master's level education, with 11 universities or colleges providing siviløkonom programs. Significantly, there exist substantial variations in the entry requirements and admission standards among these educational institutions, particularly with NHH upholding a more stringent threshold in comparison to other academic establishments (Samordna opptak, 2014). This discrepancy might imply that the “Siviløkonom” education at NHH continues to be perceived as prestigious, given the greater difficulty associated with securing admission to this program compared to alternative institutions.

Despite these changes, there is limited evidence suggesting overeducation among “siviløkonomer” in Norway. A study from NIFU investigating the degree to which Norwegian master's degree students from diverse academic backgrounds obtained relevant employment opportunities within two to three years of graduation showed that most individuals employed in professions that typically require a master's degree also believe that their job duties necessitate such an advanced degree (Næss & Støren, 2018). A significant 87% of “Siviløkonom” were engaged in "secure master's degree occupations". Additionally, 70% of these professionals opined that their job responsibilities necessitated education at their level or above. Moreover, while 59% of “Siviløkonom” were to some extent overeducated six months after graduation, this proportion reduced significantly to 30% two to three years after graduation. These findings suggest a dynamic labor market where the distribution of qualifications aligns more accurately with job requirements as time elapses after graduation.

According to statistics from 2021, an unprecedented 93% of individuals who graduated as “Siviløkonom” from the Norwegian School of Economics (NHH) secured employment within six months of completing their studies and their average salary has experienced an increase (Fykse, 2021). Notably, the employment rate

for NHH graduates has consistently risen over the past three years, standing at 92%, 90%, and 88% in the preceding years. Furthermore, a staggering 97% of NHH alumni claim to be employed in a field that aligns with their academic background, which serves as a strong indication that they are not likely to be overeducated for their respective positions. Similarly, 76% of the master's students who completed their studies at the BI Norwegian Business School in the spring of 2019 had secured permanent employment before their final exams (Kvadsheim, 2020). Six months after graduation, 95% of them were employed, which is an increase from 91.2% the previous year. Of those who responded to the job market survey, 19.3% work in either auditing or consulting. The statistics presented herein are consistent with the report submitted to the Norwegian government, which indicates that a significant proportion of individuals who possess higher education credentials are able to secure employment that aligns with their area of study.

2.2 Reasons for Overeducation

Given the central role of wages as an indicator of overeducation, it becomes imperative to thoroughly analyze the intricate interplay between human capital and wage outcomes. The examination of overeducation involves considering multiple theoretical perspectives, with this study specifically focusing on exploring the implications of human capital theory within this context. The decision to investigate the implications of this theory for overeducation is motivated by its premise that an individual's level of education has a direct impact on their wages, regardless of the alignment between their job and educational qualifications. Thus, the study aims to delve deeper into the consequences that arise from applying human capital theory to the phenomenon of overeducation.

2.2.1 Human Capital and Overeducation

Human Capital Theory (HCT) posits that people invest in education to maximize their utility and pay on the labor market, whereas corporations are eager to fully utilize workers' abilities and knowledge to achieve optimum production (Capsada-Munsech, 2017). This theory argues that both individuals and businesses choose the optimal option to achieve an acceptable match, and that preferences are homogeneous. According to the HCT, employees are always paid their marginal output, and there should be no underutilization of human capital in a labor market

in equilibrium (Pseiridis et al., 2018). A transitory mismatch between work features and human capital traits or a statistical artifact may produce overeducation in the short term. Long-term, however, both companies and individuals will make the required technical and administrative modifications, and imbalances will be eliminated.

Considering HCT, the premise that companies are ready to fully exploit the abilities of their workforce by modifying their production processes in accordance with any shift in the corresponding supply of labor arises expressly from the assumption that employees will always be paid their marginal output (McGuinness, 2006). Thus, wages will always equal a worker's marginal product, which in turn will be decided by the amount of human capital a worker has acquired through formal education or on-the-job training. With this understanding of the labor market, overeducation, which relates to worker underutilization and wage rates below the marginal product, would seem incongruous. Nonetheless, some scholars have continued to maintain that HCT is perfectly consistent despite the prevalence of overeducation.

It is also possible that overeducated employees are in some manner less capable than their suitably matched counterparts; consequently, lower earnings are only a reflection of inferior ability or productivity (McGuinness, 2006). If the empirical methodology is incapable of detecting any potential skill disparities, this will also inject bias into the estimated pay impacts of overeducation. In summary, the HCT proposes that an individual's salary is determined by their human capital, including factors such as education and experience, and their marginal productivity, rather than their job type. This implies that an individual's level of education has a direct impact on their wages, regardless of whether their job is a good fit for their education level. However, some economists argue that this only applies if companies can make full use of each employee's potential, which is challenging according to Duncan & Hoffman (1981), Hartog & Oosterbeek (1988), and Rumberger (1987). When companies are unable to maximize employee potential, wages will instead be influenced by the job type.

2.2.1.1 The Return on Education and Work Experience

Education is a widely discussed source of human capital, with studies consistently demonstrating that individuals with higher levels of education earn more than those

with lower levels (Hægeland, 2003). However, determining the precise returns to education is challenging due to several reasons. Firstly, the returns on education vary across industries, levels, and fields of study, with the private sector generally offering higher returns compared to the public sector. For instance, Raaum et al. (1999) found that individuals in professions such as “Siviløkonom”, medicine, law, and civil engineering enjoy significantly higher returns on their education than teachers and nurses. Secondly, it is likely that different individuals have different returns on their education, as factors such as IQ may influence both the length of education chosen and wages earned. This may result in a correlation between the independent variable and the error term, leading to biased estimates of the returns to education.

In addition to education, work experience and job training are also important investments in human capital, contributing to higher wages (Becker, 1993). However, this also implies an opportunity cost of education as individuals miss out on potential work experience. The question then arises whether work experience can substitute formal education or whether work experience and education complement each other (Hægeland, 2003). A study by Hægeland (2002) demonstrated that the returns to work experience and seniority increase with the level of education, suggesting that education and work experience are complementary and the returns on education are realized over time. This is because higher education leads to higher wage growth as individuals gain more work experience or seniority (Hægeland, 2003).

2.2.1.2 The Effect of Overeducation on Wages

According to NIFU's report, candidates with job responsibilities that require higher education, but at a lower level than their education, experienced that gross monthly salary was about 3% lower than for candidates with the appropriate level of education (Støren et al., 2014). Those who have job responsibilities that do not require higher education but still provide an advantage to have, have a 7% lower salary. For those who work in a position where higher education is entirely irrelevant, the salary was 24% lower. These findings confirm the validity of the candidates' self-reported goals for over education as a measure.

Moreover, the analyses showed that the effect of overeducation on wages varied significantly by field of study, sector of employment, and gender, having the most significant impact on women's wages (Støren et al., 2014). The wage gap between overeducated and non-overeducated candidates was most significant for candidates in social science fields, but relatively small for those in educational, natural science, and technical fields. Overall, the report found that wage differences between overeducated and non-overeducated workers were more significant in the private sector than in the public sector.

2.2.1.3 The Effect of Gender on Overeducation and Wages

Over the course of history, women have consistently earned lower wages compared to their male counterparts, highlighting the significance of gender as a crucial consideration in the measurement of overeducation. According to Boto-Garcia and Escalonilla (2022), women are more exposed to overeducation. Historically, women have had a weaker labor market attachment than men, opting for part-time employment and experiencing more frequent and longer career breaks during the parenting phase (Østbakken and Frisell, 2021). Empirical evidence also shows that women receive less job-related training and education compared to equally qualified men, which can be attributed to their weaker labor market attachment and employers' reluctance to invest in training for potentially transient employees (Barron et al., 1993).

Another potential explanation for wage disparities between genders is the influence of family dynamics, specifically the impact of having children. It is observed that women with children tend to earn less than their childless counterparts, despite similar characteristics (Cukrowska-Torzewska and Matysiak, 2020), which is commonly referred to as the "motherhood penalty". Various factors contribute to this phenomenon. Maternity leave, during and after pregnancy, can lead to a depreciation of women's human capital as they are absent from the workforce. Moreover, many women prioritize job flexibility to meet their caregiving responsibilities (Felfe, 2012). This reduced labor market attachment and limited work experience have implications for wage progression. Furthermore, research indicates that early childbirth negatively impacts wage growth, as the returns on work experience diminish over time (Miller, 2011). This effect is particularly prominent in occupations characterized by higher wage growth. Furthermore,

Becker (1991) proposed an economic theory stating that men become more productive upon starting a family and having children. Consequently, men have historically specialized in paid work, allowing them to focus on their careers. The higher earnings of married or family-oriented men may also reflect their distinct characteristics, such as enhanced interpersonal skills (Blau and Winkler, 2018). In general, these mechanisms provide insights into the disparities in wages and overeducation observed between men and women, and they align with the theory of differential overqualification, which posits that females experience higher levels of overeducation due to reduced mobility resulting from family responsibilities (Boto-García & Escalonilla, 2022). Women also exhibit a preference for job positions in proximity to their residences and prioritize job security, while men demonstrate a stronger motivation for financial rewards and career advancement.

Gender disparities in wages are influenced by the phenomenon of gender segregation in the labor market, which can be observed in both horizontal and vertical dimensions. Horizontal segregation refers to the tendency of women and men to concentrate in different occupations and industries (Melkas & Anker, 1998). For instance, women are overrepresented in sectors such as healthcare and services, while men dominate skilled trades (Grybaite, 2006). Similarly, women are more prevalent in the public sector, while the private sector is predominantly male (Fløtre and Tuv, 2022). Preston (1999) finds that female-dominated occupations often involve less responsibility, control over work, and fewer opportunities for advancement. Thus, horizontal occupational segregation can hinder women's career development and contribute to the gender wage gap. Vertical segregation, on the other hand, pertains to the unequal distribution of women and men across job hierarchies, with men predominantly occupying higher-level positions (Jensen and Øistad, 2019). The factors contributing to this segregation include educational patterns and the perceived conflict between family and work, particularly for female leaders (Blau & Winkler, 2018). While not solely driven by discrimination, gender disparities in the labor market can also stem from societal barriers, including biased recruitment practices and stereotypical notions about leadership abilities. The significance and relevance of examining the gender aspect in relation to the research questions are underscored by these findings, as the outcomes have the potential to vary substantially between males and females.

Through this review of pertinent literature concerning the issue of overeducation among business graduates, this research endeavors to explore the following research questions:

RQ1: To what extent is earning a master's degree advantageous in the long term in relation to salary?

RQ2: Are the results different for men and women?

RQ3: How do wage disparities between bachelor and master graduates evolve throughout the career trajectory?

3 Data

The following sections provide a comprehensive overview of the datasets and methodology employed in the analysis. A quantitative approach is adopted to assess the occurrence of overeducation, utilizing cross-sectional data obtained from Statistics Norway (SSB). Specifically, the measurement of overeducation is based on the examination of salary differentials between bachelor's and master's degree holders in the field of business. This is motivated by the theoretical framework of human capital theory, which postulates that remuneration serves as an embodiment of an individual's accrued human capital, encompassing educational attainment, experiential knowledge, and skill proficiencies. By scrutinizing disparities in salaries among candidates with divergent levels of educational attainment within a specific occupational realm, insights can be gleaned regarding the extent to which individuals with higher education are compensated commensurate with their respective educational credentials. Initially, the selection process and description of the data sets are presented, outlining the key characteristics and considerations. Subsequently, the methodology employed for analyzing the selected data is outlined, highlighting the specific techniques and procedures employed to derive meaningful insights.

3.1 Selection Process and Comprehensive Description of Data Sets in Present Study

The collected data is unmanipulated and on an individual-level, and provides detailed information on educational attainment, employment outcomes, income, and other relevant variables. Access to this data is facilitated using Microdata.no, a data-sharing platform operated by a collaboration between Statistics Norway (SSB) and the knowledge sector's private provider, Sikt.

The data obtained through Microdata.no is subject to strict privacy and confidentiality protocols, ensuring the protection of individuals' personal information (Microdata.no, n.d). As such, access to this data is only granted to authorized researchers who have undergone a rigorous vetting process and are committed to adhering to the ethical principles of data privacy and confidentiality. The use of this data enables a comprehensive analysis of the relative advantages of pursuing a master's degree versus a bachelor's degree, while also allowing for the examination of potential confounding factors that may impact outcomes.

3.1.1 Data Set with Educational Degree

The present research endeavors to explore the aforementioned issue within the economic sector, utilizing a dataset composed of individuals possessing either a business-administration degree or a master's degree that confers the "Siviløkonom" designation. Moreover, an additional goal of this investigation is to ascertain whether disparities exist between genders. This section will provide a description of the participants and outline the methodology employed in the selection process.

The analytical framework utilized in this study centers upon individuals possessing educational qualifications that are deemed suitable for obtaining either a business-administration bachelor's degree or a master's degree that confers the "Siviløkonom" designation. The NUS-code, which represents "The Norwegian Standard Classification of Education," is employed to identify the highest level of education attained by each individual. This code serves as a means for categorizing an individual's educational background and activities (SSB, 2023a). Therefore, the dataset exclusively consists of individuals possessing codes that commence with

'6411' or '7411,' which correspond to a business-administration bachelor's degree and the "Siviløkonom" title, respectively.

3.1.2 Selection Process in Microdata

Table 1: Selection process for the dataset used in the analysis.

Selection Process

	Total Count	Removed	Bachelor	Master
Selection Process All Business Graduates				
(1) Population 01.01.2021	8 603 935			
(2) Remove individuals living outside of Norway	5 391 373	3 212 562		
(2) Keep relevant educations	124 784	6 545 114	72 901	51 885
(3) Retain only wage earners	101 974	22 810	57 393	44 577
(4) Remove individuals with unspecified information	93 903	8 071	52 374	41 522
Final selection	93 903		52 374	41 522

Table 1 shows the selection process for the dataset used in the analysis. Business graduates are candidates with relevant educations where the NUS-code starts with '6411' and '7411'. The analysis has only kept the ones that include a finished bachelor or master. Individuals with unreported information are removed because of missing observations for some of the variables.

Table 1 provides a comprehensive account of the selection process employed in obtaining the datasets utilized in this analysis. The initial phase of this process involved examining all graduates up to the present date, yielding a sample size of 93,903 individuals. The selection criteria required importing all individuals residing within the boundaries of Norway as of 01.01.2021, while excluding those who were domiciled outside of the country, to ensure that the analysis exclusively pertains to the Norwegian context. Next, we retained only those individuals possessing relevant educational qualifications. A complete list of the educational programs can be found in A1.3 in the Appendix. Further, we have restricted the sample to wage earners. Finally, individuals with incomplete observations were excluded from the dataset, as these would not be included in the subsequent regression analyses.

Subsequent sections of the table adopt a similar methodology, albeit with the additional constraint of limiting the sample to individuals who graduated prior to specific years, namely, 2005, 2009, 2013, and 2017, respectively. The corresponding subsections contain 50,843, 61,888, 75,272, and 92,536 individuals, and are listed in Table A1.1 the Appendix. The rationale behind this methodology is to facilitate a comprehensive analysis of the evolution and tendencies concerning the interrelation among education, salary, and job position. The study is

constrained by the availability of Microdata, which necessitated a focus on data from 2005 and subsequent years. This time frame was deemed optimal to obtain reliable measures and an adequate sample size. It is important to consider this limitation in the context of the evolution of Norwegian business degrees, as the clear distinction between bachelor's and master's degrees was not as prevalent during the period under investigation. Instead, the norm was primarily centered around the attainment or nonattainment of a degree.

3.2 Salary

The focal variable of interest in our study is the individual's full-time equivalent monthly salary, which serves as the dependent variable. This measure is consistently assessed across all datasets used in our analysis and is reported in 2021 values. In other words, in the datasets measuring individuals who graduated prior the specific years (2005, 2009, 2013, and 2017), are accumulated, and the monthly salary for the individuals is measured in 2021. This is done to provide a longitudinal perspective on the impact of work experience on earnings. It enables the observation of trends, patterns, and changes in wage growth as individuals accumulate more years of experience. In addition, using a consistent measurement point accounts for the effects of inflation and economic fluctuations. It allows for a more accurate assessment of real wage growth, as salary figures from different years are adjusted to a common reference point.

Equivalent monthly salary is the same variable SSB uses in their statistics involving salaries, and it includes agreed monthly salary, irregular additions, and bonuses. Using this variable gives the opportunity to study salary differences with an overall payment from the employment excluding other sources of income. The data employed in this study is sourced from a program that comprises a coordinated repository of data pertaining to employment conditions, remuneration, and taxation, jointly managed by SSB, NAV, and the Norwegian Tax Agency (SSB, 2023b).

Given that salary figures may assume highly positive values, the regression model incorporates the natural logarithm of the salary, rendering it log-linear. This is intended to alleviate the issue of skewed distribution that may arise when a small

subset of individuals command exceedingly high salaries. Additionally, the logarithmic transformation serves to reduce the magnitude of the difference between the highest and lowest salary values, thereby enhancing the robustness of the results in the presence of potential outliers.

Table 2: Full-time equivalent monthly salary in 2021

	Male			Female		
	Mean	Std	Median	Mean	Std	Median
Bachelor Business Graduates						
Monthly Income	63 325.16	26 805.56	55 600	56 310.38	19 804.77	50 900
ln (Monthly income)	11.13	0.41	11.08	10.97	0.33	10.92
Master Business Graduates						
Monthly Income	80 914.81	31 705.93	72 500	68 413.63	23 558.13	62 200
ln (Monthly income)	11.37	0.42	11.32	11.18	0.35	11.14

The table shows the full-time equivalent monthly income for both bachelor's and master's degree individuals.

Table 2 displays the descriptive statistics for the dependent variable, which is the full-time equivalent income. It should be noted that the numbers presented in the table are subject to winsorization by Microdata, which results in a slight loss of precision. The procedure involves adding the 1% highest values to the 99-percentile and adding the 1% lowest values to the 1-percentile. Consequently, the estimates for mean monthly income and mean logarithmic monthly income may not be entirely accurate and may deviate slightly. The median remains unaffected by this treatment.

The presented table indicates that individuals holding a bachelor's degree earn a lower salary than those with a master's degree, irrespective of gender. The log average monthly income for male bachelor's degree holders was estimated to be 11.13, corresponding to NOK 63,325.16, and for female bachelor's degree holders it was 10.97, corresponding to NOK 56,310.38. In comparison, male and female master's degree holders had an log average monthly income of 11.37 and 11.18, corresponding to NOK 80,914.81 and NOK 68,413.63, respectively. The table also demonstrates that women tend to have lower salaries than men. Notably, male bachelor's degree holders have a monthly income that is almost equivalent to that of female master's degree holders. The median income is lower than the mean for

both genders and both educational levels. This is due to the skewed distribution of salaries where the highest salaries pull the mean up even after winsoring. Moreover, the standard deviation is higher for both educational levels and genders. However, it is the highest for males, where the logarithmic standard deviation is 0.41 and 0.42 compared to the female standard deviation of 0.33 and 0.35. This suggests that the wage dispersion among males is higher.

