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THE BEST AND BRIGHTEST OR JUST MEDIOCRE?

A Quantitative Study about Wages and Talent in the Financial Sector in Denmark

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Abstract

Since the last decade, wages in the financial sector have risen drastically around the world. This has been attributed both to increasing financial deregulation in the 1980s, as well as to the growing importance of highly skilled labour in the financial service industry (Célérier and Vallée 2015; Philippon and Reshef 2012). As this skill-bias has been found to have sever implications for productivity in other parts of the economy, understanding its origins has increasingly been a focus in economic research (Baumol 1990; Murphy et al. 1991). This paper uses annual Danish administrative panel data from 1986 to 2013, provided by Statistics Denmark, in order to explain escalating wages in the financial sector. It challenges the proposed relationship between financial wages and talent, using the final high school GPA, in an extensive, multi-level model, primarily analysing dynamics in the aggregated financial sector, and secondly the differences in financial sub-branches and thirdly individual career choices. The major role that economic theory and previous researchers have attributed to individuals' skills and talent level in explaining income inequality is the foundation for the focus of the thesis. The aggregated industry analysis presented within the thesis shows that wages of workers in the financial sector in Denmark relative to non-financial sectors increase to the same extent as in other financial markets in developed economies. Contrary to the proposed positive relationship, neither talent nor other human capital measurements account fully for the major increase in the finance wage premium; though the results do show a positively significant relationship. In addition, talent endowment was not found to increase the chances of individuals entering the finance industry. A high GPA was even found to have a negative influence on an individual's choice to work in finance. However, years of education, measuring skills more broadly, have a positive influence. The intra-industry analysis revealed differences in terms of wage and talent allocations among industry groups and industry classes in the financial industry. The analysis also shows that not only high-paid sub-branches succeed in attracting the highest skilled financial employees. Finally, the findings show a significant loss of highly talented financial employees within the financial sector to other sectors of the economy, with this mostly taking place after only a short work period. In sum, this thesis shows that the Danish financial industry is not clearly subject to a "talent-bias".

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1. Introduction

The relevance and implications of wages and talent in the world of finance

'Nobody from the bank mentioned the biggest reason a college senior might be attracted to Wall Street - namely, the fact that first-year analyst jobs pay a starting salary of around 70.000$, with a year-end bonus that can be upwards of 50.000$' (Roose 2014: 19). This statement is from an employee at a well-known investment bank in the United States, made shortly before the recent financial crisis. It underlines the dramatic earning potential that has been enjoyed by those working in the financial sector, which went along with an increased importance and power of the financial sectors in major leading economies. Since the expansion of economic and financial deregulation in the 1980s and the ensuing Washington Consensus promoting neoliberal policies, financial compensation has increased largely. In the United States alone, earnings have increased from 20 percent in the 1980s above relative wages in other sectors in the economy to up to 70 percent during the financial crisis of 2008, when the collapse of the financial sector in the United States started a worldwide recession (Philippon and Reshef 2012). The implications of this pattern are two-fold. On the one hand, recent discussions have not only addressed increasing financial wages, but have also highlighted an enormous influx of "the best and brightest" into finance, also known to cause a skill-bias or brain-drain in recent discussions. This "brain-drain" is referred to when describing the movement of talented professionals from other economic sectors into finance. Many scholars still argue that the financial sector is necessary for economic growth and development, and thus defend the need for such a concentration of talent within finance (Levine 2005; Rousseau and Wachtel 2011). On the other hand, this skill-bias has also been found to have negative effects, as it decreases productivity in other skill-intensive industries due to lower skilled labour in sectors outside of finance (Kneer 2013a; Murphy et al. 1991). It is argued that high wages are necessary to keep talented individuals in the financial industry. However, the recent financial crisis has drastically shown the limitations of the financial sector and the great potential for error within its practices. Discussions highlight the concern that there is "too much finance" in economy and society, and questioning any long-term benefits (Arcand et al. 2015; Cecchetti and Kharroubi 2015; Hodgson 2013; Zingales 2015).

Research on income inequality, a central topic in economics and social sciences, has so far failed to adequately explain the ever-rising wages in the financial sector. Even in the aftermath of the financial crisis, high earning differences between financial and non-financial sectors continue to persist. Moreover, rising wages in the financial sector have contributed much to rising income inequality

throughout the whole economy (Bakija et al. 2012; Bell and van Reenen 2013; Denk 2015; Godechot 2011; Philippon and Reshef 2012). The failure of the financial markets that became blatantly clear after 2008 have underlined the importance of understanding income distributions for continuous economic growth and the prevention of another market crash in the future (Atkinson 2015; Atkinson et al. 2011). In aiming to achieve such an understanding, researchers have considered institutional, political and social dynamics influencing income inequality, mostly with inconclusive results.

Theoretical focus of the thesis

Just like in the United States, the financial services sector in Denmark is, as of 2016, the highest paid sector in the country, paying an average yearly salary of 720,000 DKK (Statistics Denmark 2016a). So far, no research has addressed the rising financial income or looked into the possibility of the skill-bias in the financial industry in Denmark. This thesis aims to help fill this research gap by analysing the relationship between skills and wages, while limiting its scope to economic explanations for income dispersions. Several "myths" explaining increasing income from a classical economic theory perspective dominate economic research at this stage. This thesis focuses on the importance of talent and skill as one of those myths postulated in human capital theory (see Becker 1962). Human capital explanations imply that income differences are justified if they can be traced back to individuals' variation in human capital accumulation. This theoretical argument underlies again the importance of understanding in academia and policymaking how much of the income inequality, in this case between the financial sector and non-financial sectors, is justified by financial professionals having acquired higher skills. Becker, as one of the first ones in economic research to highlight the importance of skills, distinguishes between specific and general human capital, which can be increased through individuals' investment in, for example, schooling, measuring general human capital, whereas on-the-job training would symbolize specific human capital (Becker 1962).

Individuals' career choices and the industries they choose to work in have been explained by the economist and scholar Roy (1951), who proposes a dynamic self-selection process in which individuals choose the career with the highest expected earnings in relation to their acquired skills. His work offers one of the earliest and most extensive explanations for the distribution of skills in different industries and career choices based on skills and wages. In addition to human capital theory, this thesis uses this so-called *Roy model*, which has been very influential in labour economics for explaining income differences in the financial industry (Roy 1951). Thus, this thesis seeks to answer the following research question:

Research question: *Does talent explain increasing income of employees in the financial sector in the last 30 years in Denmark?*

Research method and scope

This thesis is privileged by access to comprehensive Danish administrative data since 1986, provided by Statistics Denmark, which collects data on the entire Danish population (Statistics Denmark 2016b). This data, almost not available for any other country in the same detail, provides an excellent opportunity to contribute to current research with insights on wage and skill distributions in a European financial market which has not been studied before. In addition, a major advantage is that this dataset provides access to more comprehensive estimates of talent and skill than most studies. While several authors make use of different variables to measure human capital, choices of indicators are generally the same across studies. These often include the length of one's education, job tenure and labour market experience - mostly because they are easy to measure (Mincer 1974; Philippon and Reshef 2012). However, these variables have limitations and recent research has shown the importance of focusing on additional variables measuring human capital. In addition to common human capital measurements, high school grades or test scores can serve as a good proxy to measure individuals' talent, as this can also be interpreted as ability or general human capital being very influential for future earnings (Böhm et al. 2015; Célérier and Vallée 2015; Chevalier et al. 2004; Kjelland 2008; Kneer 2013a; Lindley and McIntosh 2014). Thus, this thesis uses the extensive data available to measure talent or also referred to as "cognitive skills" (in additional to common variables measuring skill), which is represented by individuals' final high school grade point average (GPA) leading the focus of this thesis to the effect of general human capital endowments. The final high school GPA, used in Denmark to determine future university or career choices, has become more and more important. However, it can be questioned whether a high GPA really represents potential talent on the labour market. The thesis also provides excellent information on yearly income, which is the factor used to measure individuals' wages for employees in both the financial and non-financial sectors.

The research question is answered in an extensive multi-level analysis, moving from initially studying the financial sector as a closed entity (*aggregated industry level*), to examining intra-industry differences in sub-branches of finance (*intra-industry level),* to analysing mobility and career patterns among individuals in the financial sector *(individual level).* Different levels of analysis are particularly important to generate new insights on the studied phenomenon since recent research on the aggregated financial sector has not provided results to understand the wage dispersion in finance.

Explaining human behaviour from an individual perspective has recently attracted more attention and proven quite useful in addressing major economic questions (Atkinson 2015; Thaler 2016). Considering the rich longitudinal panel dataset available, which dates back to 1986, it is possible to extend earlier research on the relationship between wages and skills to investigate intra-sectoral differences within the financial industry, as well as individuals' career considerations based on the nexus of skills and wages available to them.

In order to generalize results from analysing the Danish financial market, the first level of analysis compares findings on the relationship between skills and wages in Denmark with the Swedish financial sector, which is comparable in size and scope (Böhm et al. 2015). I make use of descriptive analysis as well as ordinary wage regressions to estimate the effect of skills on the finance wage premium. In addition, a probit choice and linear probability model is utilized to determine individuals' career choices. In the second and third level of the analysis, descriptive analysis, mobility measurements and social network analysis are used to display intra-industry differences and career paths of individuals leaving and entering the financial sector. This thesis is based on human capital theory and the Roy model, thus using deductive reasoning to develop hypotheses about the relationship between wages and skills.

Literature

Little research has addressed rising income inequality with a focus on the financial sector in explaining high and increasing income levels in the industry. The purpose of this thesis is to combine several streams of previous research on the relationship between wages and skills to provide additional knowledge for understanding earning dispersions in the financial sector. Most research on wage dynamics in the financial sector has been conducted in the United States. In this field, Philippon and Reshef (2012) were among the first scholars to document a U-shape for wages and skills in the United States; this documentation showing wages increasing parallel to skills from the 1980s up until the recent financial crisis. Specifically in the aftermath of this crisis, the extravagance of wages within the financial sector (including infamously outrageous bonuses to bankers) has attracted much attention, not only in policymaking, but also in economics. Several scholars have documented similar findings for European countries, proving a directly proportional relationship between increasing wages and skills in finance; with some of them also focusing on the influence of cognitive skills measured by grade scores (Célérier and Vallée 2015). Other scholars remain sceptical towards a skill-bias, arguing that skills and

talent as such have not increased in the financial sector in recent years (Bell and van Reenen 2010; Böhm et al. 2015; Lindley and McIntosh 2014).

In terms of intra-sectoral differences and career paths among financial workers, this thesis steps into under-researched terrain. So far, most mentioned studies focus on reasons for wage increases for financial jobs in comparison to non-financial ones. None have looked deeper and studied intra-sectoral differences or financial career choices in such a way as this thesis is attempting to. Some scholars have analysed recent business school graduates' career paths in the United States; leaving the analysis to a small sample of individuals entering the financial sector (Oyer 2008a; Shu 2015). In addition, this analysis ties to labour mobility studies, with consideration of both income and talent, which so far has not been used empirically to explain wage differences in the financial sector (Kambourov and Manovskii 2009a).

Executive Summary

In short, the analysis finds that the financial wage-increase cannot be explained by attracting "the best and the brightest". The industry as a whole performs worse than all non-financial industries in Denmark in attracting future employees with the highest levels of human capital according to my analysis, thus disproving the above-mentioned theory that "brain drain" is occurring and talent is conglomerated in the field of finance. Moreover, the most talented individuals entering a job in the financial sector often choose a short-term career there. These findings raise concerns when it comes to justifying high compensations in finance from an economic point of view, and also for combatting income inequality. Given increasing income inequality between the industries of finance and "non-finance", the findings of this thesis have broad implications for research and policymaking, showing that the Danish financial sector is not subject to a skill-bias.

Structure

The structure of the thesis proceeds as follows. Firstly, I present the major theoretical concepts that this thesis draws from: human capital theory and the model of occupational self-selection. Secondly, relevant literature and research in the field that gives attention to the financial sector as a subject area is reviewed. Thirdly, a chapter on data selection and criteria is provided, which explains the characteristics of the panel dataset and the variables used for the analysis. Fourthly, the findings chapter first studies wage differences between finance and non-finance as two distinct industries before conducting an intra-industry analysis to shed light on differences amongst sub-branches of

finance. Subsequently, I move to a micro-level and analyse professionals' career choices and expected income development. The main empirical models and methodology are explained along with the analysis to facilitate interpretation of the findings. Finally, I discuss the presented findings and show limitations of the results and methods used, as well as policy and research implications, before concluding the thesis.

2. Theoretical Framework

Becker was among the first to strengthen the concept of human capital and its importance for productivity in 1962. Essentially, the human capital approach explains income dispersion with individuals' variation in human capital accumulation. Since then, the human capital approach has been widely used in economic research to show significant positive effects of skills on wages and economic growth (Bils and Klenow 2000; Hall and Jones 1998; Jones 2014; Krueger and Lindahl 2001).

The overall aim of this thesis is to contribute to the debate on human capital theory by focusing on the significance of skills and talent, as general human capital, for income differences in the financial sector. This relationship was studied earlier in a similar way in other international financial markets (Célérier and Vallée 2015; Böhm et al. 2015). Doing so, this thesis adds to recent discussions about the increasing importance of talent in the financial industry because it elaborates on how improved talent has affected recent escalating financial wages in Denmark. In addition, this thesis uses several levels of analysis and moves from an industry-perspective to individual career choices in the finance sector, previously mostly analysed in the United States by e.g. Kedrosky and Stangler 2011 and Shu 2015. Unlike these studies, I will focus predominantly on the importance of talent, not only educational skills; the latter of which has attracted most attention in economic research on human capital and thus has not provided sufficient results. This thesis contributes to these results by analysing additionally the importance of cognitive skills, rather than only education, and shows that both play only a minor role accounting for an increasing finance wage premium. Furthermore, I introduce additional explanations for increasing wages, e.g. by borrowing concepts from sectoral mobility studies, (e.g. Atkinson et al. 1992) to investigate further on financial workers' career paths. To my knowledge, no research has been conducted on specific industry mobility within and outside of the financial sector. Additionally, this analysis is the first one to comprehensively study intra-industry wage and skill distribution *within* the financial sector. It uses hereby concepts, which explain the industry specific nature of wages (e.g. Kambourov and Manovskii 2008).

No previous studies have explained the role talent plays in the Danish financial labour market nor given any reasons for increasing wages in an industry, offering one of the highest earnings in the Danish economy. Only recently have Bagger et. al (2011) developed a model which points in a similar direction. They also relied on Danish administrative data in order to generally analyse the influence of human capital on individuals' earnings and job searching processes in the Danish labour market (Bagger et al. 2011). However, this thesis mainly focuses on the financial sector as one of the highest

increasing income sectors in Denmark and solving the puzzle on the relationship between wages and skills in the financial industry.

2.1 Human Capital Theory

Becker's publication (1962) particularly acknowledges human capital in economics arguing that human capital increases productivity and thus explains income disparity among workers. Thus, it extends the 1960s traditional neoclassical approaches (Solow 1956) by so-called "human capital" (see Becker 1962). After Becker's publication, scholars started to recognize the importance of specific labour skills and characteristics (knowledge, skills, attributes or competencies) as dependent variable in the production function and therefore abandoned defining labour input as only the amount of labour hours. Whereas neoclassicism emphasizes four major variables (land, capital, labour and technological advances), human capital theory strengthens the importance of incorporating human capital as an additional and very important form of capital, boosting productivity and hence economic growth levels (Brue and Grant 2013; Sengupta 2011). The human capital approach also gained importance because physical capital did not particularly influence income levels. In traditional neoclassical reasoning, human capital therefore does not differ from the original interpretation of physical capital but analysed similarly; both input increases productivity and wages. Firms have to invest into physical capital to be productive and competitive. Individuals have to invest into human capital respectively. Investments in human capital accumulation do not only help to increase individuals wage levels, but also firms employing high human capital stay productive and sustain their competitive advantage (Marimuthu et al. 2009). Consequently, human capital becomes an indispensable part of economic growth suggesting a causal effect of human capital on wages (Becker 1962; Gess 2003).

Though costly and time consuming, education, seen as an investment in human capital, guarantees higher wages and future returns. As Becker puts it, investments in human capital are "activities that influence future monetary and psychic income by increasing the resources in people." (Becker 1975: 9). Workers rationally choose how to invest in human capital by maximizing their future income. They evaluate disadvantages of current educational expenditures and missing incomes with the benefits of future higher wages (Becker 2011).

Basically, Becker mentions two different types of investment in human capital: on the job training and schooling, and emphasizes that human capital investment not only exists in the form of institutional education but can also take place in the labour market. Profound effects on following research had his

distinction between specific and general human capital: General skills increase productivity in all companies. Specific human capital only provides an investment for specific companies. He argues that companies suffer when workers with specific skills change occupations being an asset to the company. However, workers with specific training, knowledge and skills have also more difficulties switching jobs. On the other hand, generally skilled workers show higher occupational mobility among companies because they carry human capital, beneficial to every company (Becker 1975).

Since Becker's research, Schultz (1961) and Mincer (1974) have particularly shaped and more extensively expanded further discussions on the present importance of human capital, the analysis formalizing and defining human capital. Schultz points out how investment in education influences most of the wage increases. He calls this "educational capital" (Schultz 1961). Mincer formalizes Becker's approach in a human capital wage function, which explains variations in income levels, defining human capital through education and labour market experience. He argues that an extra year of schooling increases productivity at the work place respectively and hence results in proportionally higher wages. Labour market experience plays a crucial role when a worker remains at a certain company longer and automatically acquires more on the job training, thus increasing human capital. Job tenure would hence serve as a form of measuring specific job skills; whereas labour market experience would focus on general skills should the individual work at different companies. The general assumption prevails, that postponing today's income to invest in education decreases current wages but results in future higher returns. However, Mincer also underlines the difficulties of measuring human capital due to multicollinearity between variable measuring human capital, and the fact that, from a specific age, wages do not increase proportionally to education.

In conclusion, early research suggests that human capital can be measured in several ways, either through labour market experience, job tenure or years spent on education (Mincer 1974).

2.2 Workers' Self-selection: Relationship between Skills and Income from an Individual's Perspective

Roy (1951) was among the first economic scholars to explain workers' occupational choices. The difference to human capital approaches is that those focus on explaining aggregated income variations, but not individuals' choices as such. Roy reasons that sectoral choices in the labour market are individuals' optimizing decisions considering their expected wages according to different skill levels. Still, he mostly uses the human capital model introduced by Becker to explain aggregated

income differences. He simplifies his analysis only by distinguishing between two sectors, fishing and hunting. In his argumentation, assuming all sectors would require the same skills; suggests the highest occupational movement between the two sectors. However, the fishing sectors yield little success and require intensive skills. Therefore, individuals, with the required skills, prefer occupations with the highest expected earnings. This self-selection process implies that the fishing industry would mostly attract skilled fishers whereas the hunting sector would acquire fewer skilled workers.

However, Roy also sheds light on the importance of technology. He argues that the skill distribution in certain sectors changes though introducing technology in order to help every worker to be equally productive. The influence of technology on skill demand has since been studied widely (Acemoglu and Autor 2010; Acemoglu 2002; Goldin and Katz 2007). As Roy formulates: "If 'anybody can do it', there is no reason to esteem or pay very much for its performance." (Roy 1951: 145). However, if technology only increases productivity of those with the best skills, fishing industry would still be skill-biased. This is simplified reasoning. However, in reality, wages would not solely depend on the workers' output, and labour markets would not consist of only two sectors. In addition, workers would not solely base their decisions on the expected highest income related to their skills. Still, Roy argues that his model might specifically hold true for individuals' when they first enter the labour market.

As a conclusion, Roy elaborates as one of the first economists on the idea that wages and individuals' career choices are dependent on certain factors such as human skills and technology availability in certain economic sectors (Roy 1951).

2.3 Limitations & Criticism of Human Capital Theory

Common criticism indicates that the human capital approach is weak to test a causal relationship between income and education. Since it symbolizes an extension to neoclassical perspectives, main criticisms address assumptions of the neoclassical production model. The OECD recently defined human capital as "*the knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic Ill-being."* (OECD 2001). This definition expands previous described views on human capital theory by not purely focusing on education. It leads however to measurement complications when empirically trying to observe the relationship between human capital and wages. Thus, most labour economists still focus on educational levels as proxies for human capital mostly because it is easy to observe and to measure (Acemoglu and Autor 2010).

Whereas the previous discussion shows the importance of human capital, measured as educational achievements, Putnam, Fukuyama or Bourdieu strengthen informal institutions and social capital in the form of culture and common sets of beliefs in the society as important for economic performance (Bourdieu 1986; Fukuyama 1995; Putnam 1995).

Social capital generally reduces transaction costs and makes working more efficient and innovative in sharing the same norms and beliefs (Fukuyama 1995; Putnam 1995). Today, few economists started to include these forms of human capital into their empirical analyses explaining wage differences (Borghans et al. 2008; Deming 2015; McCann et al. 2014; Shu 2015). Specifically the role of trust in the financial market has been analysed (Gennaioli et al. 2014, 2015). However, the list of criticisms on human capital theory is extensive (Gess 2003). Bourdieu (1986) in particular, heavily criticizes the economists' view of human capital and introduces a sociological perspective by distinguishing between economic, cultural-, and social capital. Investment decisions are not made rationally but are based on the individual's habitus. According to his definition, institutionalized education is a form of cultural capital, but by far not the only important component of human capital (Borghans et al. 2008; Deming 2015; McCann et al. 2014; Shu 2015) In addition, he not only focuses on institutional education but also on parents' socialization (Bourdieu 1986). Reviewing the main arguments in the debate about human capital theory shows that assumptions are naturally very simplified. It poses a problem to believe empirical studies that a wage increase results purely from increasing productivity because of higher education; subjects in school or university are rarely transferred to the job market (Gess 2003; Sesselmeier and Blauermel 1998).

Aside from sociological criticism on human capital theory, others, such as Spence and Stiglitz, do not question the entire human capital model and neoclassical reasoning as such, but suggest minor adjustments. Some economic scholars criticize the reasoning that variations in education and schooling are the only factor explaining variations in productivity. Spence (1973) and Stiglitz (1975) were the first to argue that each additional year of education does not proportionally lead to higher workers productivity. Instead, they propose that education serves as a way of measuring unobserved individuals characteristics. Spence (1973) claims that based on uncertainty and information asymmetry, employers have to decide whom to hire. As a result, workers invest in costly education and diplomas, "signalling costs", to show their productivity levels. The employer implements these degrees to assess the workers' productivity potential. This is necessary because real output first appear at the work place (Spence 1973). Stiglitz similarly argues that education does not necessarily

lead to higher productivity but screening processes identify productive employees (Stiglitz 1975). It follows “individuals who can be labelled as ‘more productive’ are thereby able to obtain a higher wage” (Stiglitz 1975: 283). Empirically, those assumptions are hard to test against human capital wage models. Both suggest a positive causal relationship between education and earnings, but in theory explain it differently. Human capital approaches strengthen the assumption that an increase in education automatically leads to higher productivity. However, signalling and screening prove otherwise. In conclusion, signalling, screening and human capital theories share the same reasoning, namely that workers with higher education earn higher wages.

As mentioned earlier, focusing only on the economical view of human capital fails to include human beings’ important characteristics and skills. Hence, the definition of human capital in an economic sense introduces difficulties and lacks depth. Empirical results are ambiguous as statistical measurement of the variety of human capital is challenging (Card et al. 2013; Chevalier et al. 2004; Kjelland 2008; Song et al. 2015). The next section elaborates upon empirical findings and current methods used in testing the relationship between human capital and earnings.

3. Literature Review

3.1 Current Theoretical Discussions: Wages and Human Capital in Finance

3.1.1 Rent Extraction

In recent years, the dominant theoretical debate in understanding an influx of talent in the financial sector has focused on possible rent extraction within this industry (Haldane 2010; Krugman 2009; Murphy et al. 1991; Stiglitz 2015; Turner et al. 2010; Zingales 2015). As a result of increasing financial wages, it has been thoroughly discussed whether the increasing financial sector exclusively had positive effects for the economy (Levine 2005). Thus, several scholars argue that even though the financial industry might have given higher personal gains than have other industries, especially since the financial crisis, it has harmed economic growth and societal benefits. In addition, scholars claim that the financial sector has high moral hazards and rent extraction possibilities and thus disproportionally attracts many qualified and skilled workers (Célérier and Vallée 2015; Kneer 2013b; Krugman 2009; Murphy et al. 1991; Zingales 2015). Proponents of the theory of the financial industry as a pure rent-seeking sector argue that increasing wages are not the result of productivity, as human capital theory assumes, but of increasing rent extraction. Rent-seeking is possible due to moral hazard, asymmetric information and financial workers taking high risks (Kneer 2013b; Krugman 2009). In addition, individuals have made increasingly riskier investments in the financial sector during the last decades, which has produced higher returns to increase short-term profits (Gennaioli et al. 2014). Some argue also that only increasing trust in the financial sector caused higher risk-taking (Gennaioli et al. 2014, 2015).

3.1.2 Competition for Talent

Contrary to previous debates on increasing rent-seeking in the financial sector, another group of scholars argue that sectors like the financial industry are more competitive and therefore attract better skilled labour. In accordance to human capital theory, competition for talent leads to the fact that better skilled labour increases productivity in the company. Recent growth in the use of technology also increases such a skill-bias in the financial industry because it absorbs routine-based work and extends the need for talent. Skill-intensive sectors offer an easy flow of capital and a high scale effect among minor talent differences (Célérier and Vallée 2015; Katz and Murphy 1992). One of the first in labour market studies, Rosen (1981) expands the definition of human capital from educational skills and labour market experience to talent. Contrary to previous discussions, he argues that workers prefer

occupations with the highest return to their talent and ability rather than education. He introduces the so-called “superstar theory” reasoning that small talent differences justify higher wages (Rosen 1981). Superstar theory has often been used to explain high CEO salaries. Though empirically difficult to prove, the imprtance of so-called ability for future earnings has been widely acknowledged since then (Chevalier et al. 2004; Kjelland 2008; Weiss 1995).

3.2 Current Empirical Studies: Wages and Human Capital in Finance

The relationship between human capital and wages has mostly been empirically analysed extensively by quantitative methods. Predominantly, labour economists have focused on easy empirically measurable human capital, such as the influence of job experience and tenure as well as schooling on income. Results show that human capital accumulation and wages often correlate positively. They suggest a causal relationship by human capital influencing wage levels (e.g. Bagger et al. 2011; Nawakitphaitoon 2014; Weiss 1995).

Mechanisms in the financial sector and its high wages have often been questioned particularly since the financial crisis. Several studies have since then focused on the fact that, compared to the rest of the economy, wages in the financial industry have increased drastically in the last decades (Bakija et al. 2012; Kaplan and Rauh 2007). Other scholars studying income inequality confirm these findings and document that financial worker or “bankers” contribute much to the rising top of the income distribution (Bell and van Reenen 2010, 2013; Kaplan and Rauh 2007). Those findings raise the question of why income has increased, particularly in the financial sector and during the financial crisis. Scholars have yet to find plausible results.