3.3 Variables That May Account for Disparities in Salary and Job Position

Further, the independent variables in this analysis are examined and controlled for. The variables are chosen based on comparability and feasibility to conduct, as well as their relevance to the literature. Descriptive statistics will be presented here, and a full exhaustive overview can be found in Appendix A1.2.

Table 3: Descriptive statistics of the independent variables

	Bachelor		Master	
	Male	Female	Male	Female
Work Experience				
Work Experience	11.54	11.5	8.4	7.96
Work Experience ²	149.61	150.18	86.41	79.43
Age				
Mean of Age	45.83	44.28	44.49	43.03
Part-time Employment				
Short part-time	5,02%	4,93%	2,12%	2,33%
Long part-time	4,01%	9,02%	1,66%	3,45%
Full-time	90,98%	86,05%	96,22%	94,22%
Employment Sector				
State-owned Enterprise	4,68%	3,89%	6,99%	6,24%
Private Owned Enterprise	64,70%	59,60%	57,33%	47,70%
Credit Granting Institutions	8,41%	7,09%	9,15%	6,90%
Other Financial Enterprises	1,96%	1,12%	3,81%	1,53%
Insurance	2,07%	1,43%	1,78%	1,59%
Public Administration	15,05%	23,72%	18,40%	32,29%
Non-profit Organizations	2,16%	2,40%	2,10%	3,39%
Self-employed o.l.	0,97%	0,75%	0,43%	0,35%
Gender				
Gender Distribution	47,46%	52,54%	55,14%	44,86%

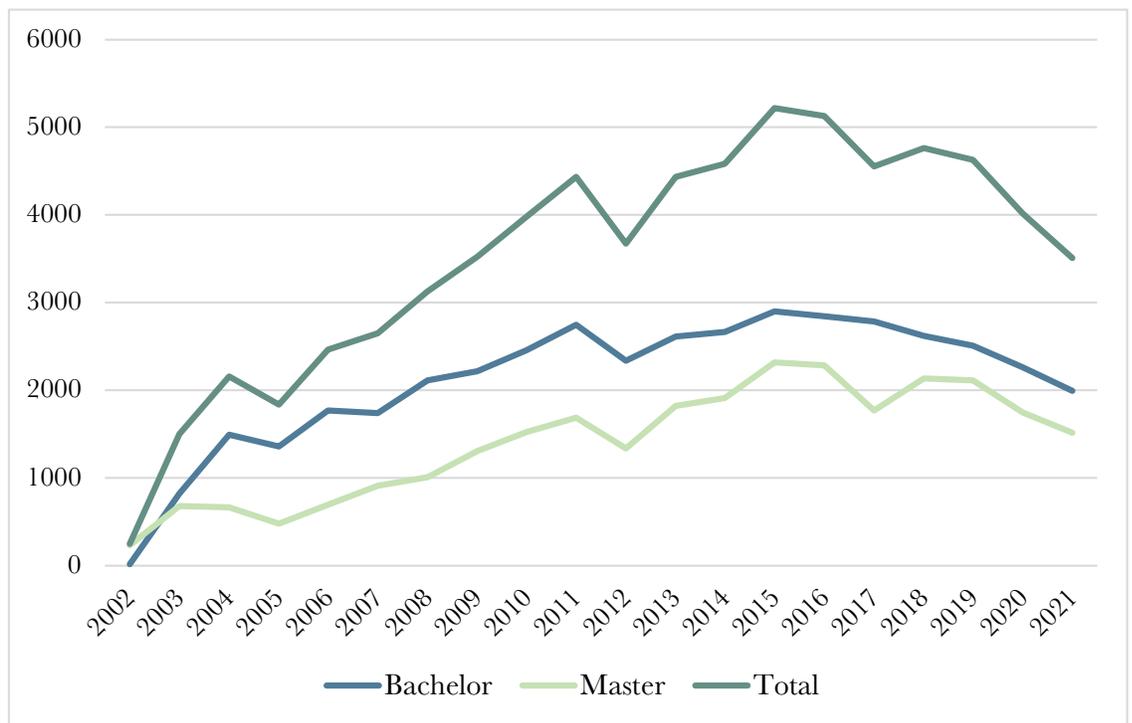
The table shows descriptive statistics of the independent variables. Business graduates are candidates with educations where the NUS-code starts with '6411' and '7411'. Work Experience are number of years after the highest ended education. Short part-time corresponds to a vacancy rate of less than 50%. Long part-time involves a vacancy rate between 50% and 100%. The occupational groups are based on SSB's standard for occupational classification, STYRK-08. The sectors are put together in accordance with SSB's standard for institutional sector grouping. Gender shows the distribution between male and female in each educational level.

3.3.1 Work Experience

The first independent variable is *work experience*. The variable gives the number of years after the individual's graduation. For individuals who have finished both a

bachelor's degree and a master's degree, the first degree will be used when measuring the number of years of experience. The paper presumes that the yield on work experience is decreasing. This implies that the coherence between income and experience is not linear. This means that for each year with experience, the income increases less than the year before. To measure this effect, we have included *work experience*² as an independent variable.

Figure 1: Number of individuals in the selection graduating from 2002-2021



The presented tabular data represents the count of individuals who successfully completed a bachelor's or master's degree program in each academic year spanning from 2002 to 2021. The data is sourced from the Microdata databases NUDB_AAR_FORSTE_FULLF_BACH and NUDB_AAR_FORSTE_FULLF_HOV. The x-axis represents the respective graduation years, while the y-axis indicates the corresponding count of graduating individuals. The provided numbers specifically pertain to the year 2021. The data for the years 2002 and 2021 only encompass eight months of information compared to the remaining years, potentially leading to an underestimation of the actual number of individuals who completed their degrees.

Table 3, presented in section 3.3, unveils a consistent pattern wherein individuals with a bachelor's degree tend to possess a higher level of work experience compared to their counterparts with a master's degree. This discrepancy can be partially

attributed to the disparity in the number of graduates from each degree program, as depicted in Figure 1. Upon closer examination of Table 3, particularly regarding the female cohort, the differences become more pronounced. Specifically, females holding a bachelor's degree exhibit an average of 11.5 years of work experience, which is nearly 4 years more than those with a master's degree who possess an average of 7.96 years of experience. The table also highlights that males, overall, have more work experience than females. This discrepancy can be attributed to the historical gender distribution of business degree completions, as discussed in section 3.3.2.

It is worth noting that Figure 1 also illustrates a decline in the number of graduates in the later years, diverging from the national trend of increased participation in higher education. However, it is important to consider that the data for 2021 only captures information from the first eight months, potentially leading to an underestimation of the actual number of degree completions for that year. A similar situation is observed for the year 2002. Furthermore, it is crucial to acknowledge the possibility of missing values within the selected dataset, which may influence the observed trends and deviate from the actual educational landscape. The data obtained from SSB is the most comprehensive available, and this factor will be taken into consideration throughout the remainder of the paper.

3.3.2 Gender

The second independent variable incorporated into the analysis is gender. Its inclusion stems from the recognition that the impact of educational level and potential overeducation might differ across genders, as evidenced by previous research (Støren et al., 2014). It has been observed that women are more susceptible to overeducation, often choosing part-time employment and encountering more frequent and extended career breaks during the parenting phase.

Table 4 illustrates the percentage of female representation within the sample size. The initial selection, comprising all graduates, is characterized by a 49% female presence. Notably, a discernible upward trend is evident when tracing the sample from 2005 (with 42% female presence) onwards to the present day, indicating an increasing female participation in this domain. Furthermore, the distribution of

gender is relatively balanced across all the years considered in the analysis. The gender distribution for selected years is included in Appendix A1.4.

Table 4: Gender distribution

	Male	Female	Total
Bachelor Business Graduates	24 860	27 519	52 379
Master Business Graduates	22 895	18 626	41 521
Total	47 755	46 145	93 900
Total in %	51%	49%	100%

The table shows the selection process for the datasets used in our analysis. The selection are candidates with the relevant NUS-codes are displayed in Table A1.3 Individuals with unreported information are removed because of missing observations for some of the variables.

3.3.3 Age

The subsequent independent variable is *age*, which is incorporated due to the possibility that certain individuals may have pursued their education much later than others and may have garnered significant work experience beforehand. As work experience alone may fail to account for such circumstances, incorporating age in the analysis can facilitate a better understanding of whether a potentially high salary is associated with seniority.

Table 5: Mean of age

	Gender		
	Male	Female	Total
Bachelor Business Graduates	45.83	44.28	45.01
Master Business Graduates	44.49	43.03	43.84
Total	45.19	43.78	44.49

The table shows the mean of age in 2021 for both educational levels.

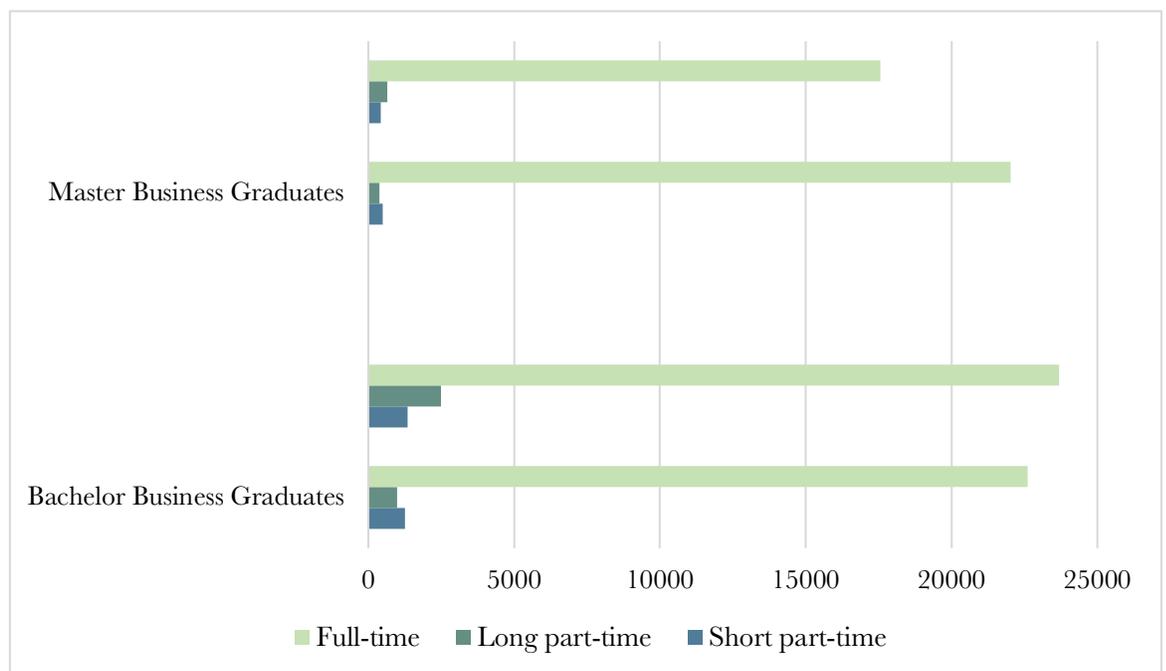
The corresponding statistical information is displayed in Table 5, revealing a relatively normal mean age in the dataset, considering many finish their studies in

their late 20s and work until their late 60s. The selection has males averaging 45.19 years and females averaging 43.78 years.

3.3.4 Part-time Employment

The subsequent independent variable pertains to part-time employment, which is obtained by collecting information about an individual's vacancy rate from the program that comprises a coordinated repository of data pertaining to employment conditions, remuneration, and taxation. In situations where individuals possess multiple employment relationships, their vacancy rates are added together. Moreover, two dummy variables have been created, one each for short and long part-time employment. The former describes a vacancy rate below 50%, whereas the latter pertains to a vacancy rate ranging between 50% and 100%. The inclusion of this variable is necessary to elucidate that individuals working part-time tend to receive lower salaries, a trend that is not apparent with the full-time equivalent variable. Therefore, the paper anticipates that the coefficients will be negative. The complete table can be found in Table A1.5 in the Appendix.

Figure 2: Balance between individuals working full-time and part-time



The figure shows a distribution of the individuals working short part-time, long part-time, and full-time. Short part-time corresponds to a vacancy rate below 50%, long part-time corresponds to a vacancy rate between 50% and 100%.

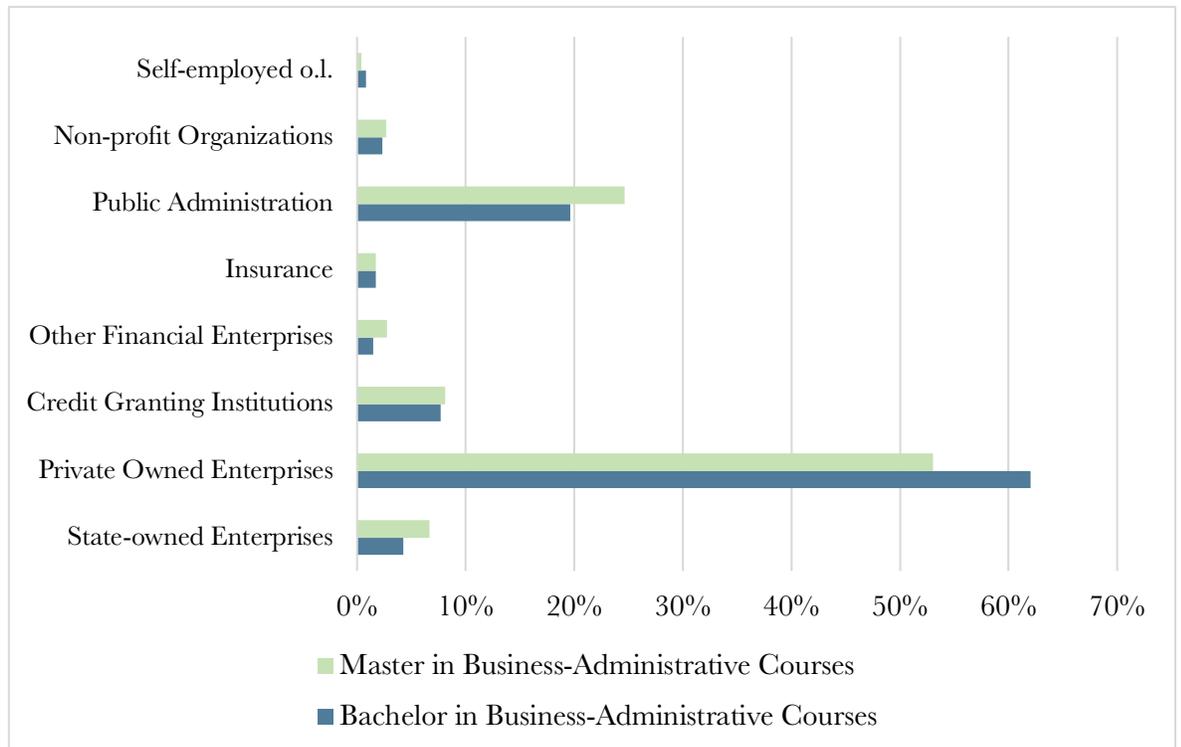
Figure 2 presents the descriptive statistics of Table A1.5 graphically, indicating a relatively small proportion of business graduates employed on a part-time basis, for

both educational levels. Moreover, the results reveal that a higher percentage of individuals with a bachelor's degree work part-time as compared to those with a master's degree. Specifically, at the bachelor's level, 90.98% of males and 86.05% of females are engaged in full-time employment, while at the master's level, the corresponding figures are 96.22% for males and 94.22% for females. Additionally, the data indicate that women constitute a larger percentage of part-time workers, except for the short part-time category among bachelor's degree holders where males constitute 5.02% and females 4.93%. The gender differences can be associated with maternity leave as women generally take longer maternity leaves than men.

3.3.5 Employment Sector

This independent variable is collected from the register-based employment statistic, and accounts only for the individual's main employment relationship. The measure date is November 2019. The sector grouping is in accordance with SSB's standard for institutional sector grouping. In Norway, the labor market is divided into 9 sectors, of which 6 main sectors. We look away from the sector 'abroad', as we wish to study only employees in Norway. The sectors included in the analysis are the following: *state-owned enterprise, private owned enterprise, credit granting institutions, other financial enterprises, insurance, public administration, non-profit organizations and self-employed o.l.* A complete overview of what the different sectors comprise, can be found in Appendix A1.6.

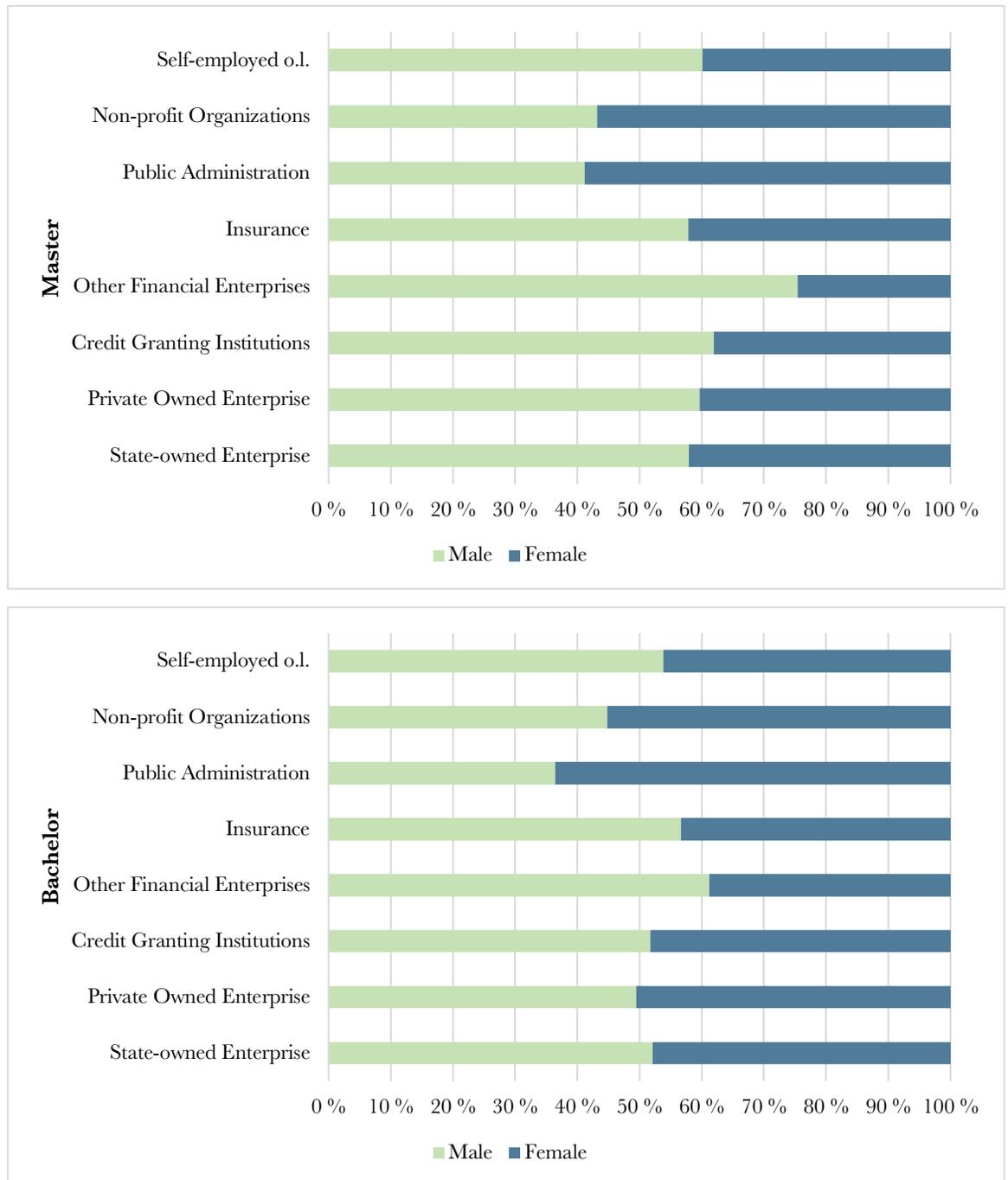
Figure 3: Distribution in the sectors



The graph shows an overview of the sector distribution between bachelor and master graduates in 2021. Business graduates are candidates with NUS-codes starting with '6411' and '7411'. The sectors are in accordance with SSB's standard for institutional sector grouping.