In this section, I present different approaches to explaining rising wages within the financial sector with focus on the influence of education and talent on earnings. However, it is important to note that the literature offers several ways of approaching how to explain increasing income in the financial industry. The importance of human capital only plays a minor role and vigorous debates exist. Other economic research point to specific structures in the financial labour market justifying higher income as a compensation for higher risks of unemployment, devoting much time to work, skill-biased technological changes, labour-market institutions or social norms (Oyer 2008b; Piketty and Saez 2006; Salverda and Checchi 2014). Since presenting all debates in the literature exceeds the focus of this paper, I will continue by giving an overview on varying approaches most situated in labour economics, which all rely predominantly on the influence of skills and talent on rising wages.

3.2.1 Does Talent explain rising Wages?

One group of studies reasons with traditional human capital theory that rising educational level and college graduates in developed societies generally produce increasing wages (Goldin and Katz 2007; Katz and Murphy 1992). Several scholars apply this hypothesis to the financial sector analysing a simultaneous increase of skilled-labour and increasing income in the industry. Focusing on human capital in an economic tradition, they study the effect of education and ability, as human capital factors, on rising income specifically in the financial sector. The issue has been particularity raised due to public concerns about a recent so-called brain-drain in finance (Böhm et al. 2015; Célérier and Vallée 2015; Kneer 2013b; Philippon and Reshef 2012). Most results suggest that, even though talent has a positive and significant influence on wages, it does not account much for ever-rising wages. Bell and van Reenen (2010) and Lindley and McIntosh (2013) show how wages and skills continuously rise in the United Kingdom, even during the financial crisis. They fail in explaining the increasing finance wage premium even though financial workers show higher test scores in school. Those findings hold true for 17 other OECD countries. Böhm et al. (2015) confirm those findings. They study the phenomenon of rising wages and skill-bias in the Swedish financial sector. Measuring skills more precisely than using education as a proxy, they include Swedish military assessments of 18 year-old men's cognitive and non-cognitive data. This proves advantage because they use time-constant variables in their panel analysis to measure talent rather than education, which varies over time. Their findings also suggest that, even though financial wages are also increasing in Sweden, rising talent does not account for all rising wages (Böhm et al. 2015). However, not all findings point to the same direction. Célérier and Vallée (2015) use specific test scores required to enter engineering schools in France to study wage increase and its effects on the French economy. In contrast to Böhm et al. and Bell and van Reenen, they find that high and increasing returns to talent indeed cause the development of financial wages in France. Bertrand et al. (2010) also show that most of the gender wage gap in the financial sector can actually be explained by human capital factors (Bertrand et al. 2010). It is observed that scholars present different findings using different data sets and financial markets in developed countries as basis of empirical analyses.

3.2.2 Implications of a Skill-Bias for the Economy

Other research focuses on implications of such a movement of skilled labour in the highest paid occupations and further discuss a possible financial skill-bias. Baumol (1990) and Murphy et al. (1991) argue that a high amount of skilled labour and resources in rent seeking industries can proportionally lower productivity and economic growth in other parts of the economy. Disappearing skilled workers in

jobs with high social returns causes low productivity in some economic sectors. Skilled workers rather become lawyers, financial workers or entrepreneurs receiving high wages and causing low productivity in societal more important sectors. Murphy et al. (1991) explain that high influx of talent in the financial- and legal sector, which occurred at the time of their publication in the beginning of the 1990s, resulted actually in economic stagnation in the United States (Murphy et al. 1991). Scholars have also recently focused on the impact of the increasing flow of skills within one industry. Kneer (2013) emphasizes that particularly skill-intensive industries, such as sciences and technologies, suffer under a brain-drain because it lowers productivity. In the same tradition, others focus on discussing finance' social returns (Zingales 2015). Zingales (2015), a famous scholar in finance, strengthens that finance scholarship, rather than other fields, generally receive a worse reputation in society because private returns are much higher. He suggests more emphasis on the academic field of finance to study its benefits on society.

3.2.3 Which Factors trigger rising Wages and Talent?

Following the same tradition of studying the correlation of skills and wages, another stream of research focuses on uncovering factors applying attention on rising wages and skills in the recent years in the financial sector (Boustanifar 2010; Boustanifar et al. 2014; Kneer 2013a; Philippon and Reshef 2012). Most in the debate agree that financial deregulation specifically triggered a skill-biased financial industry. Philippon and Reshef (2012), one of the first to report economic liberalisation as a cause, studied the evolution of relative wages and education in the United States' financial sector during the last century. Their findings show a U-shape of wages and education decreasing since the beginning of 1900, drastically increasing again since the 1980s. During economic deregulation, they observed a skill-bias occurring parallel with rising wages in the US financial sector, especially since the mid-1990s. However, contrary to other scholars (e.g. Célérier and Vallée 2015), they argue that education alone only explains a minor part of high income in the financial sector. Boustanifar supports those findings using a panel data set for several developed countries, arguing that financial deregulation is the main variable influencing increasing wages and skills in the global financial industry (Boustanifar 2010; Boustanifar et al. 2014).

3.2.4 Workers' Self-Selection and Career Choices

Another group of scholars focuses more on the individual level and workers' career choices. In contrast to previous research, focusing on an aggregated level, some base their analysis on Roy (1951), to analyse individuals' career selection and implications (Böhm et al. 2015; Shu 2015). The Roy-model is suitable because it links individuals' skills with wages and occupational choices. Most

research in this field has been conducted in the United States, studying career paths of students of high ranked Ivy League universities. In line with some of the previous findings, they observe that the number of graduates taking financial jobs is increasing. Selected universities, such MIT (Kedrosky and Stangler 2011; Shu 2015), Harvard (Goldin and Katz 2008) and Stanford (Oyer 2008a) are studying career choices of their graduates having access to internal alumni surveys. Böhm et al. (2015) provide one of the few studies outside of the Untied States. They extend their analysis on increasing financial wages by studying individuals' choices in the Swedish financial sector. Results vary but talent measured in grades generally correlates positively with entering financial jobs (Böhm et al. 2015). Contrary, Shu (2015) emphasizes that, students with high university GPAs graduating from MIT have a negative influence on the choice of working in finance. Suggestions correlate with research by Marmaros and Sacardote (2002) and Deming (2015) that, compared to technical industries, social skills play a bigger role in financial jobs (Deming 2015; Marmaros and Sacerdote 2002). Looking at this part of research in general, it can be criticised that the studies predominantly conducted in the United States use small elite samples with students graduating from top universities. However, they also provide in-depth knowledge relying on extensive graduate surveys. The study conducted in Sweden is more comparable to this paper because it uses panel data similar to mine, permitting the same access to career choices of every individuals residing in Denmark.

3.2.5 Individuals' Career Choices: Mobility, Wages and Human Capital

In line with previously mentioned studies, which focus on individuals' career choices, another part in academia has put attention on labour movements of individuals and its contribution to income inequality. Originating from sociological approaches, mobility has also attracted much attention within labour economics explaining labour movements across occupations and industries. Most studies point to a positive relationship between occupational mobility and wages. From a labour economics perspective, individuals act rationally, optimizing their wages and making strategic career moves when changing jobs. Hence, wages are an important determinant for workers choosing to switch occupation or industries (Groes et al. 2014). Research shows that occupational mobility has specifically a significant positive effect on higher wages in early careers because younger employees are more mobile due to the lower costs of switching occupations (Bachmann et al. 2010; Fedorets 2015). In addition to occupational mobility, some have also developed insights into industry mobility, which underlines the effect on wages when workers switch industries instead of occupations in the same sector (Abowd et al. 2012). Industry mobility is theoretically embedded within occupational mobility

using industry definitions instead of occupational coding.[1] This thesis focuses on industry classifications comparing the financial sector to non-finance related jobs and distinguishing between industry groups and classes within finance.

Many occupational mobility models related to wage inequality use reasoning in line with human capital approaches and relate income mobility to skill endowments. Generally, research shows which workers most likely change jobs according to the accumulation of human capital in the form of skills and talent. Results in this field of research most often point to the validity of human capital theory and the dominance of skills and tasks as *general human capital* more influential for individual wages than the industrial or firm environment. This is shown when individuals wages are path-dependent when switching occupations, and do not vary because of industry specific characteristics (Alvarez and Shimer 2011; Bachmann et al. 2010; Kambourov and Manovskii 2009a; Poletaev and Robinson 2008). Others reason that occupational mobility depends on the degree of *specific human capital* since occupation specific capital makes moving more difficult (Kambourov and Manovskii 2009a, 2009b). On the contrary, as outlined above, some researchers show that human capital is industry specific (Neal 1995; Parent 2000). This thesis focuses on industry differences, not only broadly between finance and non-finance but also amongst sub-branches within finance. Some researchers have focused on careers of central bankers using social network analysis after the financial crises. They conclude that the career background of central bankers, mostly economists, is a good measurement for conservative financial policies (Adolph 2013; Epstein 2013; Krippner 2007).

Groes et al. (2014) confirm implications of the Roy model in a study on occupational mobility in the Danish labour market and add some additional assumptions to the model by few. They conclude that workers at both sides of the income distribution and human capital accumulation, (with very low and high wages/human capital), are most likely switching occupations. Earning a high wage and having much human capital before a change in occupation, workers most likely switch to jobs with higher wages. On the contrary, workers with low human capital and wages most likely move to lower paid jobs (Groes et al. 2014).

3.2.6 Methods used in Empirical Studies

Methodologically, most human capital studies share a positivist view and use longitudinal panel data and quantitative evidence to test the causal relationship between education and earnings. Since most

[1] For further research on industry mobility see for instance (Artuç and McLaren 2015; Kambourov and Manovskii 2008; Parrado et al. 2007).

studies are situated in the field of economics, the majority uses quantitative economic research (Rossilah 2004). However, recently new quantitative methods are used to map career paths of financial workers such as alumni surveys from top universities in the United States as well as LinkedIn research and network analysis, particularly in the debate about the importance of talent and education on individual career choices (Deming 2015; Goldin and Katz 2008; Kedrosky and Stangler 2011; Oyer 2008a; Shu 2015). In addition, research on income mobility uses a wide range of graphical estimations (Atkinson et al. 1992; Bourguignon 2000; Jäntti and Jenkins 2015).

In the economic field, dealing with a broad definition of human capital leads to different measures used to understand the importance of human capital accumulation. Traditionally, many scholars base their analysis on the level of education as a proxy for human capital, mostly referred to as "***educational skills***" (e.g. Mincer 1974). However, recent incorporation of psychological and sociological concepts into economic research, have introduced a new focus of measuring human capital, in the form of cognitive and non-cognitive skills (Borghans et al. 2008; Heckman 2000; Heckman et al. 2006; Kautz et al. 2014). They emphasize that skills are a multidimensional and dynamic concept, difficult to measure empirically. Cognitive-skills refer to the "ability to understand complex ideas" and can be operationalized by using IQ tests, school or university grades as well as standardized achievement tests, such as PISA. Contrary, non-cognitive skills, defined as "personality traits are proven to also have a significant influence on individuals' labour market outcomes. Some argue that non-cognitive skills cannot be measured with administrative data at hand but instead with psychological surveys (Kautz et al. 2014). Thus, economists have recently discovered the use of other proxies for cognitive and non-cognitive skills using different databases such as military assessments or surveys. Workers' IQ, school and university grades, used as a proxy for cognitive skills are often found in administrative data (Böhm et al. 2015; Chevalier et al. 2004; Deming 2015; Kjelland 2008). Because human capital relates to a complex concept, it is not fully clear what exactly grades and achievement test measure. Some reason that it also incorporates parts of non-cognitive skills, motivation for instance, influencing educational outcomes. Measuring grades or IQs is often known under the term "***ability***" or "***talent***". Others also refer to it as *"**cognitive skills**" (*Kautz et al. 2014). This thesis uses the final high school GPA as a proxy for talent, further also referred to as ability or cognitive skills.

3.2.7 Summary of Empirical Debate

The presented empirical debates on the relationship between rising wages and skilled labour appear at different discussions in the literature. Most studies focusing on talent or ability in the financial sector,

such as this thesis does, use a small sample of absolvents of top United States' business schools. Most criticise the generality of these research findings. Workers with a MBA are a small part of the financial sector, which questions the positively and significantly causal relationship between skills and income in finance. Most studies using more comprehensive micro-level data disprove increasing education and talent in the financial sector (e.g. Böhm et al 2015). Still, some scholars reason that talent or skills explain much of the finance wage premium increase in recent years (e.g. Célérier and Vallé 2015). This thesis contributes further to these discussions. Others, such as Phlippon and Reshef (2012), argue that an educational increase only plays a minor role of the story. Wages and skills usually increase in times of economic and financial deregulation, which this omits. Hence, they believe that education alone cannot explain all wage increases in the financial sector. Others again focus on the implications of such a disproportional flow of talent in one industry of the economy (e.g. Zingales 2015) and leave causes of increasing earnings unexplained. Most studies use the United States' financial market as one of the biggest and influential. Country differences persist and results show that especially European financial sectors do not show wage increases to the same extent.

Previous approaches help to uncover the problematic of increasing earnings, especially in the finance sector, and identify appropriate methods to compare Danish financial sector to other countries. Most studies use quantitative research and limit their findings to the same economic theory of human capital. These presented studies rarely reveal any new in-depth knowledge of the original issue of rising income in the financial industry focusing on skill and talent. Instead, human capital assumptions are either rejected or approved. In addition, studies show unsatisfying results and call for more comprehensive investigation. This thesis takes the first steps towards analysing the importance of cognitive skills for rising earnings in finance, and continues with recent research on studying career paths and intra-industry differences contributing to on-going discussions.