Figure 3 presents the sectoral distribution of individuals at both bachelor's and master's levels. The results indicate that most individuals are employed in *Private Owned Enterprises*, comprising over 60% of the total workforce at the bachelor's level. Additionally, around 20% of the individuals work in *Public Administration*, with the remaining sectors accounting for less than 10% of the individuals in both educational levels. A more accurate table of the sector distribution can be found in Appendix A1.7.

Figure 4: Gender balance in employment sector



The graph shows an overview of the gender balance for business graduates in the various sectors in 2021. This means that for each sector it is shown what proportion of business graduates are men and women, respectively. Business graduates are candidates with educations where the NUS code begins with '6411' and '7411'. The sectors are put together in accordance with SSB's standard for institutional sector grouping.

Figure 4 presents the gender distribution across various sectors at both educational levels. The table demonstrates that males constitute a higher proportion of the workforce in all sectors, except Non-profit Organizations and Public Administration, for both educational levels. This gender imbalance is expected

considering the overall gender distribution of the population. However, the gender distribution is highly skewed in some sectors. For example, in Other Financial Services, males account for 75% of the workforce at the master's level, and 62% at the bachelor's level. Conversely, there are significantly more females employed in Public Administration, with females constituting 63% and 58% of the workforce at the bachelor's and master's levels, respectively. Non-profit organizations also have a higher proportion of female employees. These differences in gender distribution across sectors have important implications for gender-based income disparities, as public sector organizations and companies typically offer lower salaries than their private sector counterparts.

4 Methodology

To measure overeducation, we adopt an approach that involves estimating wage differentials between business graduates who hold a master's degree and those who possess solely a bachelor's degree. This analysis encompasses the estimation of both the unadjusted wage gap and the wage differences while controlling for various covariates. Furthermore, we examine the temporal patterns of these wage disparities.

4.1 Estimation of Overeducation Among Norwegian Business Graduates

The paper conducts multiple regression analyses to estimate the prevalence of overeducation among Norwegian business graduates. These analyses include the incorporation of a dummy variable indicating the possession of a master's degree. We employ a log-linear model, wherein the estimated coefficients indicate the percentage change in wages when the corresponding independent variable changes by one unit, holding all other factors constant.

A simple regression analysis is utilized to estimate overeducation among Norwegian "siviløkonomer". The model focuses on the salary of individual i in 2021 and is represented as follows:

$$\ln W_i = \beta_0 + \delta_0 \text{Master}_i + \epsilon_i$$

(1.1)

The dependent variable in this analysis is the natural logarithm of salary, denoted as $\ln W_i$, while β_0 represents the constant term. The independent variable is a dummy variable indicating *Master*. Dummy variables are binary variables that take on values of either 0 or 1, allowing for the inclusion of qualitative information in a regression model. Within the scope of our analysis, the variable is assigned a value of 1 to denote an individual's possession of a master's degree in business, while a value of 0 signifies the attainment of a bachelor's degree. Moreover, the coefficient δ_0 represents the impact of holding a master's degree, reflecting the percentage change in salary associated with completing such a degree. Thus, this coefficient serves as an indicator of overeducation. The error term, denoted as u , captures the influence of unobserved factors other than education that affect the salary of individual i .

The coefficients are estimated using the Ordinary Least Squares (OLS) method, which involves determining the estimates that minimize the sum of squared residuals. The resulting OLS model can be expressed as follows:

$$\widehat{\ln W}_i = \hat{\beta}_0 + \hat{\delta}_0 \text{Master}_i \quad (1.1)$$

The parameter $\hat{\beta}_0$ corresponds to the estimated constant term, whereas $\hat{\delta}_0$ signifies the estimated percentage change in salary attributed to attaining a master's degree. It is important to acknowledge that in certain cases, the constant term may hold limited practical significance, particularly when examining models where it is improbable or practically unattainable for all independent variables to be simultaneously zero. However, within the framework of this specific model, the constant term represents the average wage among male business graduates.

4.1.1 Estimation of Overeducation with Control Variables

Having estimated the prevalence of overeducation, our research endeavors to further investigate this phenomenon while considering the influence of various independent variables. To achieve this objective, we employ a systematic approach by progressively introducing additional independent variables. Initially, our

objective is to assess the disparity in earnings between female and male business graduates, with the dummy variable denoting female as the independent variable. The coefficient assigned to the female variable, denoted as β_1 , indicates the percentage change in wages associated with being a female. Thus, this coefficient serves as a quantification of the wage gap between male and female business graduates.

$$\ln W_i = \beta_0 + \delta_0 \text{Master}_i + \beta_1 \text{Female}_i + \epsilon_i \quad (1.2)$$

Secondly, we aim to investigate the occurrence of overeducation by considering the influence of age, encompassing both age and its quadratic term. The inclusion of both terms in our regression model provides a more comprehensive understanding of how wages change with age and identifies deviations from a linear relationship. Thus, we specify Equation 1.3 as our regression model, where the coefficient β_2 represents the percentage change in wages associated with each year of age, assuming all other factors remain constant. Furthermore, the coefficient β_3 captures the non-linear relationship between age and wages, illustrating the phenomenon of diminishing returns. The linear term reveals the overall trend in the relationship between age and wages, indicating whether wages tend to increase or decrease, while the quadratic term captures any non-linear patterns, such as changes in the rate of wage growth or inflection points.

$$\ln W_i = \beta_0 + \delta_0 \text{Master}_i + \beta_1 \text{Female}_i + \beta_2 \text{Age}_i + \beta_3 \text{Age}_i^2 + \epsilon_i \quad (1.3)$$

Thirdly, our focus is directed towards examining the prevalence of overeducation by controlling for disparities in work experience (Exp). Similar to Equation 1.3, both experience and its quadratic term are incorporated. The incorporation of experience into our regression model is motivated by the premise that the returns to experience exhibit diminishing marginal effects. Consequently, Equation 1.4 represents the specified regression model, wherein β_4 represents the percentage change in wages associated with each year of experience, all else being equal. Additionally, β_5 captures the non-linear impact of experience on wages, illustrating the phenomenon of diminishing returns.

$$\ln W_i = \beta_0 + \delta_0 \text{Master}_i + \beta_1 \text{Female}_i + \beta_2 \text{Age}_i + \beta_3 \text{Age}_i^2 + \beta_4 \text{Exp}_i + \beta_5 \text{Exp}_i^2 + \epsilon_i$$

(1.4)

Subsequently, we will introduce a control for working hours by incorporating two additional dummy variables: one for individuals engaged in short part-time work (SPt) and another for those involved in long part-time work (LPt). The model is represented by Equation 1.5. In this context of multiple categories, dummy variables are employed to account for the various employment arrangements. It is customary to designate one category as the reference, typically full-time employment, while the remaining $n - 1$ categories are included as dummy variables. It is worth noting that wages are adjusted to reflect full-time equivalent monthly earnings, allowing us to assess the earnings individuals would have attained if they were working on a full-time basis. Consequently, the coefficients, denoted as β_6 and β_7 , convey the proportional change in full-time equivalent monthly earnings associated with working short or long part-time hours, relative to full-time employment.

$$\ln W_i = \beta_0 + \delta_0 \text{Master}_i + \beta_1 \text{Female}_i + \beta_2 \text{Age}_i + \beta_3 \text{Age}_i^2 + \beta_4 \text{Exp}_i + \beta_5 \text{Exp}_i^2 + \beta_6 \text{SPt}_i + \beta_7 \text{LPt}_i + \epsilon_i$$

(1.5)

Finally, we incorporate sector controls into our analysis, as outlined in Equation 1.6. In this context, privately controlled enterprises are designated as the reference group. The remaining seven sectors are included as dummy variables to account for their respective influences. The coefficients (λ_s) of these variables provide insights into the percentage variation in earnings associated with working in the different sectors, relative to the reference group.

$$\ln W_i = \beta_0 + \delta_0 \text{Master}_i + \beta_1 \text{Female}_i + \beta_2 \text{Age}_i + \beta_3 \text{Age}_i^2 + \beta_4 \text{Exp}_i + \beta_5 \text{Exp}_i^2 + \beta_6 \text{SPt}_i + \beta_7 \text{LPt}_i + \lambda_{s,j} \text{Sector}_{s,j} + \epsilon_i$$

(1.6)

To comprehensively analyze business graduates and investigate temporal patterns, we will conduct regressions 1.1 to 1.6 in five iterations. Our first iteration will encompass the entire sample of business graduates, followed by subsequent iterations that focus on business graduates who graduated in 2005, 2009, 2013, and 2017, respectively.

4.1.2 Estimation of Overeducation in Different Sectors

Subsequently, we explore the extent to which overeducation varies across various sectors by employing regression analyses that incorporate interaction terms. Statistical interaction refers to the phenomenon where the impact of an independent variable on the dependent variable can vary based on the value of another independent variable (Stoltenberg & Grønmo, 2021). In our case, we aim to investigate whether the relationship between sector of employment and wages is contingent upon educational level, providing insights into the interplay between education and labor market outcomes.

To initiate our analysis, we investigate the variation in wage differentials across diverse occupations. Employing regression analysis using Model 1.6, we consider the logarithm of wages as the dependent variable. Our model incorporates dummy variables for holding a master's degree in business, sector, and interaction terms between sector and master. As the public administration sector serves as the reference category, β_0 represents the average wage of business graduates holding a bachelor's degree within this sector. δ_0 signifies the percentage by which master graduates earn more in the same sector. The coefficients β_1 to β_6 elucidate the impact on average wages for bachelor graduates in business when employed in alternative sectors. This implies that in public administration enterprises, the average wage for business graduates with a bachelor's degree is represented by the sum of β_0 and β_1 . Correspondingly, δ_1 to δ_6 reveal wage changes for master graduates across the remaining sectors. In this regression, we opt to omit self-employed individuals from the sample due to their limited presence within the dataset, constituting less than 1% of the overall population. It is important to acknowledge that our analysis does not incorporate adjustments for variations in experience or working hours. Therefore, our findings provide insights into the unadjusted wage disparities among business graduates holding both bachelor's and master's degrees across various sectors.

$$\begin{aligned}
\ln W_i = & \beta_0 + \delta_0 \text{Master}_i + \beta_1 \text{StateOwned}_i + \beta_2 \text{PrivateOwned}_i + \\
& \beta_3 \text{CreditGranting}_i + \beta_4 \text{OtherFin}_i + \beta_5 \text{Insurance}_i + \beta_6 \text{NonProfit}_i + \\
& \delta_1 \text{StateOwned} \cdot \text{Master} + \delta_2 \text{PrivateOwned} \cdot \text{Master} + \\
& \delta_3 \text{CreditGranting} \cdot \text{Master} + \delta_4 \text{OtherFin} \cdot \text{Master} \\
& + \delta_5 \text{Insurance} \cdot \text{Master} + \delta_6 \text{NonProfit} \cdot \text{Master} + \epsilon_i
\end{aligned}
\tag{1.7}$$

4.1.3 Testing the Significance of Overeducation

Subsequently, the analysis endeavors to examine the significance of wage differentials. This entails investigating whether the coefficient for the variable "Master" deviates significantly from zero. To assess the significance of a coefficient, a t-test is employed. The rationale behind this test is grounded in the understanding that the true value of a coefficient remains unknown. Nonetheless, by formulating hypotheses regarding its value, statistical methods can be utilized to evaluate and test these hypotheses.

The null hypothesis posits that the independent variable does not exert any influence on the dependent variable, specifically monthly income. In essence, it assumes the absence of wage differentials, implying that there are no significant variations in income based on the independent variable.

$$\begin{aligned}
H_0 : \delta_0 = 0
\end{aligned}
\tag{2.1}$$

The alternative hypothesis posits that the coefficient in equation 2.2 is not equal to zero, indicating a significant departure from the null hypothesis.

$$\begin{aligned}
H_1 : \delta_1 \neq 0
\end{aligned}
\tag{2.2}$$

The null hypothesis is rejected when the p-value falls below the predetermined significance level. In this scenario, the p-value indicates a substantially low probability of the coefficient being equal to zero, thereby providing evidence for the presence of a wage difference. The analysis also assesses the significance of the

remaining coefficients to determine if they have a statistically significant impact on wage differences. The significance of these coefficients indicates whether the corresponding variables have a discernible effect on wage disparities.

4.2 Testing the Return on Experience

Moreover, our study aims to examine the potential disparity in return on experience between individuals with a master's degree and those with a bachelor's degree. Specifically, we investigate whether the impact of work experience on income varies depending on the educational attainment, distinguishing between master's and bachelor's degree holders. Additionally, we intend to assess this phenomenon through a gender-based analysis.

4.2.1 Return on Experience in Terms of Educational Level

In contrast to employing linear regression models, this study adopts a distinct methodological approach for evaluating the return on experience. Instead, a mean-measurement approach is employed, which entails examining the monthly equivalent salary corresponding to a particular year of work experience for both bachelor and master business graduates. By utilizing this approach, we aim to investigate the significance of the return on experience associated with specific durations of work experience. Our primary objective is to assess whether these findings reveal a substantial wage disparity between bachelor and master business graduates in terms of the return on experience. A significant difference would suggest that individuals with a master's degree attain a higher return on experience compared to their counterparts with a bachelor's degree. This indicates that, while holding other factors constant, business graduates with a master's degree experience a greater average increase in wages per year of work experience compared to those with a bachelor's degree.

Subsequently, we employ the master dummy variable and estimate it in conjunction with the mean log monthly salary for each category within the work experience variable. Specifically, this analysis encompasses individuals with a minimum of 2 years of work experience and extends up to a maximum of 20 years of experience. Following that, we analyze the wage trajectory specifically for business graduates who obtained their degrees in 2005, 2009, 2013, and 2017. This approach allows

us to investigate the temporal evolution of wages among business graduates and discern any discernible patterns or trends.

4.2.2 Return on Experience in Terms of Gender

In line with section 4.2.1, we extend our analysis by incorporating additional terms, specifically by adding genders, to examine the relationship between return on experience and gender. This way, we can determine whether there exists a gender disparity in the return on experience among economists. We use the same variables and measurements as in section 4.2.2, but here, the female dummy variable is included. Consequently, if the mean scores are statistically higher, it implies that male economists experience a higher rate of return on each year of work experience compared to their female counterparts, on both educational levels assuming all other factors remain constant.

5 Results and Analysis

In this chapter, the principal findings from the analysis are presented. However, it is essential to revisit the research questions that guided this study:

RQ1: To what extent is earning a master's degree advantageous in the long term in relation to salary?

RQ2: Are the results different for men and women?

RQ3: How do wage disparities between bachelor and master graduates evolve throughout the career trajectory?

Building upon these inquiries, each research question will be systematically addressed, and the corresponding analysis findings will be presented. Initially, the focus lies on estimating the magnitude of overeducation by examining wage disparities between business graduates possessing a master's degree and those with solely a bachelor's degree. Subsequently, an investigation into the gender-specific wage disparities among the whole selection of business graduates is conducted. Finally, the evolution of wage disparities throughout the trajectory of careers is scrutinized.

5.1 Research Question 1: To what extent is earning a master's degree advantageous in the long term?

This subsection undertakes a thorough investigation of overeducation among business graduates in Norway, encompassing a comprehensive analysis of the entire 2021 sample. The research begins with an examination of overeducation among business graduates, followed by an exploration of variations in overeducation across different sectors. Additionally, the study investigates the impact of experience on salaries, considering factors such as academic levels, gender, and temporal dynamics.

5.1.1 Estimation of Overeducation Among Norwegian Business Graduates

Table 7 provides the estimated values for wage disparities while accounting for various characteristics. Each column presents the estimated wage difference for models 1.1 to 1.6, as outlined in subsection 4.1. Moreover, it includes the standard deviation, explanatory power of the models, and the number of observations incorporated in the regression analysis.

The analysis commences by investigating the discrepancy in wages between business graduates possessing a master's degree and those possessing solely a bachelor's degree, with particular attention given to the average monthly earnings. At this stage, our control variables are limited to the level of higher education. In column 1.1, the estimated coefficient for a master's degree is 0.24517, implying that business graduates with a master's degree earn 24.52% higher wages compared to those with only a bachelor's degree, all else equal. The wage disparity exhibits statistical significance at a confidence level of one percent. Next, we explore the wage dynamics upon the inclusion of additional independent variables. In regression 1.2, we introduce gender as an explanatory variable. As a result, the impact of having a master's degree decreases to 23.16%. The estimated coefficient for female is -0.17644, indicating that, all else equal, female business graduates earn, on average, 17.64% less than their male counterparts. The findings highlight the significant role of gender in shaping the wage differential across various educational levels. Notably, the observed wage disparity retains its statistical significance at the one percent level, underscoring the robustness of the gender-related wage gaps

identified in the analysis. Subsequently, we investigate the wage dynamics by incorporating age and age squared as explanatory variables in regression 1.3. Our findings indicate a decrease in the effect of holding a master's degree on wages, with the coefficient estimate declining to 22.28%. Analyzing the coefficients associated with age variables, we observe a statistically significant positive relationship between age and wages. Holding all other factors constant, each additional year of age is associated with a 6.14% increase in earnings. The results indicate a positive association between age and wages, indicating that older individuals tend to command higher earnings. Additionally, the statistically significant wage disparity between individuals holding master's and bachelor's degrees persists.

The inclusion of experience and experience² as explanatory variables in regression 1.4 provides valuable insights into the wage dynamics. These variables encompass two dummy variables each, differentiating business graduates with a master's degree from those with solely a bachelor's degree. The impact of holding a master's degree on wages strengthens, as indicated by an increased coefficient estimate on the experience variable of 26.59%. The empirical analysis reveals a discernible inverse association between salary and work experience, whereby an increase in the experience variable corresponds to a decrease in wages. Notably, when considering the initial year as 2002, the negative coefficient aligns with expectations since the subsequent year (2003) implies a reduction of one year's worth of experience. Consequently, it is conceptually sound that the coefficient assigned to the master's degree variable exhibits a relatively higher magnitude. Additionally, it is reasonable to observe a comparatively lower coefficient for the master's degree variable, implying that the wage growth trajectory in response to experience is more pronounced for individuals holding a master's degree compared to those with a bachelor's degree. Controlling for other factors, business graduates with a master's degree and one year of experience can expect to earn an estimated 2.47% more than their counterparts without any work experience. Similarly, individuals with only a bachelor's degree and one year of experience can anticipate a 0.50% increase in earnings compared to those without work experience. It is worth noting that when accounting for differences in work experience, wages tend to decline, given the relatively higher average experience level of male business graduates compared to their female counterparts. Furthermore, we find that the wage disparity remains statistically significant at the one percent level.

In addition, dummy variables for short and long part-time employment are incorporated, in accordance with model 1.5 outlined in subsection 4.1. The results in the table indicate that the inclusion of a control variable for working hours leads to a decrease in the wage differential to 25.72% compared to regression 1.4, where we solely control for gender, age, and experience. This decline in wages underscores the substantial "economic penalty" associated with working part-time. One plausible explanation is that this variable also captures the inherent differences in job positions or levels of responsibility among business graduates engaged in part-time work, which consequently contributes to lower wage levels.

The final column, denoted as 1.6, presents the wage disparity after controlling for all independent variables. Upon including the sector dummy variables, the wage disparity diminishes to 24.85%. Notably, this coefficient remains statistically significant at the one percent level. Consequently, we ascertain that business graduates holding a bachelor's degree earn 75.15% of their counterparts with a master's degree, given equivalent levels of experience, working hours, and sector. When analyzing the coefficients in detail, it emerges that business graduates, irrespective of holding a master's or bachelor's degree, employed in financial enterprises, command a substantial 46.71% wage differential compared to their counterparts in the domain of public administration, all else equal. Furthermore, business graduates working within non-profit organizations earn an additional 5.82% compared to those in public administration. Finally, the combined independent variables account for approximately 31% of the variance in the dependent variable, the logarithm of full-time equivalent monthly salary.

These findings reveal that business graduates holding a master's degree experience higher wages in comparison to those with solely a bachelor's degree. Remarkably, this wage premium persists even after controlling for various influential factors such as gender, age, work experience, working hours, and sectoral variations. These results provide evidence that the prevalence of overeducation among business graduates is relatively low, as the higher earnings associated with a master's degree align with the level of education attained.

Table 7: Estimation of wage disparities for total selection of business graduates

	Log Monthly Income					
	(1.1)	(1.2)	(1.3)	(1.4)	(1.5)	(1.6)
Master	0.24552*** (0.00266)	0.2308*** (0.0026)	0.22228*** (0.00243)	0.26576*** (0.00358)	0.25717*** (0.00355)	0.24847*** (0.00344)
Female		0.17762*** (0.00259)	0.16924*** (0.00243)	0.16351*** (0.00243)	0.15594*** (0.00241)	0.12852*** (0.00236)
Age			0.06145*** (0.00084)	0.05742*** (0.00092)	0.05062*** (0.00093)	0.05422*** (0.00090)
Age ²			0.00057*** (0.00000)	0.00054*** (0.00001)	0.00047*** (0.00001)	0.00049*** (0.00001)
Experience Bachelor				0.00501*** (0.00092)	0.00697*** (0.00091)	0.00552*** (0.00088)
Experience Master				0.02466*** (0.00095)	0.02559*** (0.00094)	0.01808*** (0.00091)
Experience ² Bachelor				0.00028*** (0.00005)	0.00041*** (0.00005)	0.00033*** (0.00005)
Experience ² Master				0.00145*** (0.00005)	0.00151*** (0.00005)	0.00112*** (0.00005)
Short Part-Time					0.19985*** (0.00648)	0.19294*** (0.00626)
Long Part-Time					0.17398*** (0.00569)	0.17188*** (0.00550)
State Owned Enterprise						0.24866*** (0.00557)
Private Owned Enterprise						0.19583*** (0.00297)
Credit Granting Institutions						0.22804*** (0.00482)
Other Financial Enterprises						0.46709*** (0.00840)
Insurance						0.22484*** (0.00912)
Non-Profit Organizations						0.05819*** (0.00771)
Constant Term	11.0505*** (0.00177)	11.144*** (0.00220)	9.61885** (0.01808)	9.74235** (0.02073)	9.90561** (0.02101)	9.61142** (0.02077)
Observations	93 286	93 286	93 286	93 286	93 286	93 286
R ²	0.08275	0.12671	0.236	0.24316	0.25731	0.30757
Adjusted R ²	0.08274	0.1267	0.23597	0.2431	0.25723	0.30745

Standard error in parenthesis

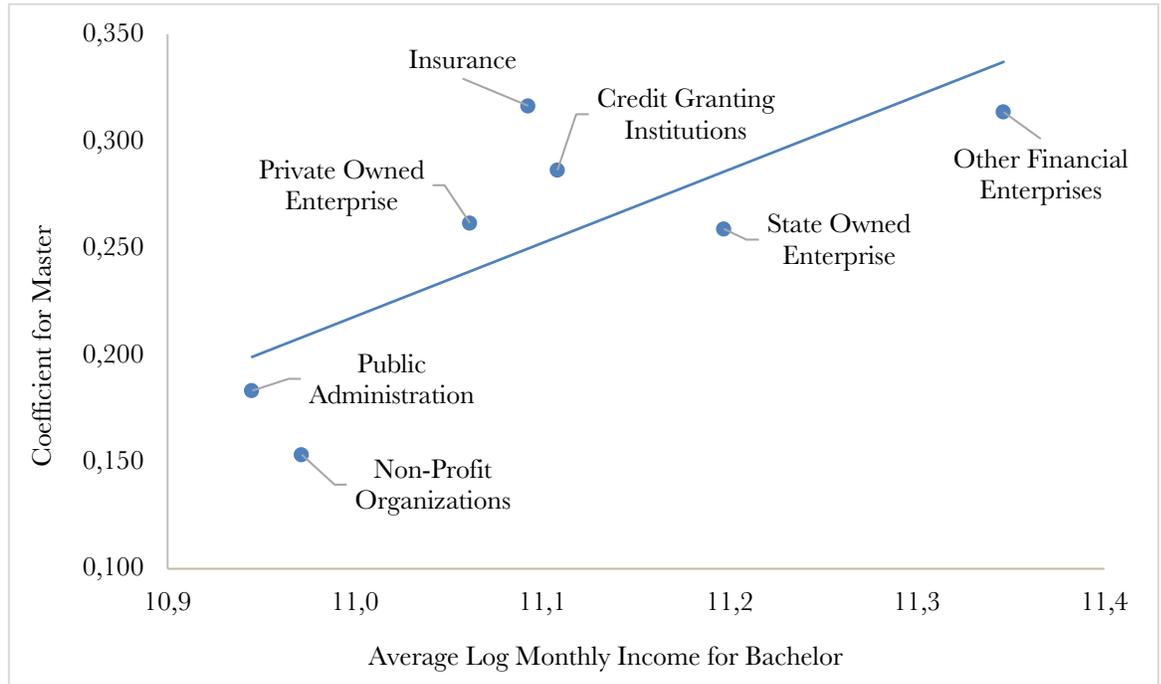
*** p < 0.01 ** p < 0.05 * p < 0.1

The table shows the complete regression results that have been used to estimate the wage gap between Norwegian bachelor and master business graduates. Business graduates here are candidates with educations with NUS codes starting with '6411' and '7411'. The target year is 2021. The reference categories are bachelor, male, academic occupations, full-time and public administration.

5.1.2 Wage Disparities Among Business Graduates in Different Sectors

Subsequently, the analysis investigates the potential variations in wage disparities among the whole selection of business graduates across different sectors. To explore this, we have conducted a regression analysis using model 1.7, as discussed in subchapter 4.1.2. The outcomes of this analysis are presented in Figure 5. For a more comprehensive overview, the complete regression table can be found in the Appendix (see Table A2.1). The reference category used is Public Administration.

Figure 5: Wage disparities among business graduates in different sectors



The graph shows an overview of the wage gap bachelor and master business graduates in the different sectors. The sectors are in accordance with SSB's standard for institutional sector grouping. Business graduates are candidates with NUS-codes starting with '6411' and '7411'. The x-axis displays the average log monthly income for bachelor graduates. The y-axis displays how much more master business graduates earn relatively to bachelor graduates in the same sector.

The horizontal axis displays the average full-time equivalent monthly salary for bachelor graduates across various sectors, presented logarithmically. On the vertical axis, the graph illustrates the percentage difference in earnings between master graduates and bachelor graduates within each sector. The figure reveals a pattern indicating greater wage disparities in sectors where master graduates tend to earn higher average salaries. Conversely, the Non-Profit and Public Administration sectors exhibit the smallest wage gaps, coinciding with their comparatively lower average salary levels. Our analysis reveals that the largest wage disparities exist within the sector of other financial enterprises. Specifically, the wage gap in this sector amounts to 31.36%. Notably, this sector also employs a relatively small number of individuals, as depicted in Figure 3 of subsection 3.5.5. Importantly, all coefficients reported in our analysis demonstrate statistical significance at a level below 5%. These observations align with the anticipated trend of narrower wage gaps and lower salary levels within the public sector, as previously discussed in the analysis.

The findings of this study indicate that sectors characterized by higher average salaries exhibit larger wage disparities between business graduates holding master's degrees and those with bachelor's degrees. This suggests that obtaining a master's degree provides a significant advantage in terms of earning potential within these sectors. In contrast, sectors such as Non-Profit and Public Administration, which have comparatively lower average salary levels, show smaller wage gaps between master and bachelor graduates. This suggests a potential higher prevalence of overeducation in these sectors, where individuals with master's degrees earn similar wages to their counterparts with bachelor's degrees. These results highlight the importance of considering sector-specific dynamics when examining overeducation phenomena. Overall, the findings suggest that overeducation may be more prevalent in sectors where the wage differentials between master and bachelor graduates are narrower. This implies that business graduates with master's degrees in these sectors may be overqualified for their positions, as their additional education does not result in substantial earnings advantages compared to those with bachelor's degrees.

5.1.3 Wage Disparities Among Business Graduates Holding Similar Levels of Experience

This segment focuses on analyzing wage disparities among business graduates who possess similar levels of work experience. To account for the financial implications arising from the two-year educational commitment and the resultant opportunity cost of foregone earnings and work experience for business graduates who opt to pursue a master's degree, this paper incorporates the "Bachelor+2" category. This category serves to estimate the income level of bachelor graduates after a two-year period of professional experience, thus quantifying the wage differential that master's graduates forego during their extended period of study. By incorporating this analytical approach, the study endeavors to provide a nuanced understanding of the economic considerations associated with the decision to pursue advanced education, thereby shedding light on the intricate trade-offs between acquiring further qualifications and early labor market entry for business graduates in general.

Table 8: Development of Log Monthly Income among individuals in 2021 with varying levels of educational attainment and work experience

	Log Monthly Income				
	2 years	5 years	10 years	15 years	20 years
Bachelor	10,74	10,86	10,96	11,08	11,09
Bachelor +2	10,82	10,93	11,02	11,05	11,15
Master	11,00	11,09	11,22	11,39	11,53

The table shows the development of log monthly income after a given number of work experience under different educational attainments. 'Bachelor+2' starts at 4 years of experience instead of two, to show a more applicable comparison to individuals attaining a master's degree.

The tabulated data presented herein provides insights into the distribution of monthly logarithmic incomes among individuals with varying levels of educational attainment and work experience. Specifically, the categories encompass "Bachelor" (individuals holding a bachelor's degree), "Bachelor+2" (those with a bachelor's degree supplemented by an additional two years of work experience), and "Master" (individuals possessing a master's degree).

When analyzing the figures, it is evident that the Master category consistently attains the highest levels of monthly logarithmic income across different durations

of work experience. Notably, at the outset of a 2-year period, the Master category reflects an income level of 11.00, while the Bachelor and Bachelor+2 categories exhibit marginally lower incomes of 10.74 and 10.82, respectively. Furthermore, as individuals accrue additional years of work experience, all categories exhibit an upward trajectory in logarithmic income. However, the growth patterns differ across the categories. The Master category consistently maintains the highest income levels, followed by the Bachelor+2 category, with the Bachelor category exhibiting the lowest income levels.

To offer a comprehensive portrayal of the results, we have incorporated a supplementary table displaying the conversion of logarithmic monthly income values to their corresponding monetary figures in Norwegian kroner. This addition serves the purpose of facilitating a more holistic understanding and interpretation of the findings by grounding them in a tangible currency context. By providing concrete and accessible income figures, we aim to enhance the clarity and applicability of the results for academic discourse and practical implications in the field of economics.

Table 9: Development of Monthly Income among individuals in 2021 with varying levels of educational attainment and work experience

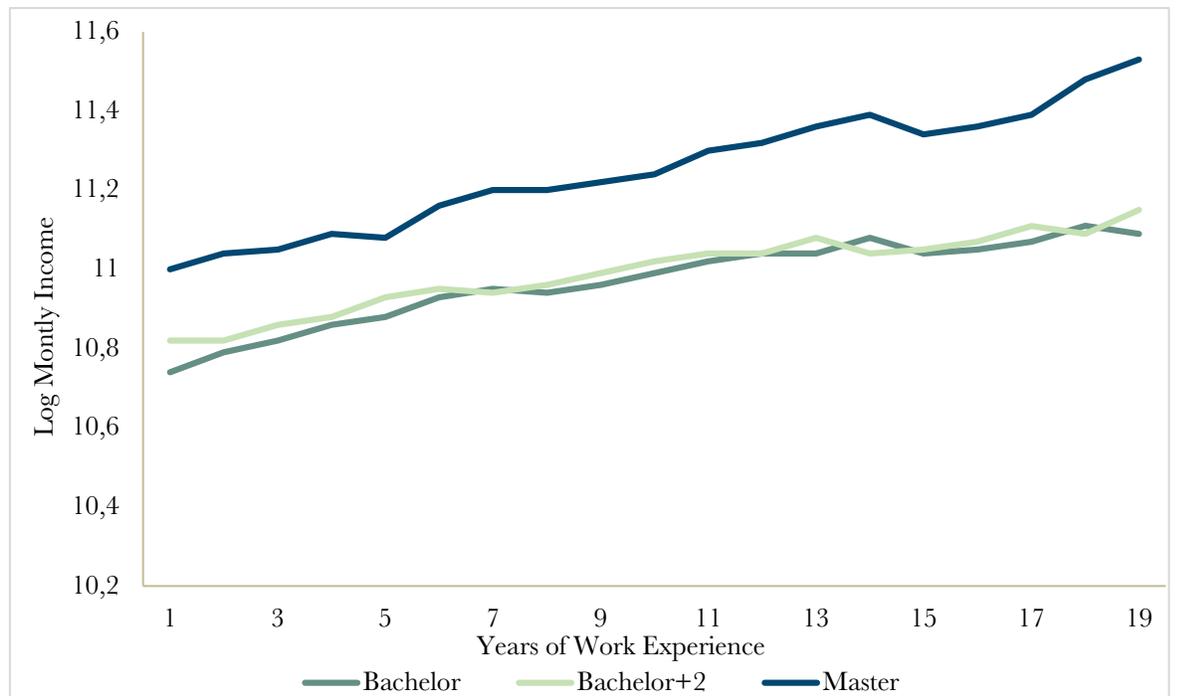
	Monthly Income				
	2 years	5 years	10 years	15 years	20 years
Bachelor	46 166.05	52 052.08	57 526.44	64 860.88	65 512.75
Bachelor +2	50 011.09	55 826.28	61 083.68	62 943.95	69 563.83
Master	59 874.14	65 512.75	74 607.66	88 432.96	101 722.11

The table shows the development of monthly income after a given number of work experience under different educational attainments. 'Bachelor+2' starts at 4 years of experience instead of two, to show a more applicable comparison to individuals attaining a master's degree.

Figure 6 presents an analysis of average salaries in 2020 among business graduates who possess comparable levels of work experience, differentiated by their educational attainment of either a bachelor's or master's degree. Additionally, the figure includes the average salary for bachelor graduates starting with two years of work experience. The observed wage disparities are visually depicted through the shaded area between the plotted lines. Notably, the figure consistently demonstrates that business graduates with a master's degree command higher salaries than their

counterparts with a bachelor's degree, irrespective of the level of work experience attained. However, it is important to recognize that the magnitude of these wage differentials varies across different stages of the career trajectory. Among individuals with relatively shorter work experience, particularly those with five years of experience, the differences in salaries between master and bachelor graduates are relatively smaller. Nevertheless, as individuals progress further in their professional journey, the wage gaps tend to widen. These empirical findings provide insights into the evolving nature of wage disparities between bachelor and master business graduates, revealing a positive association between advanced education and earning differentials that intensifies with the accumulation of work experience.

Figure 6: Development of average log monthly income among business graduates who possess comparable levels of work experience



The graph illustrates the development of monthly income after a given number of work experience under different educational attainments. 'Bachelor+2' starts at 4 years of experience instead of two, to show a more applicable comparison to individuals attaining a master's degree. The x-axis is number of years of work experience. The y-axis is log monthly income.

The findings demonstrate a positive relationship between the wage differentials of master and bachelor business graduates and the accumulation of work experience, even when considering the two additional years of work experience for the Bachelor+2 category. This suggests that as individuals progress in their careers, the

value of a master's degree becomes more evident, leading to higher income disparities between the two groups. These implications support the notion that the prevalence of overeducation among master graduates may be relatively low. The higher income levels observed for master's degree holders, even after accounting for work experience, indicate a suitable alignment between their educational qualifications and job positions, mitigating the risk of significant educational-job mismatches.