The presented empirical studies, all-focusing on the importance of skill and talent on rising wages in the financial sector, present ambiguous results. So far, the cause of rising wages has been explained inadequately. Thus, these are some of the questions this thesis seeks to answer: *Is the accumulation of human capital an important factor for starting a career in the financial sector? Does talent matter more than education for increasing wages?* The importance of human capital rests unclear, at least for explaining continuously rising earnings in financial industries in developed countries. The presented empirical and theoretical debate sets an interesting starting point revealing reasons for rising financial income in the recent years in Denmark and analysing the importance of talent and skills respectively.

4. Data

The quantitative analysis is based on a collection of different administrative registers provided by the organisation Statistics Denmark. The organization in registers derives from an old data law, which prohibited earlier uploading large amounts of individual level data onto one file. Data is still kept dividing different registers into different topics such as, for instance, income register or population register. Statistics Denmark is the main institution which handles public statistics in Denmark, collects different register data, conducts all sorts of evaluations and provides access to data from other agencies such as the Danish Ministry of Employment. The data is updated annually, some dating back to the 1970s. The most recent available data dates 2013. Data files are available online in Stata compatible ".dta" format for specific research purposes via a server from Statistics Denmark. One can generally download data on an individual, household, and company level. This thesis uses individual level data.

This paper uses seven different registers from Statistics Denmark, containing anonymised micro level data:

1. ***The population register*** contains personal information such as gender and age (BEF).
2. ***The income register*** is based on tax returns including information about different types of income (IND).
3. ***The attainment register*** gives information about the highest educational level completed (UDDA).

Two different ***labour market registers:***

4. A labour market register provides appointment information (IDAN).
5. Another labour market register shows personal working information (IDAP).

Two different registers contain information on ***educational achievements***:

6. Average grades (GPA) of the final education (UDG)
7. High school grades (UDGK)

Each register contains several variables. I only extract those variables I need for the analysis. In addition, for every register, I keep each individual's personal I.D. in order to later merge and append the different datasets using the statistics program Stata, which is also used later on for the analysis. I

use gender and age from the population register. The income register provides the variable for measuring income. A variable on the highest fulfilled education stems from the attainment register. The two labour market registers give access to the variables related to the current job such as the personal industry code of occupation, starting year and day as well as labour market experience and job tenure (Statistics Denmark 2016b). A detailed description of the variables is given in section 4.2 “Description of variables”.

4.1 Panel Data

The data structure is a unique panel data set. It includes each individual who has lived in Denmark from 1986 to 2013, and continuously reports information on these individuals over time. This period was selected because the most important variables for the analysis are available exclusively. The panel is unbalanced, which means that I do not have continuous information on every individual every year from 1986 to 2013. Individuals are only registered in the data set if they have lived in Denmark in November of each year, when the data registering process for most registers occurs. Individuals can drop out if, for instance, they move out of Denmark (panel attrition). They are included when they move to Denmark (late entry). Advantages of such a unique micro level panel data, covering every person in Denmark since 1986, is that individual changes and trends in careers and income can be followed throughout the entire time period, given that the individuals have lived in Denmark. It thus includes Danish citizens and non-Danes (Andreß et al. 2013).

4.2 Description of Variables

The seven different registers are merged onto individual level using a unique personal I.D. to obtain a single dataset for the analysis. This gives 28 datasets for every year, which are later appended. Appending these datasets gives a working data set in long format, which contains several annual observations for each individual living in Denmark. It also includes all variables needed for the analysis stemming from different administrative registers.

The sample covers a dataset with ca. 149 million individuals between 1986 and 2013. I restrict the analysis to the full-employed work force aged 15 to 64 to exclude e.g. student workers and information on too low income, which could bias the analysis. This leaves me with a sample of about 68 million observations. Summary statistics on the main variables used in the analysis are shown in Table 1. The average age in the sample is 38,5 and it includes a little more men than women (Table 1).

Table 1: Summary Statistics (main variables)[2]

Variable	Obs.	Mean	Std. Dev
Age	68894885	38.58	12.83
Gender	68894885	1.48	0.50
GPA	14197429	60.55	10.70
High school	68894885	0.45	0.50
Master	68894885	0.06	0.23
Phd	68889312	0.002	0.05
Labour market experience	68880122	10.83	8.23
Years of school	68894885	13.21	2.77
Income	68889290	292443.5	383840.9
Finance	62327120	0.03	0.18
Job tenure	56026356	4.39	5.37

Source: Statistics Denmark (2016)

a) The income register

The information in the income register mostly stems from administrative data from Danish tax authorities. Secondary data on income originates from municipalities and unemployment funds. Generally, if differences arise, tax data is prioritized, correct. Before 2008, information was based on tax returns. Because information on tax returns is no longer used for administrative purposes, Statistics Denmark suggests careful use of registers calculated after tax returns. However, they state that process mostly affects younger and older workers who are not a part of the main labour force because they often have several jobs, complicating documentation of the primary income. This information will not affect my analysis since I am only looking at the fully-employed labour force.

Income

Wages are measured annually in Danish Crowns, retrieved from the income register. The original income variable is deflated by the consumer price index, to account for inflation, and compare yearly income levels over the years. It includes workers' annual income, governmental transfers, private pension funds, and other personal income such as work bonuses. It does not include investment earnings, pension contributions and deductions of the labour market, so it is stated before tax reductions. In the analysis, it is measured in log income to determine percentage variance in income. Taking annual income instead of hourly wage has the advantage of providing a picture of the actual income including additional compensations, mostly paid annually.

[2] Minimum and maximum of variables cannot be shown because of data sensitivity issues from Statistics Denmark.

b) The attainment register

Education

Information on highest attained education stems from the attainment register and is mainly based on information from the student and qualification register.

The degree of education is defined according to International Standard Classification of Education (ISCED 2011) levels measuring the highest achieved education. ISCED 2011 levels are given on a 9er scale measuring equal levels of education programs and educational attainment. It is mostly used for cross-country analyses comparing national educational institutions (UNESCO 2012). Refer to Table 2 for the exact description of each educational level.

The variable measuring educational attainment in the Danish attainment register is HFAUDD, which provides detailed information about the highest completed education. The variable contains specific definitions of every educational degree in Denmark following Danish Education Classification. Consequently, coding is too specific to use for further analysis purposes especially when comparing it to international trends. Making results generalizable, the variable is standardized to ISCED11 level. One can download a documentation of the educational variable HFAUDD from the Danish educational register data to ISCED levels (Statistics Denmark 2016b). It is provided in SAS format. The SAS file is converted into excel to be able to read it into Stata and combine educational achievements after a Danish definition with standardized and comparable ISCED11 level.

This makes it possible to generate dummy variables for educational attainment of high school, bachelor and master degrees, and PhDs. In the analysis I use a dummy variable for university degree, defined as 1, when having completed a bachelor, master or PhD.

Table 2: International Standard Classification of Education (ISCED 2011)

0	1	2	3	4	5	6	7	8	9
Pre- primary education	Primary education	Lower secondary education	Upper-Secondary Education	Post-secondary non-tertiary education	Short-cycle tertiary education	Bachelor's or equivalent level	Master's or equivalent level	Doctoral or equivalent level	Not elsewhere classified

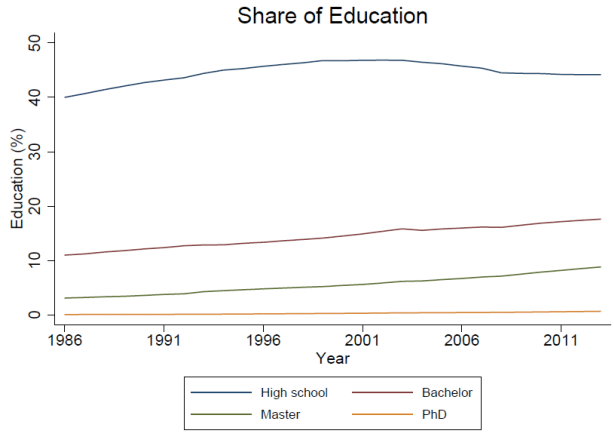
Source: UNESCO Institute for Statistics 2012

Because Statistics Denmark does not provide a variable for the educational length in years, I calculate it in a similar way than ISCED educational level. I downloaded an SAS documentation file from

Statistics Denmark for converting HFAUDD into the so-called variable PRIA, which measures information on the education length in months. I then saved it in excel and used Stata to generate a new variable. Finally, I calculate the educational length in years rather than in months.

The following graph gives an overview of the distribution of different educational degrees in Denmark during the last 30 years. One can see that attainment of all educations has been increasing slightly since 1986. In 2013, however, no more than about 8 percent of the total population reached MA level and about 15 percent reached BA level. Most continue to earn a high school degree. This has been decreasing slightly due to the popularity of getting a university education.

Figure 1: Share of education in % of labour force



c) The register-based labour force statistic (RAS)

The register on labour market statistics comprises data from 2008 to 2015 based on the Labour Market Account (LMA). Data on every person relevant to his/her work place is normally collected during the last week of November, following International Labour Organization (ILO) guidelines in defining definitions and categories of variables. However, guidelines were originally developed for survey data, which Statistics Denmark transformed to use the same standards for registered data (Statistics Denmark 2016b).

Industry

The different industry sectors are defined using the individual's personal industry code, which is part of the appointment register. It provides information which industry the individual is currently working in

(PERSBRC). Statistics Denmark receives information from the "Registerbaserede arbejdsstyrkestatistik" (RAS).

The individual must be a resident in Denmark at the end of November in order to have a listed personal industry code. I use the Danish Industry classifications, which changed in 1993 (DB93), 2003 (DB03), and 2007 (DB07), which classify individuals' work places into one industry. The latest industry classification from 2007 is applicable from 1st of January 2008, DB03 since 1st of January 2003 and the oldest one from 1st of January 1993. Workplace and individual industry codes are identical. The industry code from 2007 is based on the latest European industrial activity classification (NACE). NACE (Nomenclature générale des Activités économiques dans les Communautés Européennes) classifies economic activities comprehensively for all EU countries, classifying work places under its activity, "which contributes most to the total value added of that unit." (Eurostat 2008). Since 2008, NACE has followed worldwide applicable division of UN's ISIC classifications (International Standard Industrial Classification of all Economic Activities) to generate international comparability of economic activities. The industry codes from 1993, 2003 and 2007 all contain six digits. The first four refer to the EU NACE codes. The last two pertain to the Danish Industry. The latest 2007 definition includes a total of 726 industries.

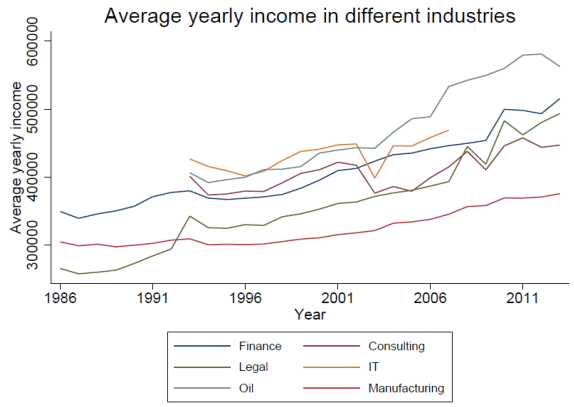
A unique variable defining the financial sector was created accounting for changes in definitions, following the most recent industry classification from 2007, similar to NACE classifications. After the 1993 and 2003 definition, the financial sector includes the industry codes "65.00.00-679999". The latest 2007 classification includes the codes "64.00.00-66.99.99".

The Danish industry code can be divided into four subgroups, following NACE classifications, depending on the degree of detail of the economic activity. In the least detailed description, the financial sector falls under the ***industry section*** "Financial and insurance industry". In 2007, it includes three ***industry divisions***, dividions starting with codes 64, 65 and 66. Going more into detail, the industry classifications include four ***industry groups***: "Monetary intermediation", "Mortgage credit institutes and similar.", "Insurance and Pension funding" and "Other financial activities", following the most recent 2007 definition. The finest definition includes ***industry classes*** and can be coherently coded throughout the three changes in definitions in 1993, 2003 and 2007 for 18 classes. However, reliable data for all industry classes of the financial industry was first made available by Statistics Denmark from 1993 on. Using these classifications, a dummy variable is created with 1 - Financial sector and 0 - All other economic sectors, four dummy variables for industry groups and 18 dummy

variables for defining industry classes. For more information on the most detailed industrial grouping of the financial sector, please refer to Appendix I.

I also create dummy variables for major industries of interest: consultancy, legal, oil, manufacturing and IT industries, with (1) for working in this sector and (0) all other industries. This is completed in the same way as the financial sector dummy variable, incorporating differences in definitions from DB93, DB03 and DB07, based on latest update of Danish Industry Classifications from 2007 (Appendix I).

Figure 2: Average yearly income in different industries, in DKK



The above graph shows the development of average annual income in different industries. The financial sector is one of the best-paid sectors, which has staged swiftly increasing wages since the mid-80s. Only the oil sector displays higher average annual wages. Manufacturing, taken from the sample of industries remains the lowest paid sectors in Denmark. However, income has been increasing in all sectors albeit to a different extent.

Experience

Labour market experience is given by the variable ERHVER from the labour market register. It is calculated in years (ERHVER) as total work experience in the labour market, measured in 1000. This means that one year of work experience would equal to a value of 1000. The variable is derived from the variable ERHVERXX, which calculates the amount of working experience for every year. Maximum full-time work achieves a value of 1000 per year. Part-time jobs have a value of 750 per year. A person returning to Denmark from abroad has his/her working experience status returned to 0, independent to the previous status.

Job tenure

Job tenure of employees' current jobs is calculated using the variable ANSAAR provided by the labour market register of Statistics Denmark. It shows the year in which the person started at the current work place. The variable is based on the variable ANSXTILB which measures employment change compared to previous years, taking account all employment changes made by the last week of November of each year.[3] Should employment change, the starting date in the variable ANSAAR is recorded the following year. Changes within a company are not considered.