5.1.4 Summary

In summary, the analysis reveals the existence of statistically significant wage disparities among business graduates in Norway, suggesting a relatively low incidence of overeducation among business graduates with master's degrees. These disparities persist even after controlling for covariates such as gender, age, work experience, working hours, and sectoral variations. Notably, these findings indicate that the magnitude of wage differentials varies across sectors, with the financial enterprise sector exhibiting the largest disparities, while the non-profit and public administration sectors display the smallest gaps. This pattern substantiates the prevailing notion that public sectors tend to exhibit less pronounced wage disparities and lower income levels. Crucially, the study also establishes a positive association between pursuing a master's degree and higher income levels compared to individuals holding solely a bachelor's degree. Remarkably, this relationship holds true even when accounting for the two years of work experience that bachelor graduates accumulate while their counterparts pursue further education. These results provide compelling evidence of a suitable alignment between the educational qualifications of master graduates and the skill requirements of their job positions, thus mitigating the prevalence of overeducation.

5.2 Research Question 2: Are the results different for men and women?

The subsequent phase of our investigation endeavors to delve into the realm of wage disparities with a specific focus on gender differentials. In a similar vein to the methodology applied in Research Question 1, this section employs an analytical framework, expanding its scope to encompass the intersections of educational attainment and gender. By interweaving these multidimensional aspects, our aim is

to achieve a nuanced comprehension of the intricate dynamics that underlie wage disparities, thus enriching our overall empirical examination.

5.2.1 Estimation of Overeducation Among Genders

Initially, an assessment of the unadjusted wage disparity between genders is conducted, disregarding their educational attainment, to gain a general understanding of the prevailing situation. The regression outcomes for this analysis are presented in Table 10, specifically in Column (1.1). The estimated coefficient for females is observed to be -0.19523, indicating that, on average, women with a business degree earn 19.52% less than their male counterparts, when all other factors are held constant. It is noteworthy that this wage gap is statistically significant at the one percent level.

Table 10: Raw wage disparity between genders, without accounting for Master

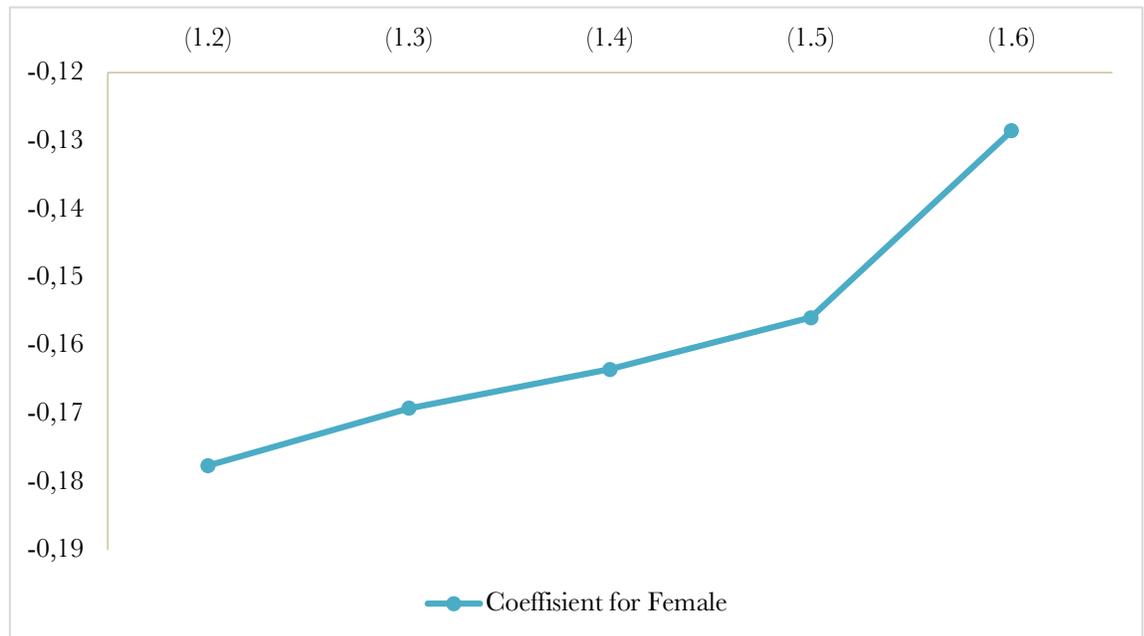
	Log Monthly Income ----- (1.1)
Female	-0,195235*** (0.002691)
Constant Term	11.25501*** (0.00188)
Observations	93 286
R ²	0.053427
Adjusted R ²	0.053417
----- Standard error in parenthesis *** p < 0.01 ** p < 0.05 * p < 0.1	

The table shows the raw wage disparity between males and females, without accounting for any other variables. The time of measurement is 2021. Business graduates are candidates with NUS-codes starting with '6411' and '7411'.

Table 7 from section 5.1.1 presents the estimated values for the unadjusted wage disparities, along with estimates after controlling for various characteristics. The subsequent analysis in this section concentrates on the coefficient estimates related to the *female* variable, particularly examining how they are influenced by the

inclusion of additional variables. The corresponding results are depicted in Figure 7, where all coefficients are statistically significant at the one percent level.

Figure 7: Coefficient for Female from Table 7 presented graphically



The figure presents the female coefficient throughout the different regression models used in the analysis and is collected from Table 7 in section 5.1.1. In the horizontal axis, the different regression models are named, and in the vertical axis, the female coefficient is

In Column 1.2 of the regression results, the estimated coefficient for females is -0.17762, indicating that, on average, earn 17.76% less than their male counterparts on both educational levels. In Regression 1.3, *age* and *age*² are included as additional explanatory variables. As a result, the wage gap decreases to 16.92%. Notably, the coefficients associated with the age variables demonstrate a statistically significant relationship, indicating a small salary increase for each year of age advancement. This accounts for both educational levels. This finding aligns with the theoretical proposition that individuals experience higher wage growth as they accumulate additional work experience or attain higher levels of seniority (Hægeland, 2003). Progressing to regression 1.4, the inclusion of *experience* and *experience*² is introduced into the regression model. Consequently, the coefficient associated with females experiences a decrease to 16.35, representing a relatively modest decline. This can be interpreted as indicating that the variable itself does not bring about a substantial change. In other words, the salaries of men and women may differ, but the

percentage change that occurs based on seniority and experience is relatively similar.

Within regression 1.5, the introduction of short and long part-time variables into the model leads to a reduction in the female coefficient to -0.1559. This decline in the coefficient can be interpreted similarly to that observed in 1.4, suggesting that although the salaries of men and women may vary, the percentage change associated with being in short or long part-time employment is relatively consistent with their initial salary levels. In regression 1.6, the *sector* variable is included in the regression model. Here, the estimated coefficient for females is -0.1285, indicating a substantive decrease from the previous model in 1.6. This coefficient indicates that females earn 87.15% of the income earned by males. The reason for this substantial decrease could be explained by the fact that when considering different sectors, some are expected to exhibit a significantly more equitable distribution of wages, particularly within the public sector, as suggested by theory. Conversely, certain sectors may demonstrate a greater disparity in earnings between genders. Overall, the inclusion of these sectors results in a smaller variation in wages between men and women, implying that there may be fewer individuals working in sectors characterized by substantial differences in pay.

5.2.2 Testing Gender Differences in Different Sectors

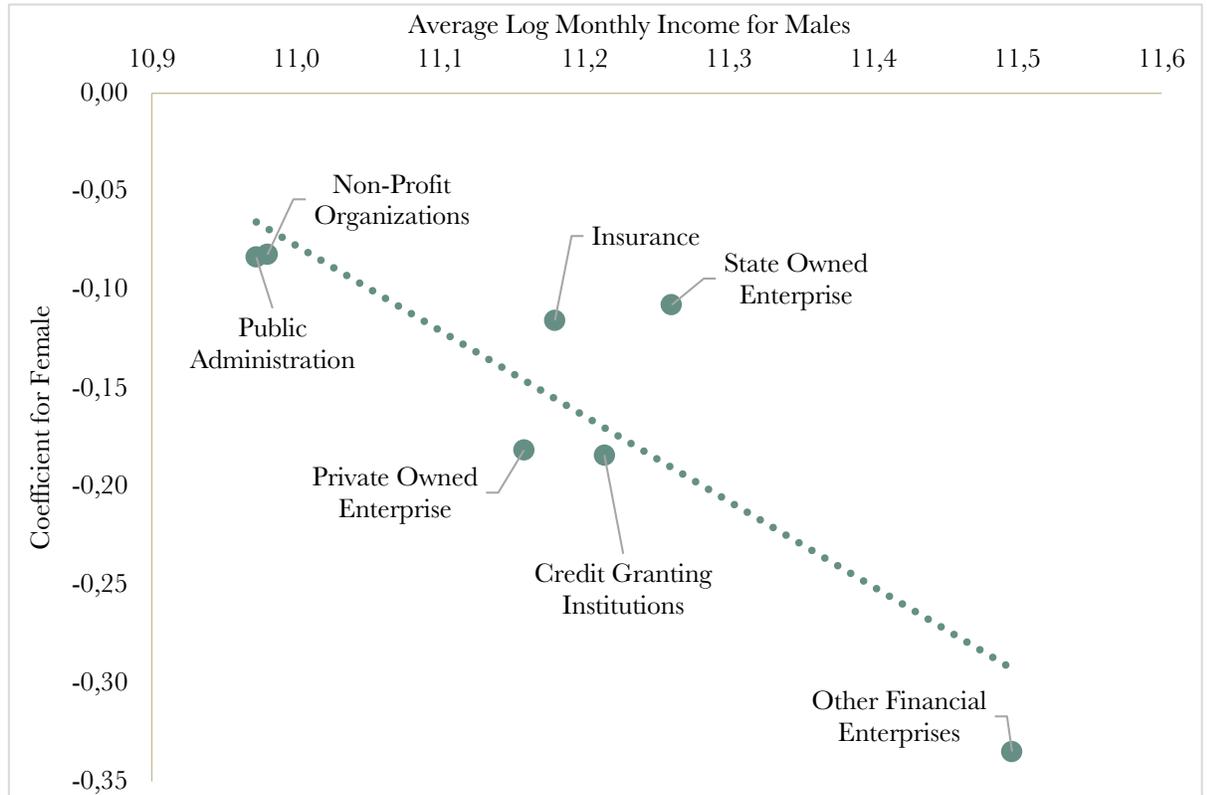
Figure 8 illustrates the disparity in wages between female and male business graduates across various sectors. This figure follows a similar construction and interpretation as Figure 5 in section 5.1.2 with *public administration* as reference value, and the distinction that the *female* variable is introduced prior to the master variable. This sequencing is implemented to be able to control for the gender effect on wages before considering the effect of educational levels. This allows us to specifically examine the gender wage gap and understand the extent to which it exists even when accounting for educational attainment. For a comprehensive display of the regression outcomes, refer to Table A3.1 in the Appendix.

The figure shows tendencies to a wage gap bigger in sectors where individuals have a higher average salary. The wage gap is at its lowest in the *public administration* and *non-profit organization* sectors; these are also the sectors with the lowest salaries,

similarly to figure 5 in section 5.1.2. Conversely, the greatest wage disparities are observed in the domain of *other financial enterprises*, exhibiting pronounced differentials. In this sector, the wage gap reaches 33.48%, and is statistically significant at a five percent level. Notably, this sector represents a relatively smaller proportion of the overall workforce, aligning with the results in section 5.2.1, where the negative coefficient associated with female gender diminishes to -0.1285. It can be inferred that if a larger number of individuals were employed in this sector, the coefficient would be further exacerbated rather than improved, accentuating the gender-based wage disparity.

In analyzing other segments within the financial sector, we observe a notable improvement in gender balance. Specifically, for *private owned enterprises* and *credit granting institutions*, the percentage difference in salaries between genders is nearly 20%, which closely aligns with the raw wage disparity when considering only the *salary* and *gender* variables. The coefficients are statistically significant at a one percent level. Overall, all sectors show a wage disparity between genders above 5%. All coefficients are statistically significant at a five percent level or lower.

Figure 8: Wage disparities between males and females among business graduates in different sectors



The graph shows an overview of the wage gap between male and female business graduates in the different sectors. The sectors are in accordance with SSB's standard for institutional sector grouping. Business graduates are candidates with NUS-codes starting with '6411' and '7411'. The x-axis displays the average log monthly income for males. The y-axis displays how much less female business graduates earn relatively to males in the same sector.

5.2.3 Testing Gender Differences in the Returns on Experience

This section parallels the examination conducted in section 5.2.3, aiming to investigate the wage disparities among business graduates with comparable levels of work experience. Additionally, the analysis incorporates the gender variable to explore potential discrepancies in returns on experience between males and females. The inclusion of the "Bachelor+2" category further enhances the examination. By incorporating the gender aspect into the analysis, we gain a more comprehensive understanding of how experience translates into salary returns. As highlighted in the theoretical framework, females are more susceptible to experiencing overeducation, thus emphasizing the significance of considering this aspect in drawing conclusive insights.

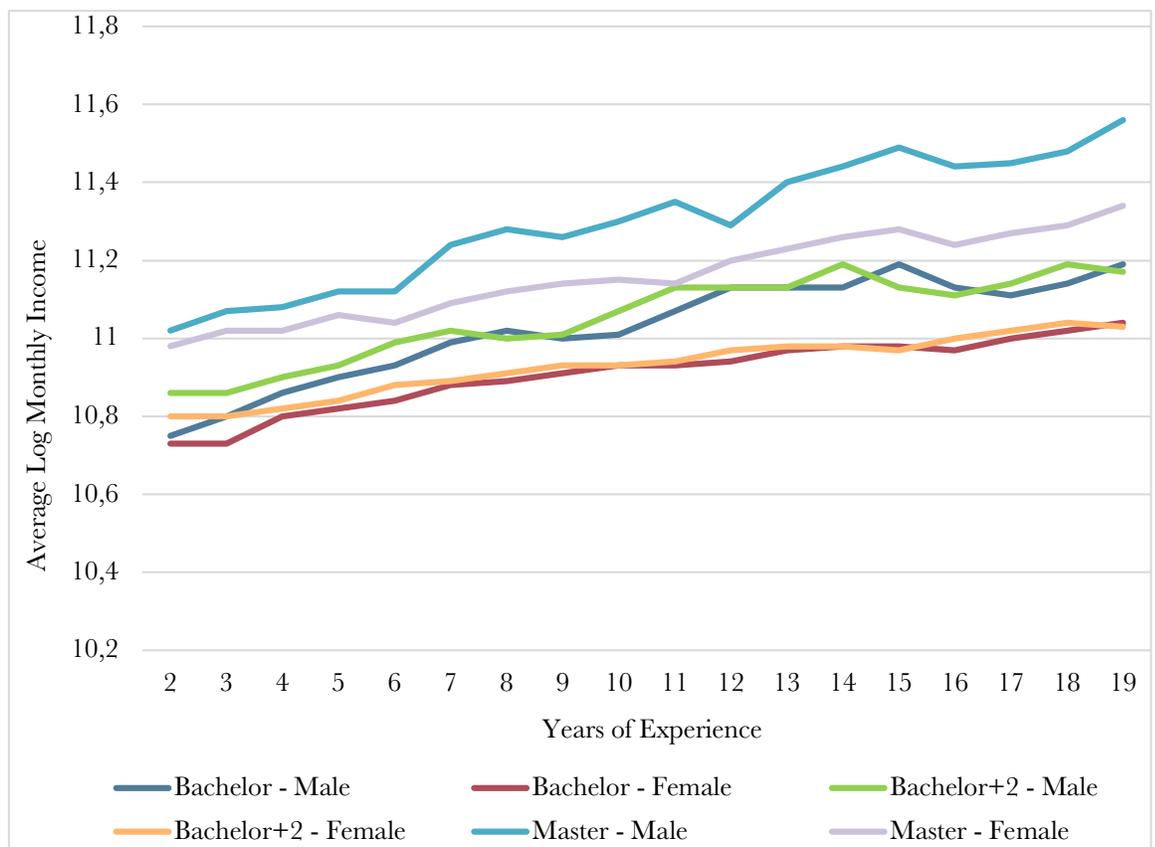
Figure 9 presents the examination of average salaries in 2020 within a cohort of business graduates with similar levels of work experience, stratified by their educational attainment of either a bachelor's or master's degree, as well as their gender. Notably, the inclusion of the "Bachelor+2" category, which encompasses business graduates with four years of experience, provides a more nuanced depiction of the distinctions between master's graduates and business graduates. In contrast to the figure presented in section 5.1.3, the current graph exhibits a more dispersed distribution and narrower gaps between master and bachelor graduates. Particularly noteworthy is the convergence of salary trajectories for male bachelor graduates with 2 additional years of experience and female master graduates. At a specific point, namely at the 11-year mark, their salary levels are nearly equivalent. Female master graduates in this instance have an average logarithmic salary of 11.14, while male bachelor graduates have an average logarithmic salary of 11.13. This convergence is of interest given that it coincides with a period commonly associated with family formation, during which women often take maternity leaves and adjust their employment to accommodate caregiving responsibilities (Cukrowska-Torzewska and Matysiak, 2020). Simultaneously, research suggests that men may experience increased productivity upon starting a family and having children (Becker, 1991).

Further examination of these two groups reveals that female master graduates experience a steeper growth trajectory, suggesting that the disparities will become more pronounced over time. Moreover, it is evident that female master graduates have a considerably lower average logarithmic salary compared to their male counterparts in the master's degree category. This phenomenon could be attributed to the observation in 3.3.5 that a higher proportion of females are employed in sectors characterized by lower average salaries, namely *public administration* and *non-profit organizations*. Conversely, a smaller percentage of females are found in sectors with higher average salaries, such as *other financial enterprises*. This correlation suggests a possible association between gender distribution across sectors and the variation in average salary levels.

Nonetheless, as individuals progress in their professional trajectories, the disparities in wages tend to widen. This observation is particularly noteworthy when

considering female bachelor graduates. Even when considering the Bachelor+2 category, females still exhibit a lower average salary compared to males in the original bachelor category. Consequently, the wage gap between females with a master's degree and males with a bachelor's degree is relatively small, whereas the gap between males with a master's degree and females with a bachelor's degree is the largest. These empirical findings shed light on the dynamic nature of wage disparities between bachelor and master business graduates, highlighting a positive relationship between advanced education and earnings differentials that becomes more pronounced with the accumulation of work experience. In other words, these findings indicate a relatively low existence of overeducation, for both genders.

Figure 9: Development of average log monthly income among male and female business graduates who possess comparable levels of work experience



The graph illustrates the development of monthly income after a given number of work experience under different educational attainments and gender. 'Bachelor+2' starts at 4 years of experience instead of two, to show a more applicable comparison to individuals attaining a master's degree. The

5.2.4 Summary

In summary, our analysis differentiating the genders reveals the existence of statistically significant wage disparities among these business graduates in Norway. These disparities persist even after controlling for covariates such as gender, age, work experience, working hours, and sectoral variations. The results indicate a wage disparity over 10% between males and females when all variables are added. Upon closer examination of various sectors, discernible variations in wage disparities become evident. Notably, discrepancies in the returns on work experience are also apparent between males and females. Specifically, male master graduates exhibit a distinctively higher average wage, while female master graduates closely approximate the earnings of male bachelor graduates in several observed years. Nevertheless, it is worth noting that female master graduates demonstrate a distinctively higher average wage compared to female bachelor graduates, suggesting a significant reduction in the prevalence of overeducation within the context of these regression findings.

5.3 Research Question 3: How do Wage Disparities Evolve Throughout the Career Trajectory?

This subsection delves into the third research question, exploring the temporal evolution of wage disparities throughout individuals' career progression. Specifically, the paper investigates the differential impact of educational attainment on the relationship between work experience and wages for business graduates. The primary objective is to ascertain whether individuals with a master's degree exhibit a greater return on experience compared to those with a bachelor's degree. Furthermore, the study assesses the temporal patterns of wage disparities among business graduates across a range of sectors. Additionally, it examines the trends in wage differentials among business graduates with similar levels of experience. By employing rigorous econometric techniques and statistical modeling, the paper strives to provide valuable insights into the interplay between education, experience, and wage differentials within the context of business graduates.

5.3.1 Estimation of Overeducation Throughout the Career Trajectory

Based on our implementation of the salaries earned by business graduates with a master's degree and those with a bachelor's degree as a surrogate measure for overeducation, this section delves into the examination of the coefficient attributed to the master's variable. The central aim is to evaluate the temporal dynamics of this coefficient across four distinct intervals encompassing the years from 2005 to 2021. Through a thorough scrutiny of its temporal changes, our objective is to offer valuable insights into the evolving relationship between educational attainment and the likelihood of overeducation within the labor market.

The A4 section in the Appendix provides a comprehensive overview of the regressions conducted for each annual interval. Focusing specifically on regression 1.1 within each interval, our analysis offers valuable insights into the evolving dynamics characterizing the relationship between wage levels and the attainment of a master's degree. Regression 1.1 explores the temporal trend of the coefficient for the "Master" variable in relation to wage differentials among business graduates. The results indicate that in 2005, the coefficient is estimated at 0.29438, suggesting a positive and significant relationship between obtaining a master's degree and wage levels. This finding implies that, all else being equal, business graduates with a master's degree tend to earn 29.44% higher wages compared to their counterparts with solely a bachelor's degree.

Transitioning to 2009, the coefficient exhibits a subtle decline to 0.28529, implying a marginal decrease in the wage premium attributed to holding a master's degree. Advancing to 2013, the coefficient experiences a further reduction to 0.27457, indicating a continuing downward trajectory in the wage premium associated with a master's degree. As we progress to year 2017, the coefficient remains relatively modest at 0.25720, signifying a sustained diminishing trend in the wage premium for business graduates holding a master's degree.

The temporal dynamics observed in regression 1.1 from 2005 to 2021 unveil a notable diminishing trend in the wage premium associated with the acquisition of a master's degree among the sample of business graduates. This discernible pattern accentuates the persistent erosion of the wage disparity between individuals holding a master's degree and those possessing a bachelor's degree within the business

graduate cohort, thereby signaling a significant transformation in the nexus between educational attainment and financial remuneration among business graduates.

In our analysis, we also examine regression 1.6 over the period from 2005 to 2017, incorporating additional independent variables such as gender, age, work experience, part-time employment, and work sectors. The findings reveal a noteworthy pattern in the coefficient for the master variable over the four-year interval. Specifically, the trend observed from 2005 to 2013 indicates a declining association between holding a master's degree and wages, reflecting a weakening positive relationship. This declining trend suggests potential challenges related to overeducation, where individuals may possess qualifications exceeding the requirements of their jobs. The inclusion of various covariates, including those capturing work experience and sector characteristics, likely contributes to this observed decline in the coefficient for the master variable during this period. However, it is important to note that in 2017, a slight upturn is observed in the coefficient for the master variable. This suggests the potential resilience or even a resurgence of the positive relationship between a master's degree and wages. This finding indicates that despite concerns of overeducation, a master's degree may still confer advantages in certain contexts, potentially aligning with labor market demands and rewarding individuals with specialized knowledge and skills.

The decreasing wage premium associated with the attainment of a master's degree among business graduates implies the presence of a potential incongruity between their educational attainment and the corresponding labor market rewards. The diminishing wage differential between individuals holding a master's degree and those possessing a bachelor's degree raises concerns regarding the prevalence and extent of overeducation within the business graduate population. These findings suggest that an increasing proportion of business graduates may be occupying positions that underutilize their advanced education, leading to a potential underutilization of their skills and qualifications. However, it is important to note that the specific findings pertaining to the wage premium do not directly indicate the presence or extent of overeducation within the analyzed sample. Further examination, encompassing additional factors such as job requirements, skill utilization, and the congruence between educational qualifications and job

demands, is essential to establish the existence and ramifications of overeducation among the business graduate cohort under investigation.

5.3.2 Wage Disparities Among Business Graduates in Different Sectors

The empirical examination of wage disparities among the sample of business graduates across diverse sectors offers valuable insights into the dynamic relationship between the coefficient for the master variable and wages during the time span from 2005 to 2021. The findings disclose a conspicuous pattern in the coefficients, which signifies the impact of a master's degree on wages throughout the analyzed years. Figure 10 visually captures the temporal evolution spanning from 2005 to 2021, depicting the wage differentials between business graduates with a master's degree and those with solely a bachelor's degree across diverse sectors. To investigate this phenomenon, a robust regression analysis was conducted utilizing Model 1.6, as elaborated in subsection 4.1.2. A presentation of the regression results can be found in Table A4.5, located in the Appendix.

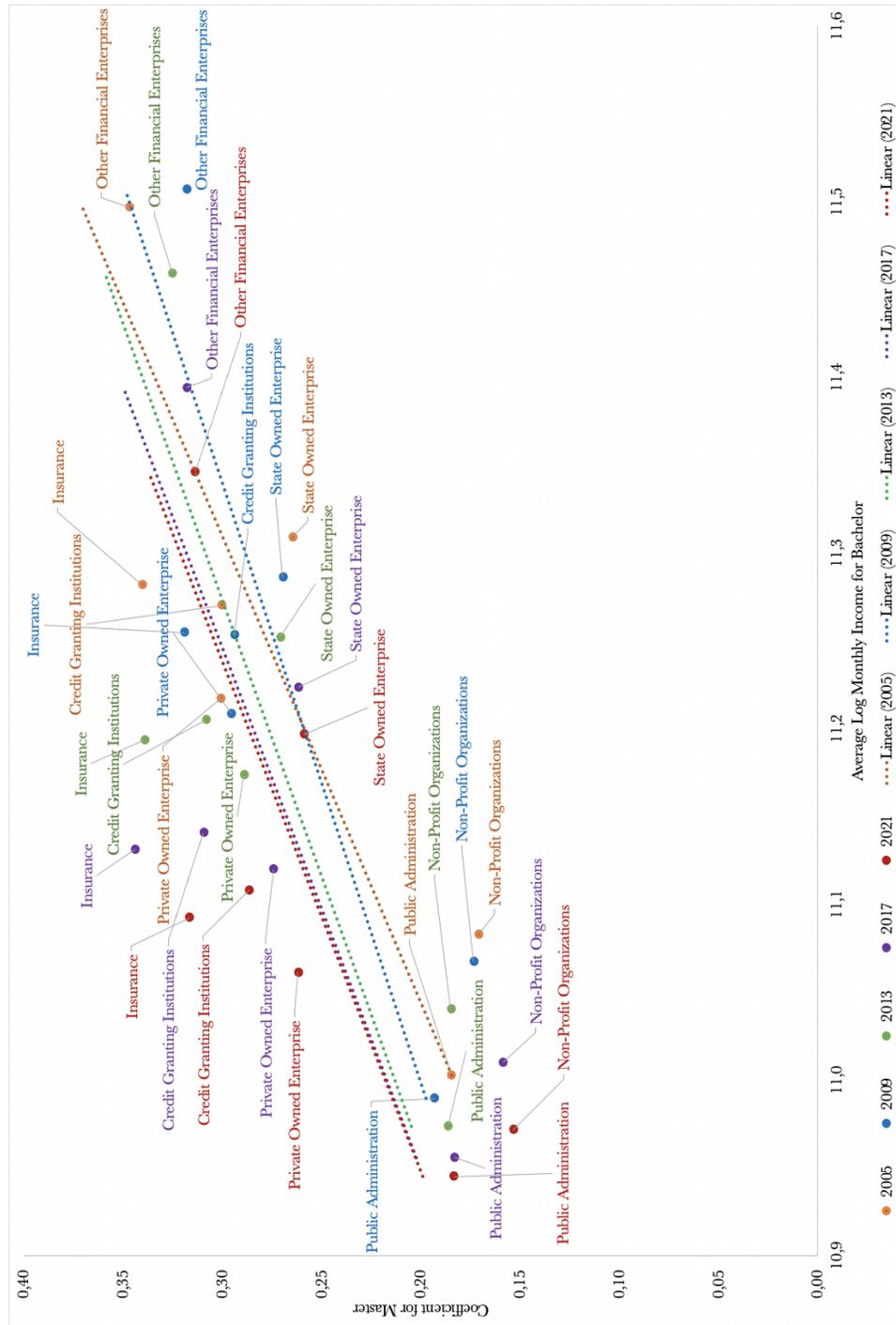
As Figure 10 shows, in 2005, significant sector-specific differences were evident in the positive correlation between possessing a master's degree and wage levels among business graduates. The wage disparity ranged from 17.07% in the non-profit organizations sector to 34.67% in the other financial enterprises sector. Similarly, in 2009, the wage gap varied from 17.33% in non-profit organizations to 31.77% in other financial enterprises, reflecting the extent to which business graduates with a master's degree earned more than their counterparts with only a bachelor's degree in different sectors. The year 2013 continued to manifest sector-specific characteristics, with wage gaps spanning from 18.48% in non-profit organizations to 33.88% in the insurance sector. This suggests a persistent positive relationship between holding a master's degree and wages, although the magnitude of the associations fluctuated across sectors.

By 2017, there was a slight decrease observed in the coefficients across sectors, ranging from 0.15841 in non-profit organizations to 0.34373 in the insurance sector. These figures indicate that business graduates in the non-profit organizations sector with a bachelor's degree earned approximately 84.16% of the wages earned by their counterparts with a master's degree. In the insurance sector, this percentage

was even lower, with business graduates holding a bachelor's degree earning only 66.63% of the wages earned by those with a master's degree. This decline suggests a potential attenuation of the positive relationship between a master's degree and wages, potentially influenced by shifts in labor market dynamics and evolving employer preferences. In the most recent year, 2021, the wage gap further diminished, ranging from 15.34% in non-profit organizations to 31.65% in the insurance sector. These findings indicate an ongoing trend of decreasing returns associated with a master's degree among business graduates.

Overall, the observed trend in wage disparities among business graduates in various sectors from 2005 to 2021 underscores a declining association between holding a master's degree and wages. These findings hold implications for the erosion of the wage premium traditionally associated with higher education. Furthermore, the sector-specific variations highlight the importance of considering industry-specific factors and labor market dynamics when examining wage disparities among business graduates with different levels of educational attainment.

Figure 10: Wage disparities among business graduates in different sectors from 2005-2021



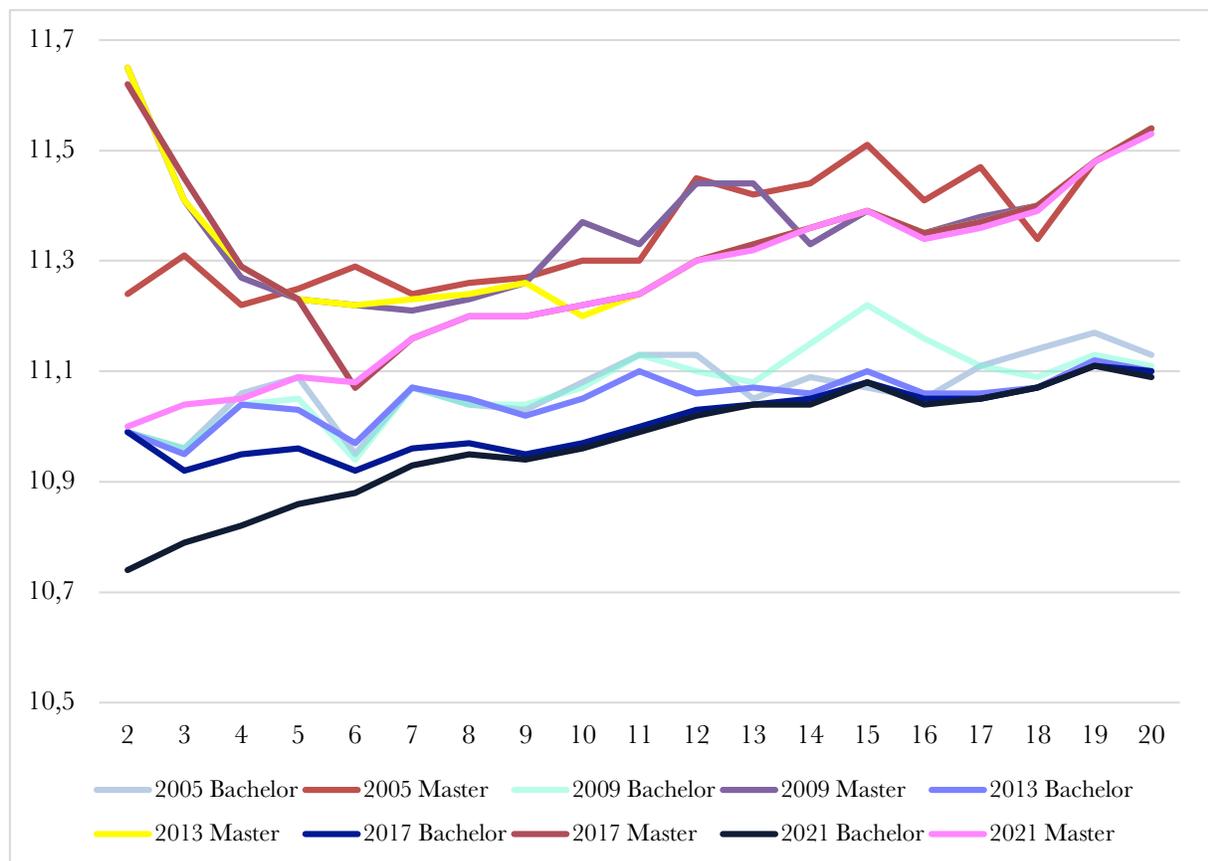
The graph shows an overview of the wage gap bachelor and master business graduates in the different sectors and in different years. The sectors are in accordance to SSB's standard for institutional sector grouping. Business graduates are candidates with NUS-codes starting with '6411' and '7411'. The x-axis displays the average log monthly income for bachelor graduates. The y-axis displays how much more master business graduates earn relatively to bachelor graduates in the same sector.

5.3.3 Trend on Wage Disparities Among Business Graduates Holding Similar Levels of Experience

This section aims to investigate the wage disparities among business graduates with comparable levels of work experience, like the analysis conducted in section 5.1.3. The analysis encompasses multiple dataset years, namely 2005, 2009, 2013, 2017,

and 2021, and the full table can be found in Appendix A4.6. In contrast to the previous sections that examined returns on experience, the "Bachelor+2" category is excluded from this analysis. The rationale for this exclusion is based on the intention to observe the trend across multiple years and the belief that the two original educational categories provide a sufficiently accurate representation of the phenomenon under investigation.

Figure 11: Progression of logarithmic monthly income as a function of years of work experience across multiple dataset years



The depicted graph portrays the progression of logarithmic monthly income as a function of years of work experience for various educational achievements across multiple dataset years (2005, 2009, 2013, 2017, 2021). The horizontal axis represents the number of years of work experience, while the vertical axis represents the logarithmic scale of monthly income.

Figure 11 presents the progression of logarithmic monthly income as a function of years of work experience for bachelor and master business graduates. The dark and blue lines represent the bachelor educational level across the multiple dataset years, and correspondingly the light red and yellow-toned lines represent the master educational level. Notably, the figure consistently demonstrates that business graduates with a master's degree command higher salaries than their counterparts

with a bachelor's degree, irrespective of the level of work experience attained. However, it is important to recognize that the magnitude of these wage differentials varies across different stages of the career trajectory and across the different datasets.

When examining Figure 11, several observations come to light. Firstly, within the earlier dataset years, business graduates holding a master's degree consistently displayed a significantly higher log monthly income in comparison to those with a bachelor's degree, particularly during the initial phases of their careers. This disparity can be attributed to the relatively lower prevalence of master's degree holders during that period, affording this group a wage advantage. Secondly, the higher initial log values in the earlier datasets can be attributed to the older age composition of the individuals included in those years. These individuals completed their master's degrees earlier and accrued more work experience by the time their salaries were recorded in 2021, thereby reflecting higher income levels. Moreover, the wage differentials observed in the remaining dataset years demonstrate greater variability when contrasted with the more stable pattern evident in 2021. This variability may be influenced by several factors, including changes in wage standards over time and the composition of individuals within the dataset. Fluctuations in industry trends, labor market conditions, and the specific characteristics of the sample population in each year contribute to the observed instability. For instance, the increasing prevalence of master's degree attainment in recent years has changed the significance of holding such a degree. While a master's degree in business historically held greater importance due to its rarity and societal value, the landscape has shifted as more individuals pursue master's degrees.

5.3.4 Summary

In summary, this study investigates the evolution of wage disparities among business graduates throughout their careers and identifies a declining trend in the wage premium associated with a master's degree. This diminishing trend raises concerns regarding overeducation and underscores the importance of considering job requirements and skill utilization. Additionally, the study reveals sector-specific variations in the relationship between a master's degree and wages, with an overall decreasing pattern. These findings emphasize the erosion of the wage premium traditionally linked to higher education. In addition, this study delves into the examination of wage disparities among business graduates with comparable levels

of work experience across multiple years. The results consistently highlight that individuals holding a master's degree in business command higher salaries than their counterparts with a bachelor's degree, irrespective of their attained work experience. However, it is imperative to acknowledge the nuanced nature of these wage differentials, as they exhibit variation across different stages of the career trajectory and within the different datasets employed in the analysis.