As Statistics Denmark suggests, I calculate job tenure by computing the difference between the current year and the year of the variable ANSAAR, the starting year of current employment. This measures the amount of years spent at the current working place not accounting for job changes within the company.

d) <u>The registers on educational grades</u>

Talent

Talent is measured using average grades from high school. Data stems from the different registers on educational grades described above. Since August 2007, all Danish state-regulated education has graded on a 7-point scale to provide an easier comparison between not only Danish and European standards but international standards as well. Before then, educational institutions had used a 13-point scale. Refer to Table 3 for the exact conversion of the two grading systems. To make grading variables comparable across the entire time span of the panel data, I normalize grades from 0 to 100 in order to account for major scale differences before 2007 and later.

<u>Table 3:</u> Grading scales in Denmark

	Excellent		***Very good***		***Good***	***Satisfactory***	***Passed***		***Failed***	
13 scale	13	11	10	9	8	7	6	5	03	00
7 scale	12	12	10	7	7	4	02	00	00	-3

Source: Ministry of Higher Education and Science 2016

[3] **Employment change coding:** 02- From self-employed or employer 03- From assisting spouse 04- From employee I2- main occupancy at workplace I3- other additions to the worker instead I9- totally irrelevant (non-conserved workplace) T1- From other work in the same company T2- From unknown work in the same company T3- From another company (other jobs) T4- From other employment to newly workplace T5- From unemployment T6- From outside the labour force (early retirement) T7- from leave (both from unemployment & employment) T8- Immigration T9- Born U- Unchanged

Statistics Denmark provides me with two different sets of variables on grades. First, I include the final grade point average (GPA) at high school graduation stemming as such from the grade register on the final education. This is an important indicator because it decides whether graduates continue after high school and which subjects he/she choses in further education. The mean GPA (after normalization) in the dataset is roughly 60.55 (see summary statistics).

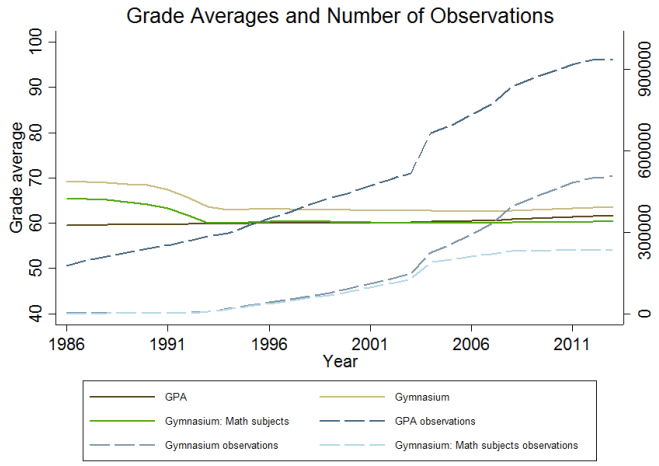
Second, the other grading register provides information on all grades received in high school as well as names of its corresponding subjects. For each individual, I calculate the mean of all grades received in high school. This variable differs from the previous final high school GPAs because few grades are considered similarly. The final GPA, for instance, is calculated taking different weights for A, B, and C-level courses. Calculating average grades throughout high school, I just give every grade the same weight. Using subject names, I additionally calculate a category for all grades that fall under math-related themes and an average math grade variable for each individual.

Table 4: Overview of variables containing grades

Register	***Variables***
High school grades (UDGK)	***gradeaveG:*** average of all high school grades per individual, normalized from 0-100 to compare different grading scales
	mathgroup: average of all grades related to math, normalized from 0-100 to compare different grading scales
Final education grades (UDG)	***GPA:*** final GPA when graduating from high school, extracted from Statistics Denmark

The following Figure 3 shows the development of all variables displaying average high school grades and the number of observations over the years with available data. Average grades generally decrease slightly in secondary school while number of observations increase. The figure shows why the analysis uses the final high school GPA measuring cognitive skills, for the following two reasons: The final average high school GPA is stable and provides access to the highest number of observations (Also in comparison to other GPAs, such as from BA and MA level). In addition, it easier comparable between individuals because as the final grade when high school is completed, it is normalized across the entire country, to make it a fair choice for further careers of high school students. However, it must be recognized that of course not all Danish students graduate from high school; though the vast majority.

Figure 3: Average annual grades, ranging from 0-100.



4.3 Methodology

This thesis follows deductive reasoning, developing five hypotheses following economic neoclassical theory, presented in section 2. Hypotheses and specific models are presented along with the analysis in the following sections 5.1 to 5.3. Fully acknowledging the limitations of deductive reasoning, this thesis choses to address the relationship between wages and talent in the financial industry in a multi-level analysis. This thesis thus contributes with an in-depth analysis having access to a dataset, which covers 100 percent of the in Denmark living population ranging back to 1986, rare in recent studies. Studying intra-industry differences and choices of financial workers closely in a panel data analysis, prevents major limitations and generates new knowledge about the relationship between cognitive skills and wages in the financial sector, which goes beyond known findings. Because the analysis makes use of varying methods, they are presented along the way in the analysis to facilitate interpretations for the reader before stating the findings. It includes quantitative methods in the form of descriptive analysis, OLS regressions, linear probability models, probit models, social network analysis (in Appendix IV) and transition matrices. Main variables of interest are throughout wages, measured in log annual income and cognitive skills, which are defined as final high school GPA.

5. Analysis

The analysis uncovers explanations for rising wages in the Danish financial market. It consists of three major parts. First, I will look at the evolution of financial wages and the influence of talent and skill on an aggregated industry level. Second, the analysis seeks more comprehensively to understand the relationship between increasing wages and talent focusing on sub-branches within the financial sector and third on individual career choices.

5.1 Income Inequality in Denmark: An Industry Perspective

Aiming for more generable results on the Danish financial labour market and its characteristics, the first part uses the Swedish financial market as a comparison. Both Scandinavian countries have similar financial structures and size. Therefore, Sweden suits as a primary comparison to the Danish financial industry. The financial sector in Denmark shares similar characteristics with other developed countries as well. It is highly competitive, attracts workers with general backgrounds and offers bonuses and variable compensation, enabling individuals in this sector to gain increasing income (Dansk Erhverv 2016). I use the same annual sample as Böhm et al. (2015) in their paper (from 1991 to 2010), comparing time trends in both countries. However, register data from Statistics Denmark gives access to an extended annual panel dating from 1986 to 2013. Extended results are also considered in the analysis. Graphs for the full data set are included in Appendix II.

Results show that wages in the financial sector in Denmark are rising almost to the same extent as in other developed countries. In addition, relatively more financial workers, with university degrees but lower grades, are hired. The paper continues to estimate a finance wage equation showing the increasing effect of the financial industry on wages. This includes talent, skill and further variables as control variables. Finally, I seek to explain how talent and skills actually determine workers' preference for the financial industry, which I calculated in a probit model using the financial industry dummy as dependent variable. Contrary to other studies, the talent coefficient is negative. Thus, having higher high school grades decreases the probability of getting work in the financial sector in Denmark. In addition, the interaction term between talent and years is insignificantly close to zero, which disproves previous results of a rising skill-bias in the Danish financial industry.

This paper focuses in the tradition of previous studies, (e.g. Böhm et al. 2015; Philippon and Reshef 2012), on the economical view of human capital, including talent and skills, as measurement for human capital. The focus leans towards generating new insights on the importance of talent, which is

assessed as average final high school grades. Using the highest educational attainment, I also incorporate skill level in this part of the analysis (5.1). Throughout this section, I follow three main hypotheses, related to research by Böhm et al. (2015), seeking to compare results of the Danish financial sector with Swedish findings.

Human capital theory argues that individuals' human capital accumulations are the main reason for variances in income. Hence, according to the theory, increasing wages in the financial sector can be partly traced back to the fact that:

H1: Skills and talent are increasing in the financial sector.

H2: Skills and talent explain at least a significant part of the rising finance wage premium.

Roy (1951) and several following scholars argue that after a self-selection mechanism, each worker acts rationally and optimizes wages by choosing the occupation with the highest expected earnings dependent on prevalent skills (see section 2.2). Wages in the financial sector have been increasing during the last years. Following Roy's argumentation, to maximize their income, more skilled workers are entering the financial sector. It follows that:

H3: Skills and talent are increasingly more important for workers choosing to work in the financial sector.

Those hypotheses will be tested in the following section first using descriptive analysis, and then OLS regressions and a probit model.

5.1.1 H1: Relative Wages and Talent

Explaining the upward trend of financial earnings through a human capital perspective, the first hypothesis states that skills and talent should be increasing in the financial sector. A simultaneous upward trend of wages and talent in the Danish financial sector would support human capital theory, which argues that increasing wages are due to rising human capital. However, one should note that descriptive results presented in this section cannot yet provide any evidence for the causality between the two factors.

The following graphs show results for the Danish financial market and respectively for Sweden. The comparison between the two financial markets aims to put results into a broader international

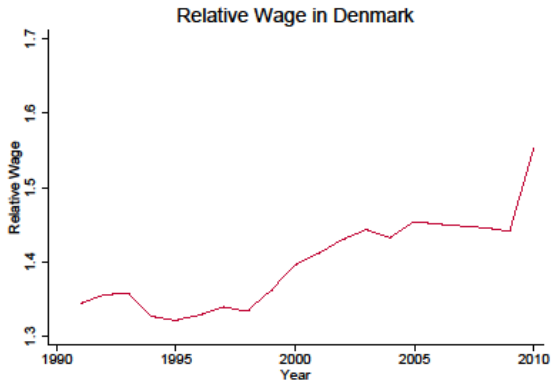
perspective. Following my research question, this thesis seeks to explain differences between financial wages and other sectors of the labour market, so that the following graphs measure relative wages, skills and talent in the financial sector and compares them to all other non-financial industries in Denmark and Sweden to provide a direct comparison of both groups.

a) Relative Wages

Figure 4 shows the evolution of relative wages in the Danish and Swedish financial sector. The annual average wage in the financial sector is divided by the annual average wage in the non-financial sector.

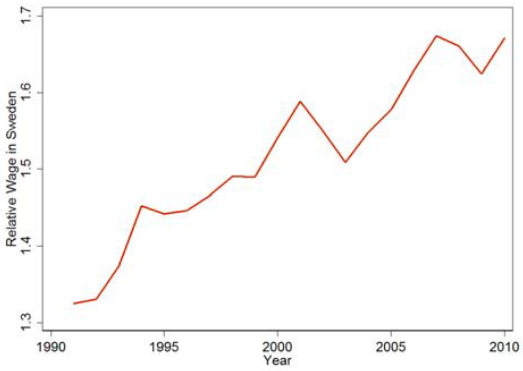
Figure 4: Relative Wages in the Financial Sector

Relative Wage (Denmark)



Source: Statistics Denmark (2016)

Relative Wage (Sweden)



Source: Böhm et al. (2015)

Relative wages in the Danish financial market show a clear upward trend from the late 1990s until most recently (Figure 4). In 1991, relative wages in finance were about 35 percent higher than average wages in the non-financial sector. Over the years, wage differences increased to nearly 60 percent in 2010. These findings parallel a global trend of increasing wages in different financial sectors especially since the 1980s (Bell and van Reenen 2010; Boustanifar et al. 2014; Célérier and Vallée 2015; Philippon and Reshef 2012). Compared internationally, increasing income inequality between the finance and other industries in Denmark is less severe. The United States, in particular, as well as smaller economies such as the Netherlands, show largest increase in relative wages in the financial industry. However, not all developed countries experience increasing financial-earnings during the time of studies (Philippon and Reshef 2013). Böhm et al. confirm the same upward trend of financial wages for Sweden (Figure 4). However, Sweden staged considerably higher increases in relative

wages than Denmark and started, in 1990, much earlier than Denmark. Financial income was about 70 percent higher in 2010 in the Swedish financial sector. However, considering Danish results for the extended sampling period (see Appendix II), one can see that, even in Denmark, the same international upward trend of rising wages already started in 1986. Differences increased until 1990 already from 25 to 35 percent, and more from 2011. Levels were approximately the same in 2013, at about 70 percent higher in the Danish and the Swedish financial sector in 2010. One can also observe that financial wages dropped in Sweden due to the financial crisis of 2001 and 2008; contrary to Denmark where wages were stagnating in those years. Still, wages, even in Denmark, increased more drastically shortly after the financial crisis of 2008.

The documented results of relative wages show a widely comparable trend of increasing income in the financial sector. Other scholars approve those results for several developed countries, displaying about the same levels of increase in relative wages since the 1980s (Bell and van Reenen 2010; Böhm et al. 2015; Boustanifar 2010; Célérier and Vallée 2015; Lindley and McIntosh 2014; Philippon and Reshef 2012).

b) Relative Education

Several papers have argued that increasing wages parallel increasing skills in the financial sector (e.g. Philippon and Reshef 2012). I first measure skills using educational degrees as a proxy to show whether the financial sector has recently attracted more skilled labour; that is if we can indeed observe a so-called increase in skill-bias in the industry. I investigate whether the number of workers with university degrees, in finance, compared to non-financial occupations, has risen over the last years.

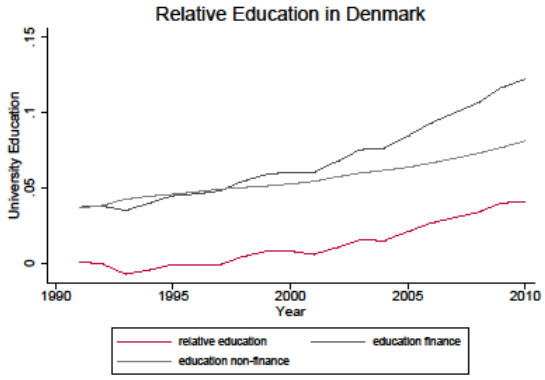
Relative education is measured as the share of individuals who acquired university degrees (Bachelor, Master and PhD) as their highest completed education in the financial sector minus the share of those who own university degrees in the non-financial sector. The red line indicates the evolution of relative education. The grey lines separately demonstrate the absolute share of individuals with a university degree in the finance and the non-finance sector.