6 Concluding Remarks

This thesis contributes to the contemporary body of literature on the returns to schooling, with a specific focus on overeducation and human capital theory. The research undertaken in this study explores various facets of wage disparities among business graduates in the context of Norway. The central objectives were to investigate the impact of educational attainment, the influence of gender, and the temporal trajectory of these disparities over the past decades. By examining the experiences of Norwegian business graduates, the aim was to ascertain the differential benefits derived from obtaining a bachelor's or master's degree and to determine whether an overeducation phenomenon is prevalent within this labor sector.

Existing scholarly investigations have indicated that in Norway, a significant number of individuals with higher education qualifications find employment aligned with their field of study (Regjeringen, 2021). The expanding labor market has intensified competition for jobs, prompting individuals to pursue advanced qualifications for a competitive advantage. Næss and Støren's (2018) research highlights that those classified under the "Siviløkonom" category who reported being overeducated, primarily experienced a milder form of overeducation, where their job requirements demanded education at a lower level than they possessed. SSB predicts a growing demand for college and university-educated labor until 2030, emphasizing the increasing importance of higher education (Dapi et al., 2016). This trend is expected to contribute to a decrease in overeducation as the labor market aligns more closely with the skills possessed by highly educated workers. Consequently, fewer individuals with higher education qualifications will find themselves in positions that do not fully utilize their educational attainment. Thus, as pertinent literature seems inconsistent concerning the issue of

overeducation among business graduates, we found it highly relevant to study these effects.

Our main findings suggest that there is a presence of statistically significant wage disparities among business graduates in Norway. These disparities persist even when accounting for various factors. The findings indicate that the magnitude of wage differentials varies across sectors and substantiates the prevailing notion that public sectors tend to exhibit less pronounced wage disparities and lower income levels, which is in accordance with previous research findings concerning human capital theory (Hægeland, 2003; Raaum et al., 1999). The results provide compelling evidence of a suitable alignment between the educational qualifications of master graduates and the skill requirements of their job positions, thus mitigating the prevalence of overeducation, confirming that obtaining a master's degree in business is advantageous in the long term. However, it is essential to highlight the absence of skill measurement in this thesis. The labor market includes individuals with lower educational qualifications who possess valuable skills, and this aspect plays a crucial role in assessing overeducation. Consequently, our conclusions are limited to quantitative indicators, such as salary returns, and do not encompass a comprehensive analysis of skills.

Previous research has emphasized the difference on overeducation between genders, finding that women often are more exposed to overeducation, due to reduced mobility resulting from family responsibilities, while men become more productive upon starting a family and having children (Cukrowska-Torzewska & Matysiak, 2020; Felfe, 2012; Becker, 1991). Our research findings reveal that disparities in wage returns exist between genders, encompassing both a broad perspective, various sectors, and varying levels of work experience. Male master graduates have a notably higher average wage, while female master graduates closely approach the earnings of male bachelor graduates in certain years. However, it is noteworthy that female master graduates also exhibit a significantly higher average wage compared to female bachelor graduates, indicating a considerable decrease in the occurrence of overeducation within the context of the regression results.

Studying wage disparities and overeducation among business graduates, we implemented both an analysis in the present state, and an analysis to measure the trend. Research has stated that in the short term, overeducation may arise due to a temporary misalignment between job characteristics and individuals' human capital attributes, or it could be a statistical anomaly. However, over the long term, both organizations and individuals are expected to adapt by making necessary technical and administrative adjustments, ultimately leading to the elimination of imbalances (Pseiridis et al., 2018; Dolton & Vignoles, 2000). Our analysis in section 5.1.3 reveals that as individuals advance in their professional trajectories, the wage disparities between bachelor and master business graduates tend to expand. The datasets examining the disparities across the career trajectory consistently corroborate these findings. Nevertheless, it is pertinent to note that the higher returns associated with obtaining a master's degree in the past can be attributed to the relatively lower prevalence of individuals holding such degrees during that period. These empirical findings shed light on the dynamic nature of wage gaps, highlighting a positive correlation between higher education attainment and increasing differentials in earnings as work experience accumulates.

Examining the relationship between wages and educational achievement in light of the Human Capital Theory enabled us to engage in a nuanced discourse on the subject of overeducation. Subsequent investigations exploring overeducation from the perspective of abilities and skills, in contrast to years of formal education, would provide valuable insights for a comprehensive comprehension of the advantages associated with pursuing a master's degree. One plausible interpretation of our findings pertains to the potential influence of market regulation on the observed outcomes for master business graduates. Although this perspective was not explored in the present study, it represents a significant avenue for future research that warrants substantial attention. Examining the regulatory aspects of the market in relation to bachelor and master business graduates could shed light on the underlying mechanisms driving the observed patterns and provide a more comprehensive understanding of the dynamics at play. Furthermore, an intriguing avenue for future research would involve exploring potential variations among different educational institutions in Norway, considering the historical prestigious reputation certain schools have enjoyed. Such inquiries would contribute to a more comprehensive understanding of the dynamics at play in the educational landscape.

Another intriguing avenue of exploration would involve examining various sectors to understand the factors contributing to the disproportionate representation of females in low-paid sectors, despite attaining similar educational levels and possessing comparable qualifications for employment in the private business sector. Such an investigation could shed light on the underlying dynamics and potential barriers that influence occupational choices and opportunities for female professionals. Thus, corresponding research of this sort may provide important suggestions for the future of “siviløkonomer” and labor market allocations.

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Appendix

A1 Variables

Table A1.1: Selection process for business graduates previously years

Selection Process				
	Total Count	Removed	Bachelor	Master
Selection Process Business Graduates before 2005				
(1) Population 01.01.2021	8 603 935			
(2) Remove individuals living outside of Norway	5 391 366	3 212 569		
(2) Keep relevant educations before 2005	62 303	5 329 063	43 637	18 673
(3) Retain only wage earners	45 656	16 647	31 937	13 709
(4) Remove individuals with unspecified information	43 495	2 161	30 441	13 043
Final selection	43 495		30 441	13 043
Selection Process Business Graduates before 2009				
(1) Population 01.01.2021	8 603 935			
(2) Remove individuals living outside of Norway	5 391 373	3 212 562		
(2) Keep relevant educations before 2009	73 004	5 318 369	48 981	24 018
(3) Retain only wage earners	55 226	17 778	36 748	18 474
(4) Remove individuals with unspecified information	52 635	2 591	35 010	17 634
Final selection	52 635		35 010	17 634
Selection Process Business Graduates before 2013				
(1) Population 01.01.2021	8 603 935			
(2) Remove individuals living outside of Norway	5 391 373	3 212 562		
(2) Keep relevant educations before 2013	86 987	5 304 386	55 565	31 423
(3) Retain only wage earners	67 944	19 043	42 682	25 269
(4) Remove individuals with unspecified information	64 706	3 238	40 545	24 155
Final selection	64 706		40 545	24 155
Selection Process Business Graduates before 2017				
(1) Population 01.01.2021	8 603 935			
(2) Remove individuals living outside of Norway	5 391 373	3 212 562		
(2) Keep relevant educations before 2017	104 857	5 286 516	63 476	41 386
(3) Retain only wage earners	84 429	20 428	49 775	34 657
(4) Remove individuals with unspecified information	79 994	4 435	46 826	33 168
Final selection	32 026		46 826	33 168

The table shows the selection process for the datasets used in the analysis. Business graduates are candidates with relevant educations where the NUS-code starts with '6411' and '7411'. The analysis has only kept the ones that include a finished bachelor or master. Individuals with unreported information are removed because of missing observations for some of the variables.

Table A1.2: Overview of the variables with referral to Microdata

Variable	Microdata Code	Explanation
Variables used in the data selection		
Population status code	BEFOLKNING_STATUSKODE	Chooses individuals that are residents in Norway per 01.01.2021
Gender	BEFOLKNING_KJOENN	Used to create dummy variables for gender
Education level	NUDB_BU	NUS-code for highest completed education
Graduation		
(1) Bachelor (NUS code: 6411XX)	NUDB_AAR_FORSTE_FULLF_BACH	Year completed university candidate or equivalent
(2) Master (NUS code: 641131, 7411XX)	NUDB_AAR_FORSTE_FULLF_HOV	Year of first completed master's degree
Monthly income	ARBLONN_LONN_EKV_IALT	Retaining only wage earners
Variables used in the regression analyses		
Monthly income	ARBLONN_LONN_EKV_IALT	Full-time equivalent monthly income
Experience (Bachelor)	NUDB_AAR_FORSTE_FULLF_BACH	2021 minus year of graduation
Experience (Master)	NUDB_AAR_FORSTE_FULLF_HOV	2021 minus year of graduation
Gender	BEFOLKNING_KJOENN	Equal to 1 if female, 0 if male
Age	ARBLONN_PERS_ALDER	Age the corresponding year
Vacancy rate	ARBLONN_ARB_STILLINGSPST	Agreed vacancy rate per employment relationship
Short part-time		Equal to 1 if vacancy rate 50, 0 if else
Long part-time		Equal to 1 if $50 \leq$ vacancy rate < 100, 0 if else
Employment sector	REGSYS_FRTK_SEKTOR_2014	Sector code, main employment relationship

The table shows how the different variables are generated and their references in Microdata.

Table A1.3: Selection of educational programs in Microdata

	NUS-code
Selection of Educational Programs, Bachelor Level	
1 Bank Economist/Diploma in Economics & Banking	641101
2 Banking Candidate (finance)	641102
3 Enterprise & Business Development	641103
4 Business Economics	641104
5 Diploma in Economics	641106
6 University Candidate - Municipal Finance and Management	641112
7 University Candidate - Business Administration	641115
8 University Candidate - Business Informatics	641116
9 University Engineering - Practical Economy and Leadership	641119
10 Municipal Candidate	641120
11 Leadership, Financial Management and Planning	641121
12 Public Administration and Leadership	641123
13 Organization and Leadership	641124
14 Accounting Economics	641125
15 Revision	641126
16 Auditor Exam	641127
17 Auditor Exam, 2.5 years	641128
18 Audit Education, fundamentals	641129
19 Audit Education, 3 years	641130
20 Tax Auditor Education, 1st dep.	641132
21 Tax Auditor Education, 2nd dep.	641133
22 Continuing Education Civil Engineers - Business Administration	641134
23 Business Administration, unspecified	641135
24 University Candidate - Business Administration	641139
25 Continuing Education - Business Administration	641140
26 Bachelor - Business Administration	641141
27 Bachelor - Audit and Accounting	641142
28 Bachelor - Public Administration and Management	641143
29 Bachelor - Finance and Resource Management	641146
30 Bachelor - Business Economics and Management	641147
31 Bachelor of Business Administration	641149
32 Bachelor - Bank and Finance	641150
33 Bachelor - Economics and Informatics	641151
34 Bachelor - Organization and Management Courses	641152
35 Bachelor of Management	641153

36 Bachelor - Food Economy	641154
37 Bachelor - Housing Economy	641155
38 Bachelor - Creativity, Innovation and Business Development	641156
39 Bachelor - Border Business Studies	641159
40 University Candidate - Finance	641160
41 Bachelor - Personal Leadership	641162
42 Bachelor of Shipping Management	641163
43 Bachelor - Facility Management	641164
44 Bachelor - Economics and Management	641165

	NUS-code
Selection of Educational Programs, Master Level	
1 Siviløkonom, 4-years	641131
2 Master - Innovation Management	641157
3 Master of Business Administration (MBA)	641158
4 Administration and Management	741101
5 "Siviløkonom" Education, CEMS-master	741105
6 Financial Analyst	741106
7 Master of Business Administration (MBA), 1.5 years	741108
8 Master of Business Administration (MBA), 1 year	741109
9 Master of International Business, 1.5 years	741110
10 Master of Management	741111
12 MSc, Business Administration, 2-year	741112
13 Master of Technology Management	741113
14 MSc, Business Administration	741116
15 Master's Candidate , Business Administration	741117
16 Revision Exams, 1.5 years	741118
17 Master, Administration and Management	741119
18 Master, Finance and Resource Management	741120
19 Master, Business Administration	741121
20 Master, Educational Management	741122
21 Master, Business Management and Economics	741123
22 Master, Change Management	741124
23 "Siviløkonom"/Master, Business Administration	741125
24 Master, Value Based Management	741126
25 Master, Educational Management	741127
26 Master, Complex Systems	741128
27 Master, Financial Economics	741129
28 Master, Accounting and Audit	741130
29 MSc, Economics and Business Administration	741131
30 Master in Leadership	741132
31 "Siviløkonom"/Master, Business Administration	741133
32 Master of Business Administration (MBA)	741135
33 Master, Entrepreneurship and Innovation	741136
34 Master, Service Management	741137
35 Master, Development Management and Administration	741138
36 Master, Innovation and Business Development	741139

37 Master, Management and Organizational Psychology	741141
38 Master, Personell Management	741143
39 MSc, Event Management	741144
40 Master, Innovation and Knowledge Development	741145
41 Master, Organization and Management Work	741146
42 Master, Innovation and Management	741147
43 Master, Organization and Management	741148
44 Master, Leadership	741149

	NUS-code
Programs not included in the research	
1 Diploma Thesis, Economic-Administrative Subjects	641105
2 Business Economist	641107
3 Health and Social Administration, Further Education	641108
4 University Candidate, Business Economics, two years	641109
5 University Candidate, Fisheries Economics, three years	641110
6 University Candidate, House Economist, two years	641111
7 University Candidate, Food Economist, two years	641113
8 University Candidate, Organization and Administration	641114
9 University Candidate, Agricultural Economics, two years	641117
10 University Candidate, Agricultural Economics and Rural development, three years	641118
11 Cand.Merc. Education, Administration	741102
12 Cand.Merc. Education, Business Economics	741103
13 Cand.Merc. Education, Economics and Administration	741104
14 Higher Department for Civil Economists, Unspecified	741107
15 Civil Engineering Education, Petroleum Economics	741114
16 Civil Engineering Education, Business Adm. Courses	741115
17 Master Innovation Management, one year	741134
18 Management, Further Education, Higher Level	741140
19 Master of Science, Space Information Management	741142
20 Master's, Personnel Management, two years	741150
21 Master of Science, Entrepreneurship, two years	741151
22 Master, International Business, two years	741152
23 Master, Strategic HR, two years	741153
24 Economic-Administrative Subjects, Unspecified	741199

Table A1.4: Gender distribution in 2005, 2009, 2013 and 2017 datasets

2005	Male	Female	Total
Bachelor Business Graduate	18 744	16 862	35 611
Master Business Graduate	10 393	4 835	15 232
Total	29 149	21 697	50 843
Total in %	57.33%	42.67%	100%
2009	Male	Female	Total
Bachelor Business Graduate	21 307	19 868	41 180
Master Business Graduate	13 444	7 274	20 715
Total	34 744	27 140	61 888
Total in %	56.14%	43.85%	100%
2013	Male	Female	Total
Bachelor Business Graduate	23 857	23 570	47 247
Master Business Graduate	17 185	10 669	27 845
Total	41 032	34 245	75 272
Total in %	54.51%	45.50%	100%
2017	Male	Female	Total
Bachelor Business Graduate	26 840	28 108	54 954
Master Business Graduate	21 909	15 680	37 583
Total	48 756	43 791	92 536
Total in %	52.69%	47.32%	100%

The table shows the gender distribution in the datasets from 2005, 2009, 2013 and 2017. The distribution are presented both in numbers and percentages. The selection of candidates with the relevant NUS-codes are displayed in Table A1.3.

Table A1.5: Balance between individuals working full-time and part-time

Bachelor Business Graduates		
	Male	Female
Short part-time	1247	1357
in percent	5.02%	4.93%
Long part-time	996	2484
in percent	4.01%	9.02%
Full-time	22 617	23 684
in percent	90.98%	86.05%
Total	24 860	27 525

Master Business Graduates		
	Male	Female
Short part-time	485	435
in percent	2.12%	2.33%
Long part-time	380	642
in percent	1.66%	3.45%
Full-time	22 032	17 556
in percent	96.22%	94.22%
Total	22 897	18 633

The table shows a distribution of the individuals working short part-time, long part-time and full-time. Short part-time corresponds to a vacancy rate below 50%, long part-time corresponds to a vacancy rate between 50% and 100%.

Table A1.6: Overview of institutional sector grouping

Sector Classification	Sector Code
Non-financial Enterprises	
1000 State Owned Enterprises	1110 - Government Business Operations 1120 - State Owned Stock Companies 1510 - Municipal Enterprise with unlimited responsibilities 1520 - Municipal Owned Stock Companies
2000 Private Owned Enterprises	2100 - Private Owned Stock Companies 2300 - Personal Enterprises 2500 - Private Producing Organizations without Profitgoals
Financial Enterprises	
3000 Credit Granting Institutions	3100 - Norges Bank 3200 - Other Banks 3500 - Credit Institutions 3600 - Funding Companies 3900 - State Loan Institutions
4000 Other Financial Enterprises Except Insurance	4100 - Financial Holding Companies 4500 - Investment Companies & Active Ownership Fund 5500 - Life Insurance Companies and Pension Funds
5000 Insurance	
Public Administration	
	6500 Muncipal Administration
7000 Ideal Organizations	7000 - Ideal Organizations
8000 - Households	8200 - Self-employed 8500 - Wage earners, Pensioner, Social Security, Students o.l
9000 Abroad	9000 - Abroad

The table shows SSB's standard for institutional sector grouping, and which sector codes is included in the different sectors.

Table A1.7: Distribution of business graduates in different sectors

	Bachelor	Master	Total
State-owned Enterprises	2237	2775	5012
Private Owned Enterprises	32487	22020	54507
Credit Granting Institutions	4045	3372	7417
Other Financial Enterprises	791	1150	1941
Insurance	906	710	1616
Public Administration	10277	10223	20500
Non-profit Organizations	1204	1116	2320
Self-employed o.l.	443	162	605
Total	52390	41528	93918

The table shows an overview of the business graduates working in the different sectors. In each sector it is displayed what proportion that is bachelor graduates and master graduates. The sectors are in accordance to SSB's standard for institutional sector grouping.