Figure 5 displays an increase of the share of workers who hold university degrees in finance as well as in the rest of the economy. These findings are not surprising since the workforce in developed economies gets increasingly higher educated. Relative skills in the Danish financial sector are clearly showing an upward trend. This implies that, over time more workers in the financial sector than in the non-financial sector possess university degrees. However, 1990s show close similarities of the

evolution of skills in the financial sector to the rest of the economy. Consequently, relative education fluctuated at about zero. Between 1992 and 1996, the non-financial sector even employed slightly more-educated workers. This similar evolution changes from the beginning of 2000, where the skill difference increases to up to 4 percent higher in the financial sector in 2010.

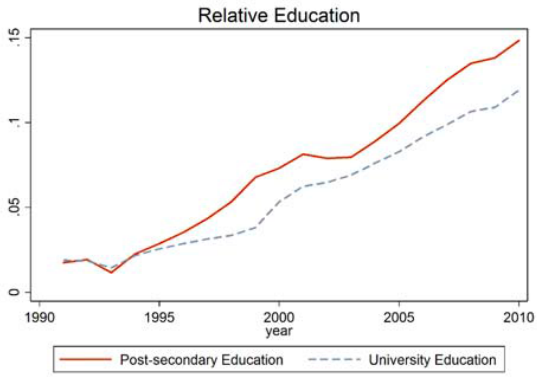
Figure 5: Relative Education in the Financial Sector

Relative Education (Denmark)[4]



Source: Statistics Denmark (2016)

Relative Education (Sweden)[5]



Source: Böhm et al. (2015)

Compared to non-finance (Figure 5) Sweden shows similar findings of rising postsecondary and university education in the Swedish financial sector. Strikingly, the difference between finance and non-finance sectors with university degrees is much broader in Sweden. Here, the financial sector employs about 12 percent more workers with university educations in 2010. In contrast, in Denmark these figures remain at only 4 percent more during the same period. Relative education in the Danish financial sector stagnated from 2010 until 2013 on the level of 2010 (see Appendix II). Moreover, the evolution of the share of workers in Denmark holding a university degree until the beginning of 2000 is similar for the financial industry and the rest of the economy; differences in Sweden have been increasing constantly since the 1990s.

In sum, the development of relative skill in finance varies from country to country. Philippon and Reshef (2013) show that, in an international context, increase in skilled labour in the Danish financial service industry remains low. Even though this increasing trend is not as drastic as in other countries, such as the United States and Finland, measuring skill as highest education achieved shows that

[4] Education is measured as Bachelor, Master and PhD degree in the figure displaying relative education in Denmark.
[5] Unfortunately, the Swedish data does not report absolute educational shares in finance and non-finance to compare with.

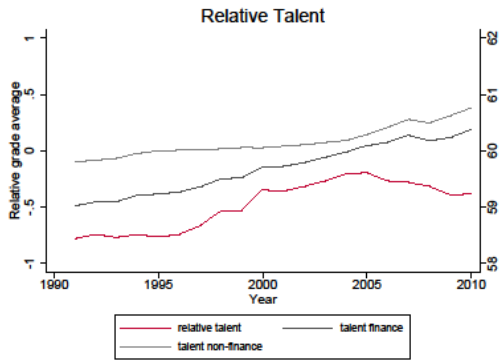
workers in the Danish financial sector actually become more skilled, albeit to a much smaller degree. In addition, despite the rise skill-bias, education is increasing in both financial and non-financial jobs.

c) Relative Talent

Using education as a proxy for skill is not ideal. It fails to identify very highly or low skilled financial worker because skills are measured using a dummy variable defined as university degree (1) vs no university degree (0). It might also be inaccurate because the number of Danes who have graduated from university has increased during the last years; a trend visible in most developed countries (see Figure 1 in section 4.2). Thus, this section uses high school grades to determine talent allocation and analyse cognitive skill distribution more adequately in the labour market and specifically in the financial sector in comparison to other industries. Using talent as a proxy for general human capital is a rather underdeveloped approach in empirical studies, whereas measuring relative skill in education is more common. Compared to using education, one of the main advantages is that high school grades remain constant for all individuals over time. Therefore, the share of talented workers changes because workers enter and leave the financial sector, not because they acquire higher education while working in finance.

Figure 6.1 and 6.2 show relative talent, calculated as the annual difference between average grades in the financial sector minus average grades in the non-financial sector. The red line indicates the difference of average grades in the financial industry compared to all other economic sectors (relative talent). The grey lines demonstrate annual average grade levels in both sectors. Figure 6.2 shows talent differences between men and women in finance.

Figure 6.1: Relative Talent in the Financial Sector in Denmark



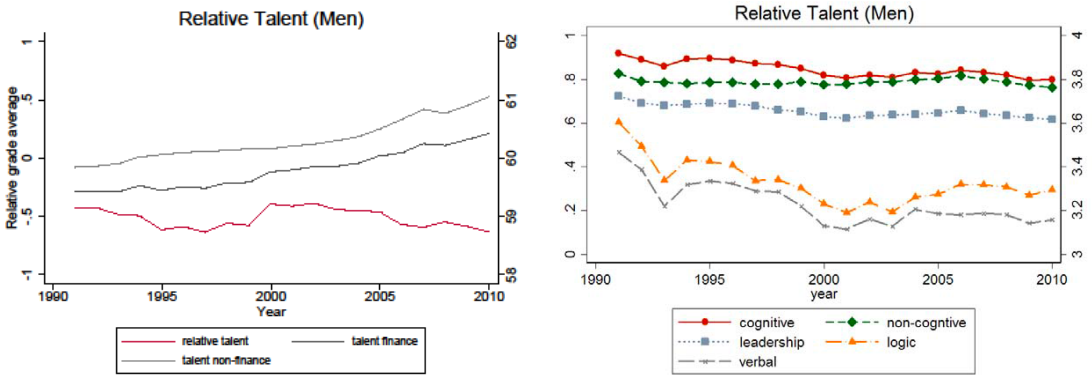
Source: Statistics Denmark (2016)

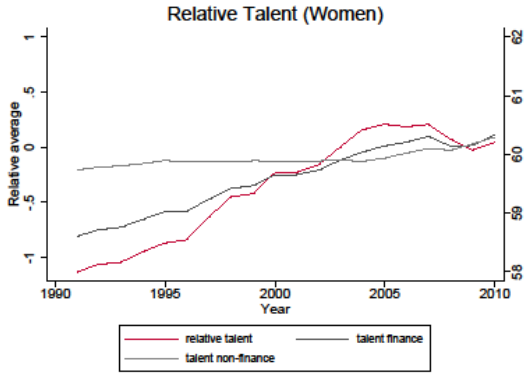
Figure 6.1 shows that relative financial talent is increasing in Denmark at least until 2005. Thus, it indicates that the financial sector attracts increasingly more talented worker in this period. However, it is interesting to note that relative talent remains constantly negative. Negative relative talent indicates that average grades in the financial sector remain lower than in the non-financial sector during the entire period and it follows that workers in the non-financial industries are more talented. The figure shows also that the difference in talent is larger in 1990 between finance and non-finance than it is in 2010. In 2010, relative grades were about 0.5 points lower in finance, compared to 0.8 in 1990. In other words, the financial sector is catching up in terms of talent to non-finance occupations. Still, aggregated average talent differences are quite low.

One could argue that this increase in relative talent shows how the financial industry is acquiring increasingly more talented workers in Denmark. However, one cannot yet draw substantial conclusions based on descriptive analyses. One should also bear in mind that financial talent remained in all times lower than in other economic sectors. Those findings reveal interesting data patterns particularly in the international context. Somewhat in line with my findings, Figure 6.2 shows that the Swedish financial sector does not share any support for rising talent, even when considering distributing to men and women separately (Böhm et al 2015). Naturally, one should remember that Swedish talent proxies also include military cognitive and non-cognitive tests, at least for the male population. All relative talent measurements for Sweden remain constantly positive over the years. This implies that talent is higher in the Swedish financial sector than in non-finance, but has not increased relatively during the last years.

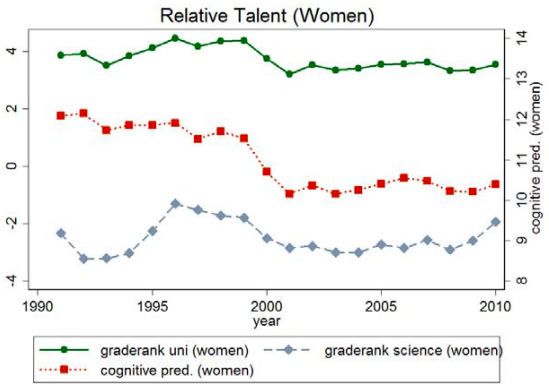
Figure 6.2: Relative Talent in the Financial Sector by gender

Relative Talent (Denmark) **Relative Talent (Sweden)**





Source: Statistics Denmark (2016)



Source: Böhm et al. (2015)

Considering relative talent in financial occupations, the difference between women and men in Denmark becomes quite remarkable. The financial sector has been constantly attracting more skilled women since the mid-1990s up to the recent financial crisis. For males, distribution of talent is stable negative throughout the entire period. This shows that, more skilled men receive up to today actually employment in other parts of the labour market than in the financial industry, whereas talented women work increasingly more in finance. From 2004 to 2008, grades were a little higher for females working in the financial industry. In contrast, males employed in finance only receive lower grades in all years. One could consider the importance of gender for talent in the financial sector showing that talent matters more in finance being a female than a male. Compared to other sectors in the Danish economy women, more than men, working in the financial sector received higher grades, significantly increasing since the 1990s.

I do not only intend to focus on whether workers in the financial sector have higher cognitive skills. I would mainly like to use this analysis to describe whether talent has actually increased in the last years and whether we have to face a rising brain-drain. Especially when comparing to Swedish results available only for males and females separately, it is striking that relative talent in the Danish financial sector is constant lower than in non-finance, whereas in Sweden the financial sector is equipped with higher talent. However, contrary to Sweden, I do not have access to other non-cognitive or cognitive skill measurements than school grades, which could explain parts of the diverging results. Apart from the increase in relative talent, another trend in the Danish financial sector has appeared since 2005. Once again, talent and skills relative to non-finance have again decreased. This could be a result of the financial crisis rendering the financial sector unattractive for high talent.

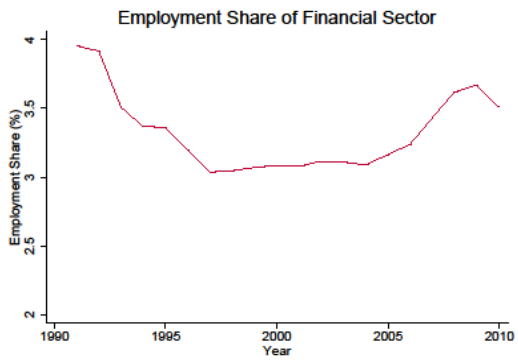
d) Employment Share in the Financial Sector

Many scholars discuss a rising financialization of developed economies; employing more professionals and accounting for an increasing part of the GDP (see e.g. Kedrosky and Stangler 2011). If the Danish financial sector would have increased in the last years, this could explain a rising employment of talented and skilled workers parallel to low skilled ones. Figure 7 shows the size of the financial sector in Denmark and Sweden, which annually measures the number of workers in the financial sector divided by the numbers of workers in the rest of the economy.

The employment share in the Danish financial industry has declined in the 1990s and stagnated since the end of 1990s. Again since 2005, the financial sector has grown slightly. As relative financial talent has decreased since 2005, employment share in the financial sector has risen simultaneously, ranging between 3 and 4 percent of the whole economy. This is similar to the size of the Swedish- and other international financial markets. A comparison to Sweden shows that the Swedish financial sector is smaller and employment share much more stable. Summing up, Figure 7 does not give support for a growing financial sector, specifically not in times where relative talent is increasing.

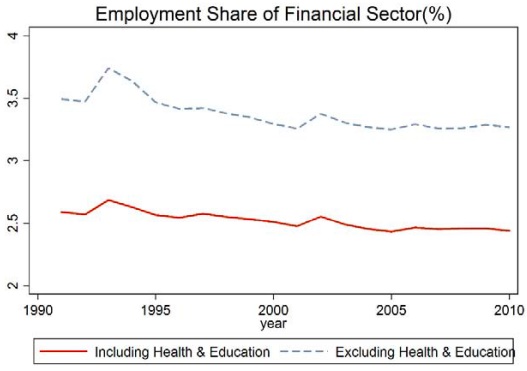
Figure 7: Size of the Financial Sector

Size of Financial Sector (Denmark)[6]



Source: Statistics Denmark (2016)

Size of Financial Sector (Sweden)



Source: Böhm et al. (2015)

Thus, this section concludes that descriptive findings tend to reject hypothesis 1, especially when focusing on talent.

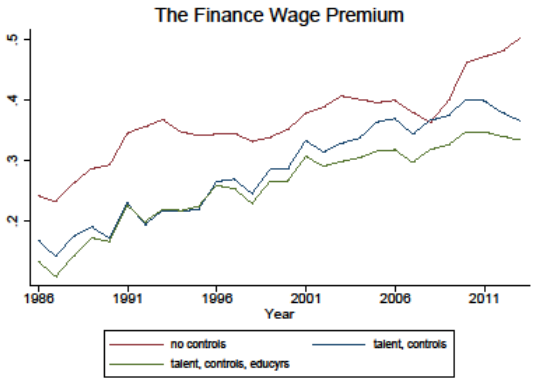
[6] This graphic measures the size of the financial industry relative to all economic sectors in Denmark. One must compare it with the Swedish employment share including health and education.

5.1.2 H2: The Finance Wage Premium

Hypothesis 2 formulates that skills and talent explain at least a significant part of the rising finance wage premium. In other words, one would expect that, when accounting for talent and other human capital, the finance wage premium is not rising to the same extent. Contrary to these assumptions, results of the wage equation, graphically displayed in Figure 8 show that the finance wage premium is rising drastically and neither workers' talent, skills nor other controls change this upward trend. Sweden shows an identical development.

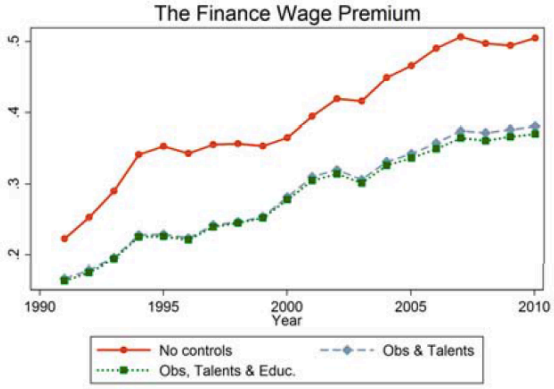
Figure 8: The Finance Wage Premium

Finance Wage Premium (Denmark)



Source: Statistics Denmark (2016)

Finance Wage Premium (Sweden)



Source: Böhm et al. (2015)

Figure 8 shows the evolution of the finance wage premium in Denmark vs. Sweden. To measure the wage effect of the financial industry and additionally human capital accumulation on wages, I estimate a simple Mincerian wage equation. The first wage regression, displayed in blue in the first graph is estimated by OLS, giving results for the pure finance wage premium, as follows:

$$\boldsymbol{Model\ 1}: \ln w_{it} = ß0 + ß1 * Finance_{it} * year_t + \varepsilon_{it}$$

where $\ln w_{it}$ is the log of wage, $Finance_{it} * year_t$ is an interaction term for the pure annual wage premium; the annual financial industry dummy interacted with each year.

The red and green lines in Figure 8 add the talent measurement (high school grades) to the previous described regression. It also includes control variables measuring human capital in the form of labour market experience and education in years. In addition, I control for age and gender. The other two

regressions, adding control variables to the pure finance wage premium, are estimated by OLS, as follows:

$$\textbf{Model 2}: \ln w_{it} = ß0 + ß1 * Finance_{it} * year_t + ß2 * gradeaverage_i + ß3 * experience_{it} + ß4 * expierience^2{}_{it} + u_i + \varepsilon_{it}$$

$$\textbf{Model 3}: \ln w_{it} = ß0 + ß1 * Finance_{it} * year_t + ß2 * gradeaverage_i + ß3 * experience_{it} + ß4 * expierience^2{}_{it} + ß3 * educyears_{it} + u_i + \varepsilon_{it}$$

where additionally to variables included in model 1, $gradeaverage_i$ is the final high school GPA, $experience_{it}$ is labour market experience in years, $expierience^2{}_{it}$ is labour market experience squared, $educyears_{it}$ is length of education and u_i is a vector of standard demographic variables, which include age and gender. Major dependent variables of interest are the interaction term of the finance dummy and years. All control variables included in model 2 and 3 (GPA, education and labour market experience) measure general human capital, which, at least in theory, can be applied to different jobs in different industries.

To account for omitted variable bias, I additionally estimate the three previous pooled OLS regressions, using individuals' fixed-effects to avoid a bias and inconsistency due to time-invariant individual characteristics. Results for the finance wage premium using fixed effects are shown in Appendix II.

Generally, the Danish finance wage premium has been increasing over the years (Figure 8) and control variables decrease the level of the finance wage premium also using fixed-effects (Appendix II). The Swedish finance wage premium resembles trends in Denmark using fixed-effects and ordinary OLS regressions. Findings suggest that the financial sector explains much of income differences, even more increasingly in recent years. It highlights the problematic of much higher wages in financial occupations than in the rest of the economy and suggests a sector specific approach on rising wages. Contrary to what hypothesis 2 suggests, GPA and other control variables cannot fully explain the increasing finance wage premium in Denmark. Including different control variables measuring general and specific human capital and other individual characteristics does not change the fact that the finance wage premium is still increasing, shown in the green and blue line. Still, the OLS regression shows that including talent, skill and experience into the regression does have a decreasing influence

on the finance wage premium; thus explaining parts of the variation in income. Fixed-effect estimators are smaller, maybe because OLS regressions omit important time-constant individual characteristics.

Main findings show that neither talent nor skills explain much of the increasing pure finance wage premium throughout all years and for both countries, talent and skills is not a strong indicator explaining the rising finance wage premium. Findings lead to the rejection of hypothesis 2 stating that increasing skills and talent can explain most of the rising finance wage premium. In contrast to assumptions drawn from human capital theory, introducing talent into the regression even increases the upward trend. This is at least the case for Denmark.

5.1.3 H3: Probit Model

Hypothesis 3 suggests that, under the assumption that workers would rationally choose their occupation; optimizing wages, skill and talent are an important determinant, especially also when following recent discussions about a skill-bias. This section presents results of the probit choice- and linear probability model for the financial industry. Recent studies on the relationship between skills and wages show that talent endowments should even become more important on the financial labour market with increasing wages. Studying the Danish financial sector paints a different picture. Talent, measured in final high school averages, negatively influences workers' choices of taking jobs in the financial industry. In addition, I do not find any evidence for increasing importance of talent during the last 30 years.

Table 1 presents empirical results of the regression estimated as linear probability model as well as probit regression as follows:

$$\textbf{Model 4}: \Pr(Finance = 1) = ß0 + ß1 * gradeaverage_i + ß2 * year_t * gradeaverage_i + ß3 * expierience_{it} + ß4 * expierience^2{}_{it} + u_i + \varepsilon_{it}$$

$$\textbf{Model 5}: \Pr(Finance = 1) = ß0 + ß1 * gradeaverage_i + ß2 * year_t * gradeaverage_i + ß4 * expierience^2{}_{it} + ß3 * year_t * educyears_{it} + u_i + \varepsilon_{it}$$

where the dependent variable is the industry dummy for working in the financial sector and the talent-proxy is the main independent variable of interest. $\Pr(Finance = 1)$ indicates the probability of working in finance, when including $gradeaverage_i$ and an additional interaction term between the grade

average and years to check whether ***talent*** becomes more important over the years for choosing to work in the financial industry. The fifth model additionally includes education, measured in years ($educyears_{it}$). It also adds an interaction term between education and a year trend to show possible increasing influences of ***skill*** over the period. I control in both models for labour market experience, experience squared and include year dummies to account for a year trend as it is a panel regression. In addition u_i shows individual demographics, namely gender. I use a linear probability model as well as a probit model. Doing so, I account for the limitations of regressions estimated by OLS when including a binary dependent variable, since it violates the homoscedasticity assumption and occasionally produces inefficient but unbiased coefficients (Wooldridge 2013).

Table 5: Probit Choice Regression

	Finance			
	(1) LPM	(2) LPM	(3) Probit	(4) Probit
GPA	-5.654***	-6.117**	-52.547***	-66.665***
	(0.144)	(0.145)	(1.620)	(1.636)
Year x GPA	0.002***	0.003***	0.026***	0.033***
	(0.000)	(0.000)	(0.000)	(0.000)
Educyrs		0.480***		4.481***
		(0.005)		(0.057)
Year x educyrs		-0.000***		-0.002***
		(0.000)		(0.000)
Experience in years	0.004**		0.059***	
	(0.000)		(0.000)	
Experience squared	-0.000***	0.000***	-0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Female	-0.021***	0.000***	-0.238***	-0,220***
	(0.000)	(0.000)	(0.001)	(0.001)
Year dummies	yes	yes	yes	yes
Constant	0.081***	0.031***	-1.436***	-1.894***
	(0.000)	(0.001)	(0.010)	(0.012)
Adjusted R-squared (Probit: Pseudo-R-squared)	0.0151	0.013	0.042	0.033
p-value	0.000	0.000	0.000	0.000
Number of observations	11,918,417	11,918,417	11,918,417	11,918,417

The results in Table 5 show that, contrary to original assumptions; higher grades have a negative influence on choosing to work in the financial sector. All models, estimated as a linear probability- and probit model, produce a grade coefficient significantly negative from zero. In other words, my findings run directly counter to several studies finding the best students in high school choose finance as a career, and to those who argue this is even causing a brain-drain in the non-financial part of the economy. While marginal effects of the probit model cannot be interpreted from Table 5, it should be stressed they are similar to column 1 and 2, which present coefficients for the LPM. Thus the findings

here are not in line with expectations amongst most scholars in the field, namely that significant grade averages are positively influencing the probability of taking on a job in finance. Findings prove that Denmark has not moved towards a talent-intensive financial service industry. The talent coefficient remains negative even when adding different control variables in the linear probability model as well as probit model. Column 1 shows that having one point higher GPA decreases the probability of having a finance-related occupation by 5.65. Adding education, measured in years, decreases the coefficient to -6.11 (Column 2). In line with hypothesis 3, an extra year of education increases the probability of being employed in the financial sector by 0.48 (column 2). Hypothesis 3 suggests that the second interaction term between grades and years is significantly positive from zero. In contrast, the importance of talent does not increase over the years. Focusing on talent and cognitive skills, hypothesis 3 is rejected since the interaction term is very close to zero. However, it needs to be acknowledged that contrary to the talent-proxy, years of education positively influence the choice of a financial occupation coinciding with graphical investigations in the earlier section, which show that the amount of financial professionals with a university degree is higher than in non-finance.

Those results lead to the conclusion that the Danish financial industry is not talent-biased, due to two results: First, the talent coefficient is negatively significant from zero, in all models (Table 5). Second and more importantly, the interaction term between years and talent as well as the interaction between education and years, are both very close to zero. To some degree, this is not coherent with findings on Sweden's financial industry (see Appendix II). Böhm et al. report a positive significant influence of talent on the probability of choosing the financial job market. Still, they support findings that talent and skills in Sweden does not gain relevance during the year (Böhm et al. 2015).

5.1.4 Summary of Results

Results of the previous analysis, using descriptive methods, wage regressions and a probit choice model disprove rising talent as an explanation for increasing wages, measured in high school GPA. Relative wages in the financial sector are increasing, also in Denmark, especially since the mid 1990s. An often-named reason for this evolution is the greater importance of hiring skilled labour in the financial sector. Some measure skills in form of the highest education achieved. The development of rising wages in Denmark stages a simultaneous upward trend of wages and educational skills. An even better proxy for measuring skills or better talent is school grades. Findings suggests that average final high school grades are actually lower in the financial industry, thus catching up slightly to averages comparable to those employed in non-finance. These findings do not give enough evidence

to support the first hypothesis that relative wages and talent rose simultaneously. This is however only valid when using the final GPA as a proxy to measure skill and talent. The length of education, measured in years, is still used in many studies to determine skill variation in the labour market (Boustanifar et al. 2014; Philippon and Reshef 2012). Given increasing positive relative education in the Danish financial sector, measured as having completed a university degree (as defined in many other paper), shows that financial workers are indeed more educated, even following an upward trend since the 1990s. However, one needs to acknowledge that the skill discrepancy between finance and non-finance in an international comparison, when measured as a university degree, is rather small (Philippon and Reshef 2013).

The graphical investigation shows to what extend higher skilled and talented labour in the financial sector could be correlated. In addition, I run wage regressions to do a more formal test seeking to answer if the finance sector becomes more skill-biased. It shows that the wage premium is increasing constantly in the last 30 years and control variables accounting for skill and talent in form of several variables measuring general human capital are not decreasing this positive development. Nevertheless, the last model including grades, experience and education in years, age as well as gender explains about 60 percent of the variation in log income. Including individual fixed-effects does not change the overall trend of an increasing finance wage premium, also when including control variables.

The probit choice model and linear probability regressions show that, against previous findings, higher grades are negatively influencing worker's choice of entering the financial sector. It might be surprising that talent as measured in this paper does not seem to be important for explaining the composition of workers in the financial industry. If so, the influence is negative. Also, as the interaction term is nearly zero, it has not become much more relevant in recent years. Even more importantly, considering the adjusted R-squared of both OLS regressions in Table 5, the shown models can only explain 1 percent of the choices of a career in finance using human capital variables, leaving section 5.2 and 5.3 to investigate further. Concluding, in line with Swedish findings, I do not confirm rising talent as an explanation for exploding financial wages.

5.2 Wages and Talent in Sub-Industries of the Financial Sector

In this section, I continue to explore reasons for increasing financial wages beyond an aggregated sectoral level, moving to an intra-industry perspective. Contrary to before, I pay closer attention to

major talent and wage differences *within* the financial sector, as the previous section has shown puzzling results in considering differences between the aggregated financial sector and non-financial industries. Doing so, the analysis aims at explaining differences between industry groups and industry classes, which give a more detailed description of the economic activities of financial firms and institutions, rather than treating "*finance and insurance*" as a homogenous whole. Analytically the thesis naturally continues from the initial analysis in Section 5.1 and hypothesis 1, to now exploring the correlations and trends between wages and talent in financial sub-branches.