A2 RQ1: Estimation of Wage Disparities

Table A2.1: Regression results for wage disparities among bachelor and master business graduates in different sectors

	Log Monthly Income
Master	0.22172*** (0.00439)
State Owned Enterprise	0.25176*** (0.00917)
Private Owned Enterprise	0.11621*** (0.00444)
Credit Granting Institutions	0.163*** (0.00729)
Other Financial Enterprises	0.40107** (0.01452)
Insurance	0.14734** (0.01363)
Non-Profit Organizations	0.02652** (0.01198)
Public Administration * Master	-0.03844*** (0.00647)
State-Owned Enterprise * Master	0.03721** (0.01062)
Private Owned Enterprise * Master	0.03997*** (0.00530)
Credit Granting Institutions * Master	0.06467*** (0.00907)
Other Financial Enterprises * Master	0.09187** (0.01633)
Insurance * Master	0.09477** (0.01764)
Non-Profit Organizations * Master	-0.06835** (0.01480)
Constant	10.9451*** (0.00387)
Observations	93 286
R ²	0.13433
Adjusted R ²	0.13421
Standard error in parenthesis	

*** p < 0.01 ** p < 0.05 * p < 0.1

The table shows the complete regression results used to estimate the wage disparities between bachelor and master business graduates in different sectors. The sectors are in accordance to SSB's standard for institutional sector grouping. Business graduates are candidates with NUS-codes starting with '6411' and '7411'. Reference category is Public Administration. Measurement time is 2021.

A3 RQ2: Wage Disparities among Genders

Table A3.1: Regression results for wage disparities between male and female business graduates in different sectors

	Log Monthly Income
Female	-0.13609*** (0.00440)
Master	0.23084*** (0.00256)
State Owned Enterprise	0.28799*** (0.00849)
Private Owned Enterprise	0.18558*** (0.00487)
Credit Granting Institutions	0.24128*** (0.00735)
Other Financial Enterprises	0.52388** (0.01132)
Insurance	0.20702** (0.01339)
Non-Profit Organizations	0.00778** (0.01280)
Public Administration * Female	0.05270*** (0.00649)
State-Owned Enterprise * Female	0.02847** (0.01045)
Private Owned Enterprise * Female	-0.04537*** (0.00525)
Credit Granting Institutions * Female	-0.04784*** (0.00896)
Other Financial Enterprises * Female	-0.19867** (0.01707)
Insurance * Female	0.02057**

	(0.01736)
Non-Profit Organizations * Female	0.05404**
	(0.01462)
Constant	10.97240***
	(0.00452)
Observations	93 286
R ²	0.16865
Adjusted R ²	0.15852

Standard error in parenthesis

*** p < 0.01 ** p < 0.05 * p < 0.1

The table shows the complete regression results used to estimate the wage disparities between male and female business graduates in different sectors. The sectors are in accordance to SSB's standard for institutional sector grouping. Business graduates are candidates with NUS-codes starting with '6411' and '7411'. Reference category is Public Administration. Measurement time is 2021.

A4 RQ3: Trend in Wage Disparities

Table A4.1: Regression results: Estimation of wage disparities for business graduates from 2005

	Log Monthly Income					
	(1.1)	(1.2)	(1.3)	(1.4)	(1.5)	(1.6)
Master	0.29438***	0.26769***	0.26459***	0.25537***	0.24761***	0.23778***
	(0.00438)	(0.00432)	(0.00431)	(0.00459)	(0.00453)	(0.00437)
Female		0.18068***	0.18694***	0.18581***	0.17261***	0.13939***
		(0.00398)	(0.00398)	(0.00398)	(0.00395)	(0.00384)
Age			0.06504***	0.07212***	0.04683***	0.05768***
			(0.00352)	(0.00379)	(0.00382)	(0.00367)
Age ²			0.00062***	0.00068***	0.00043***	0.00052***
			(0.00003)	(0.00003)	(0.00003)	(0.00003)
Experience Bachelor				0.01875***	0.01752***	0.00271***
				(0.00345)	(0.0034)	(0.00327)
Experience Master				0.02525***	0.02218***	0.02902***
				(0.0022)	(0.00217)	(0.00209)
Experience ² Bachelor				0.00092***	0.00083***	0.00011***
				(0.00018)	(0.00018)	(0.00017)
Experience ² Master				0.00108***	0.00093***	0.00125***
				0.00011	(0.00011)	(0.00011)
Short Part-Time					-0.28872**	-0.28581**

					(0.01137)	(0.01092)
Long Part-Time					0.21338***	0.20358***
					(0.00826)	(0.00794)
State Owned Enterprise						0.29981***
						(0.00804)
Private Owned Enterprise						0.23038***
						(0.0047)
Credit Granting Institutions						0.2721***
						(0.00753)
Other Financial Enterprises						0.51706**
						(0.01298)
Insurance						0.30027**
						(0.01298)
Non-Profit Organizations						0.07823**
						(0.0127)
Constant Term	11.1781***	11.2667***	9.60377*	9.39369	10.0453	9.50984*
	(0.00239)	(0.00305)	(0.09435)	(0.10295)	(0.10342)	(0.09976)
Observations	43495	43495	43495	43495	43495	43495
R ²	0.09408	0.13501	0.1432	0.14903	0.1722	0.23806
Adjusted R ²	0.09406	0.13498	0.14313	0.14887	0.17201	0.23778

Standard error in parenthesis

*** p < 0.01 ** p < 0.05 * p < 0.1

The table shows the complete regression results that have been used to estimate the wage gap between Norwegian bachelor and master business graduates. Business graduates here are candidates with educations with NUS codes starting with '6411' and '7411'. The target year is 2005. The reference categories are bachelor, male, academic occupations, full-time and public administration.

Table A4.2: Regression results: Estimation of wage disparities for business graduates from 2009

	Log Monthly Income					
	(1.1)	(1.2)	(1.3)	(1.4)	(1.5)	(1.6)
Master	0.28529*** (0.00384)	0.26150*** (0.00377)	0.25671*** (0.00378)	0.24252*** (0.00427)	0.23500*** (0.00422)	0.22817*** (0.00406)
Female		0.18832*** (0.00358)	0.19264*** (0.00358)	0.19305*** (0.00357)	0.18008*** (0.00355)	0.14475*** (0.00345)
Age			0.03857*** (0.00241)	0.04565*** (0.00289)	0.02731*** (0.00290)	0.04201*** (0.00279)
Age ²			0.00038*** (0.00002)	0.00044*** (0.00002)	0.00026*** (0.00002)	0.00038*** (0.00002)
Experience Bachelor				0.00400*** (0.00226)	0.00149*** (0.00223)	0.00838*** (0.00214)
Experience Master				0.02329*** (0.00160)	0.02002*** (0.00158)	0.02483*** (0.00152)
Experience ² Bachelor				0.00040*** (0.00012)	0.00027*** (0.00012)	0.00058*** (0.00011)
Experience ² Master				0.00112*** (0.00009)	0.00095*** (0.00009)	0.00117*** (0.00008)
Short Part-Time					-0.28307** (0.01046)	-0.28086** (0.01003)
Long Part-Time					0.21477*** (0.00767)	0.20722*** (0.00736)
State Owned Enterprise						0.29644*** (0.00734)
Private Owned Enterprise						0.23655*** (0.00426)
Credit Granting Institutions						0.27172*** (0.00680)
Other Financial Enterprises						0.52748** (0.01149)
Insurance						0.28362** (0.01301)
Non-Profit Organizations						0.07317** (0.01158)
Constant Term	11.1686*** (0.00222)	11.2620*** (0.00280)	10.3194* (0.06130)	10.13010* (0.07699)	10.5915* (0.07706)	9.94061* (0.07462)
Observations	52 635	52 635	52 635	52 635	52 635	52 635
R ²	0.09458	0.13977	0.14435	0.14997	0.17223	0.24049
Adjusted R ²	0.09456	0.13974	0.14429	0.14984	0.17207	0.24026

Standard error in parenthesis

*** p < 0.01 ** p < 0.05 * p < 0.1

The table shows the complete regression results that have been used to estimate the wage gap between Norwegian bachelor and master business graduates. Business graduates here are candidates with educations with NUS codes starting with '6411' and '7411'. The target year is 2009. The reference categories are bachelor, male, academic occupations, full-time and public administration.

Table A4.3: Regression results: Estimation of wage disparities for business graduates from 2013

	Log Monthly Income					
	(1.1)	(1.2)	(1.3)	(1.4)	(1.5)	(1.6)
Master	0.27457*** (0.00331)	0.25347*** (0.00324)	0.24936*** (0.00323)	0.23997*** (0.00396)	0.23431*** (0.00392)	0.22452*** (0.00378)
Female		0.19120*** (0.00314)	0.19089*** (0.00313)	0.19025*** (0.00313)	0.17857*** (0.00311)	0.14445*** (0.00302)
Age			0.04399*** (0.00162)	0.03797*** (0.00207)	0.02647*** (0.00207)	0.03939*** (0.00200)
Age ²			0.00042*** (0.00001)	-0.0037*** (0.00002)	0.00025*** (0.00002)	0.00035*** (0.00001)
Experience Bachelor				0.00331*** (0.00150)	0.00575*** (0.00149)	0.00031*** (0.00143)
Experience Master				0.00067*** (0.00114)	0.00165*** (0.00113)	0.00481*** (0.00109)
Experience ² Bachelor				0.00002*** (0.00008)	0.00012*** (0.00008)	0.00015*** (0.00008)
Experience ² Master				0.00000*** (0.00006)	0.00012*** (0.00006)	0.00017*** (0.00006)
Short Part-Time					0.25744*** (0.00927)	0.25420*** (0.00891)
Long Part-Time					0.20794*** (0.00696)	0.20401*** (0.00669)
State Owned Enterprise						0.28062*** (0.00665)
Private Owned Enterprise						0.22688*** (0.00375)
Credit Granting Institutions						0.25943*** (0.00600)
Other Financial Enterprises						0.51535** (0.01022)
Insurance						0.26109** (0.01151)

Non-Profit Organizations						0.06596** (0.01031)
Constant Term	11.13760*** (0.00202)	11.2347*** (0.00253)	10.12780** (0.03876)	10.32420* (0.05374)	10.60320* (0.05361)	10.0144* (0.05221)
Observations	64 706	64 706	64 706	64 706	64 706	64 706
R ²	0.09601	0.14498	0.15730	0.15919	0.17905	0.24416
Adjusted R ²	0.09600	0.14495	0.15724	0.15909	0.17893	0.24398

Standard error in parenthesis
*** p < 0.01 ** p < 0.05 * p < 0.1

The table shows the complete regression results that have been used to estimate the wage gap between Norwegian bachelor and master business graduates. Business graduates here are candidates with educations with NUS codes starting with '6411' and '7411'. The target year is 2013. The reference categories are bachelor, male, academic occupations, full-time and public administration.

Table A4.4: Regression results: Estimation of wage disparities for business graduates from 2017

	Log Monthly Income					
	(1.1)	(1.2)	(1.3)	(1.4)	(1.5)	(1.6)
Master	0.25720*** (0.00286)	0.23971*** (0.00279)	0.23606*** (0.00275)	0.25970*** (0.00375)	0.25433*** (0.00372)	0.24211*** (0.00359)
Female		-0.18799*** (0.00276)	0.18132*** (0.00269)	0.17682*** (0.00269)	0.16679*** (0.00267)	0.13575*** (0.00260)
Age			0.05006*** (0.00111)	0.03645*** (0.00133)	0.03043*** (0.00133)	0.03980*** (0.00129)
Age ²			0.00046*** (0.00001)	0.00035*** (0.00001)	0.00028*** (0.00001)	0.00035*** (0.00001)
Experience Bachelor				0.01322*** (0.00113)	0.01402*** (0.00112)	0.00856*** (0.00108)
Experience Master				0.01831*** (0.00096)	0.01970*** (0.00095)	0.01173*** (0.00092)
Experience ² Bachelor				0.00062*** (0.00006)	0.00069*** (0.00006)	0.00041*** (0.00006)
Experience ² Master				0.00102*** (0.00005)	0.00110*** (0.00005)	0.00072*** (0.00005)
Short Part-Time					0.23362*** (0.00796)	0.23170*** (0.00767)
Long Part-Time					0.19687*** (0.00622)	0.19477*** (0.00599)
State Owned Enterprise						0.26276*** (0.00598)
Private Owned Enterprise						0.21229*** (0.00327)

Credit Granting Institutions						0.23924*** (0.00521)
Other Financial Enterprises						0.48764*** (0.00896)
Insurance						0.23831*** (0.00993)
Non-Profit Organizations						0.05167*** (0.00888)
Constant Term	11.09420*** (0.00184)	11.19220*** (0.00230)	9.92404** (0.02494)	10.32970** (0.03279)	10.4665** (0.03263)	9.99562** (0.03209)
Observations	79 994	79 994	79 994	79 994	79 994	79 994
R ²	0.09142	0.14125	0.18610	0.19269	0.21012	0.26881
Adjusted R ²	0.09141	0.14123	0.18606	0.19260	0.21002	0.26867
Standard error in parenthesis						
*** p < 0.01 ** p < 0.05 * p < 0.1						

The table shows the complete regression results that have been used to estimate the wage gap between Norwegian bachelor and master business graduates. Business graduates here are candidates with educations with NUS codes starting with '6411' and '7411'. The target year is 2017. The reference categories are bachelor, male, academic occupations, full-time and public administration.

Table A4.5: Regression results for wage disparities among bachelor and master business graduates in different sectors, for all years (2005, 2009, 2013, 2017, 2021)

	Log Monthly Income				
	2005 (1)	2009 (2)	2013 (3)	2017 (4)	2021 (5)
Master	0.23848*** (0.00665)	0.23270*** (0.00585)	0.23786*** (0.00517)	0.23097*** (0.00461)	0.22172*** (0.00439)
State Owned Enterprise	0.30624** (0.0106)	0.29656** (0.01010)	0.27817*** (0.00962)	0.26745*** (0.00924)	0.25176*** (0.00917)
Private Owned Enterprise	0.21441*** (0.00557)	0.21893*** (0.00521)	0.19967*** (0.00478)	0.16392*** (0.00448)	0.11621*** (0.00444)
Credit Granting Institutions	0.26732*** (0.00948)	0.26354*** (0.00881)	0.23095*** (0.00795)	0.18481*** (0.00730)	0.163*** (0.00729)
Other Financial Enterprises	0.494** (0.01863)	0.51751** (0.01662)	0.48511** (0.01529)	0.43806** (0.01434)	0.40107** (0.01452)
Insurance	0.27894** (0.01903)	0.26508** (0.017254)	0.21974** (0.01566)	0.17523** (0.01387)	0.14734** (0.01363)
Non-Profit Organizations	0.0803** (0.01602)	0.07803** (0.01511)	0.06625** (0.01406)	0.05410** (0.01293)	0.02652** (0.01198)

Public Administration *					
Master	-0.05396**	-0.03965***	-0.05176***	-0.04814***	0.03844***
	(0.0104)	(0.00904)	(0.00779)	(0.00683)	(0.00647)
State-Owned Enterprise *					
Master	0.02616**	0.03683**	0.03283**	0.03047**	0.03721**
	(0.01435)	(0.01292)	(0.01175)	(0.01089)	(0.01062)
Private Owned Enterprise *					
Master	0.06227***	0.06258***	0.05119***	0.04314***	0.03997***
	(0.00827)	(0.00727)	(0.00636)	(0.00561)	(0.00530)
Credit Granting Institutions *					
Master	0.06184**	0.06112**	0.07038**	0.07843***	0.06467***
	(0.01373)	(0.01209)	(0.01064)	(0.00941)	(0.00907)
Other Financial Enterprises *					
Master	0.10821**	0.08494**	0.08728**	0.08687**	0.09187**
	(0.02739)	(0.02038)	(0.01823)	(0.01653)	(0.01633)
Insurance * Master	0.10171**	0.08627**	0.10097**	0.11275**	0.09477**
	(0.02411)	(0.02376)	(0.02091)	(0.01852)	(0.01764)
Non-Profit Organizations *					
Master	-0.06777**	-0.0594**	-0.05304**	-0.07256**	-0.06835**
	(0.02411)	(0.02136)	(0.01873)	(0.01641)	(0.01480)
Constant	11.0028***	10.98967***	10.97397***	10.95604***	10.9451***
	(0.00468)	(0.00441)	(0.00407)	(0.00386)	(0.00387)
Observations	43 495	52 635	64 706	79 994	93 286
R ²	0.17648	0.17880	0.17617	0.15928	0.13433
Adjusted R ²	0.17623	0.17860	0.17601	0.15914	0.13421

Standard error in parenthesis

*** p < 0.01 ** p < 0.05 * p < 0.1

The table shows the complete regression results for all years used to estimate the wage disparities between bachelor and master business graduates in different sectors. The sectors are in accordance to SSB's standard for institutional sector grouping. Business graduates are candidates with NUS-codes starting with '6411' and '7411'. Reference category is Public Administration. Measurement time is 2021.

Table A4.6: Progression of logarithmic monthly income as a function of years of work experience for bachelor and master business graduates

	Log Monthly Income									
	2005		2009		2013		2017		2021	
	Bachelor	Master	Bachelor	Master	Bachelor	Master	Bachelor	Master	Bachelor	Master
2 years	10,99	11,24	10,99	11,65	10,99	11,65	10,99	11,62	10,74	11,00
3 years	10,96	11,31	10,96	11,41	10,95	11,41	10,92	11,45	10,79	11,04
4 years	11,06	11,22	11,04	11,27	11,04	11,29	10,95	11,29	10,82	11,05
5 years	11,09	11,25	11,05	11,23	11,03	11,23	10,96	11,23	10,86	11,09
6 years	10,95	11,29	10,94	11,22	10,97	11,22	10,92	11,07	10,88	11,08
7 years	11,07	11,24	11,07	11,21	11,07	11,23	10,96	11,16	10,93	11,16
8 years	11,04	11,26	11,04	11,23	11,05	11,24	10,97	11,2	10,95	11,2
9 years	11,03	11,27	11,04	11,26	11,02	11,26	10,95	11,2	10,94	11,2
10 years	11,08	11,3	11,07	11,37	11,05	11,2	10,97	11,22	10,96	11,22
11 years	11,13	11,3	11,13	11,33	11,1	11,24	11	11,24	10,99	11,24
12 years	11,13	11,45	11,1	11,44	11,06	11,3	11,03	11,3	11,02	11,3
13 years	11,05	11,42	11,08	11,44	11,07	11,33	11,04	11,33	11,04	11,32
14 years	11,09	11,44	11,15	11,33	11,06	11,36	11,05	11,36	11,04	11,36
15 years	11,07	11,51	11,22	11,39	11,1	11,39	11,08	11,39	11,08	11,39
16 years	11,05	11,41	11,16	11,35	11,06	11,35	11,05	11,35	11,04	11,34
17 years	11,11	11,47	11,11	11,38	11,06	11,37	11,05	11,37	11,05	11,36
18 years	11,14	11,34	11,09	11,4	11,07	11,4	11,07	11,4	11,07	11,39
19 years	11,17	11,48	11,13	11,48	11,12	11,48	11,11	11,48	11,11	11,48
20 years	11,13	11,54	11,11	11,54	11,1	11,54	11,1	11,54	11,09	11,53