As mentioned, human capital theory stresses the nature of diverging incomes as a product of differences in skill/talent. The theoretical implication hereof is those financial branches that pay out significantly higher wages must be occupied by relatively more skilled employees. In this part I focus mainly on talent distribution as part of human capital using the GPA as an excellent measurement for the ability of financial worker.[7] Thus, it follows:

> **H4: Financial sub-industries offering high payment generally have more talented workers as part of their workforce.**

Methodologically, I perform this analysis through access to a unique dataset of each individual in Denmark, which also grants data on employment within each of the branches and sub-branches of finance studied. However, reliable data for sub-sectors of the financial industry was first made available by Statistics Denmark from 1993, thus the timespan is less compared to the previous section.

To my knowledge, previous studies have mainly treated the financial industry as a single entity and have not paid attention to differences within the sector; thus not addressed intra-industry differences properly in research. The limited research that does exist has tended to explain intra-industry variations by either employers' or individuals' characteristics (Abowd et al. 2012). Studying sub-industry differences from 1993 on, the results show that wages and human capital accumulation indeed differ between financial branches, and thus warrants more scrutiny to understand income disparity in finance.

First, the entire financial sector is divided into four major *industry groups*, using classifications from Statistics Denmark. After, I move another level down, and present 18 *industry classes* that make up

[7] Limitations as to the length of the thesis make it not possible to include "skills" in the intra-industry analysis, though it is worth noting that the analysis has shown similar trends as for talent.

the four industry groups, pointing to major wage differences and composition of workers. The composition of four industry groups and 18 industry classes follows coding from Statistics Denmark. Only those industries, which can be classified coherently in their industry coding over the time period dating back to 1993 are included. For more, refer to section 4.2 and Appendix I for a coding manual considering financial industry groups and classes and Appendix III for an extensive set of all graphs for each sub-branch.

5.2.1 Industry Groups within Finance

I concluded in section 5.1 that when looking at the financial sector as a whole, aggregated average financial wages relative to non-finance have increased, somewhat unexplained, steadily since the 1980s. This finding supports what we would expect, given the loosening of regulations, globalization, and finance' increasing role in modern society. However, it does not assist us to say whether wealth is concentrated within one part of the financial sector, nor can we yet explain whether it increases evenly throughout all sub-branches.

The graph on the left of Figure 9 shows relatively average annual wages for the four industry groups within finance, following country-specific industry codes from Statistics Denmark[8]: *1.) Insurance and pension funding*, *2.) Mortgage credit institutes (and similar institutions), 3.) Monetary intermediation*, *4.) Other financial activities*. Respectively, the graph on the right shows relative talent for these four groups. Relative wages are calculated as average wages in the respective group divided by average wages in the other three branches of the financial sector to identify highest paid industry groups within finance. The relative talent graph displays average annual high school grades. That is, average grades in the respective group minus average grades in all other branches within finance. Relative wage and relative talent is displayed on the y-axis in each graph. The same method is used for further graphs in this section. Comparing the evolution of *relative* wages and talent between financial industry groups and classes is crucial for answering the fourth hypothesis, namely it helps to identify which sub-branches in finance earn particularly more in relation to average wages in all other parts in finance and if those particularly employ most talented individuals' when offering high salaries. The graph below relative wages and talent gives an overview on the size of the four industry groups within finance, measured in yearly number of employees in the respective branch.

[8] And also identified by European standards of industry coding (NACE: Eurostat 2008a)

Figure 9: Relative wage and talent differences between financial sector ***industry groups***

The upper graph on the left of Figure 9 shows that, compared to 10 years ago, average wages in four major finance branches have converged until 2013. This is a general trend throughout the entire sector. This implies that workers in finance get more equal pay today than at the beginning of the 1990s. In such relative wages fell for insurances and pension funding, mortgage credit institutions and other financial institutions, while it rose in monetary intermediation. It should be noted, for monetary intermediation, which includes common banks and the Danish Central Bank, a public owned entity, could help explain the discrepancy in Graph 9. Moreover, monetary intermediation is the only sector earning significantly less than average wages in finance, though also employing a much higher number of employees than all other three industry groups covered in Figure 9 (approx. between 40,000 and 50,000). A high number of employees within common banks as monetary intermediation institutions could be the result of an aggregation bias but is also telling of organizations that handles a great degree of day-to-day personal banking. While being a financial institution, common banks also employ many back-office functions to handle a high degree of customer interaction. It is reasonable to

assume this sector thus posits somewhat lower pay out considering its variety of functions it has to undertake.

The graph on the upper right of Figure 9 displays the evolution of relative talent within the four industry groups. Relative to the other sub-sectors, there are some alterations and reduction in talent in other financial activities throughout the entire period. However, this provides somewhat of a messy picture, as there does not seem to be any major industry-differences in talent distribution. Only insurance and pension funds stand out employing on average individuals with one point lower GPA throughout the entire period.

On the surface, and to address hypothesis 4 more directly (and the key assumption in human capital theory that lies herein), the following section further dissembles the financial sector in its most detailed sub-branches classifications: industry classes. This method countervails against aggregation problems, which could result in a somewhat similar trend for all industry groups. By further breaking down the financial sector into its most detailed industry codes, and providing contextual commentary to my findings, the analysis also speak directly to – not just human capital theory – but also other scholars who have suggested why we may see income disparity within finance. Recent studies show that investment banking as well as venture capitals and private equities take up most of the internationally highest-paid sections of the financial sector, employing very skilled and educated workers (Kaplan and Rauh 2007; Kedrosky and Stangler 2011; Oyer 2008a). For instances have Chemmanur (2010), Kaplan and Rauh (2007) and Oyer (2008b) reasoned that escalating wages are a consequence of the increasing technological skill-bias permeating certain industry classes, justifying high earnings and attracting higher skilled labour as a result. More practical, some scholars have pointed to the high amount of working hours investment bankers put into their job compared to their peers in other areas of finance. This would justify high wages and mostly attract young workers (Bertrand et al. 2010).[9] As these scholars focus on distinct parts of finance, a detailed industry level

[9] It should be noted most studies which point to high wages within investment banking, venture capitals and private equities, focus on a small number of either MBA students in the Untied States, who are the most skilled, or purely executive positions within those branches (Bertrand et al. 2010; Kaplan and Rauh 2007; Oyer 2008a). I however include the entire financial sector in my analysis independent of its skill allocation and occupational position, which could explain lower average wages than expected. In addition, results might point to country-specific and institutional reasons which are focused around the United States.

analysis is necessary. More precisely it necessitates a focus on industry classes under "*Mortgage credit institutes and similar"*, including for instance investment trusts and venture capitals.

Contrary to proposed high relative wages, Figure 9 suggests, that jobs falling under mortgage credit institutes do not particularly pay higher or increasing earnings than insurance and pension funding and other financial activities, but paying the highest relative wage in 2013. In addition, in the same year, they attract most skilled labour *within* finance.

5.2.2 Industry Classes within Finance

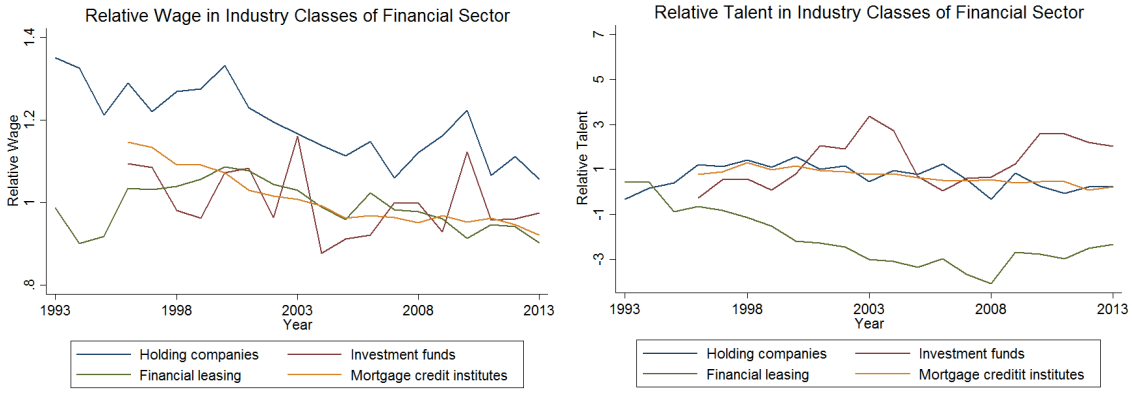
The following analysis is split into two parts. First I review industry classes under "*Mortgage credit institutes and similar institutions*" before reviewing industry classes that belong under the three other major industry groups in finance *("Monetary intermediation", "Insurance and Pension funding" and "Other financial services"*). I put particularly attention to industry classes within Mortgage credit institutes and similar because they have gotten under focus, as described above, for paying out specifically high wages in finance and attracting "the best and the brightest" (Kaplan and Rauh 2007; Kedrosky and Stangler 2011; Oyer 2008a). In addition, it might not be the group including the highest number of employees (Figure 9), but with the most diverse economic activities. Thus, mortgage credit institutes can be divided further into 8 industry classes (Figure 10.1 and 10.2), the other three industry groups belonging to the financial sector consist of 9 industry classes, according to their primary economic activity (Figure 11.1 and 11.2) (Eurostat 2008) (See Appendix I for detailed industry coding). Disaggregating this group further provides interesting insights into the allocation of talent and wages *within* the industry group of mortgage credit institutes.

a) Industry group: *"Mortgage credit institutes and similar institutions "*

The 8 sub-branches reviewed here are divided into two graphs (Figure 10.1 and 10.2) after identifying two major income trends in industry classes classified under mortgage credit institutes: Half of the sub-branches follow an upward trend in relative wages and contrary the other half a downward trend. The first, four industry classes show increasing wages, most of which attract, including variations, also increasing talented workers. The second, average wages in the other four industry classes are decreasing, with stagnating talent distribution. Having hypothesis 4 in mind, i.e. we should expect more talented workers to reside in higher-paying branches of finance; I display the data in such a way that the four sub-branches where we see a relative decrease in wages is displayed in Figure 10.1. Relative wages are juxtaposed to relative talent on the right side. Respectively those four sub-

branches where we see a relative increase in wages, and their talent-level is displayed in Figure 10.2. Following this, after presenting general wage and talent trends, I provide a further contextualized commentary for why we may interpret these results.

Figure 10.1: Relative *decreasing* wages in industry classes under the industry group *"mortgage credit institutes and similar"*

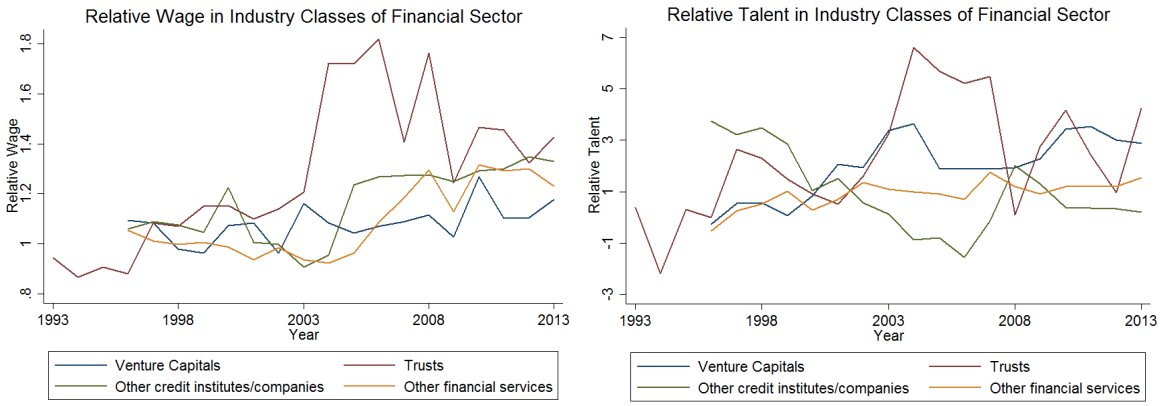


Four sub-industries (holding companies, investment funds, financial leasing companies and mortgage credit institutes), classified by Statistics Denmark as "Mortgage credit institutes and similar", show wages have been decreasing since 1993 relative to the rest of the sector. In 2013, only in holding companies are wages relative higher than the average income in the financial industry (about 15 percent higher); wages in the other three industries are about average. In addition, workers in these four branches inherent about average talent, except in financial leasing where it decreases drastically. On the other end, talent in investment funds is outstandingly high. This fluctuates drastically, having attracted a higher number of talented workers since the financial crisis and before. We may understand this discrepancy as a consequence of holding companies, mortgage credit institutes and financial leasing companies mostly include "standard" financial jobs, whereas investment funds can attract certain types of talented professionals. One reasoning could be that investment funds belong to the high-end of the financial service sector that makes investments, and thus require higher analytical skills from their employees.

Turning to the four industry-branches within Mortgage credit institutes and similar, which show increasing relative wages in the last 20 years, two financial branches stand out, showing two interesting trends in relative wage and talent allocation (See Figure 10.2). The first, investment trusts show a significant increase, from 2003 to 2008 in relative wages earning up to 80 percent more than

the average financial worker. In addition, they attract highly talented worker exactly in the same period. Second, venture capitals are also hiring relatively more talented workers, even though wages are not increasing correspondingly. Although some interest has been gained in the allocation of talent and wages in venture capitals, fewer studies have been devoted to investment trusts. I will now elaborate on why these industry differences, increasing wages and talent in both sub-branches might exist.

Figure 10.2: Relative *increasing* wages in industry group *"Mortgage credit institutes and similar"*



Investment trusts

Figure 10.2 shows that wages in investment trusts mostly depend on boom and bust cycles of the financial market; paying extremely high and rising wages until the financial crisis began. From 2004 to 2008, same years as wages are highest in the last 10 years, average grades are about 6-7 points higher in that industry than average grades in the financial sector. It shows that from 2004 to 2008 this industry employs highly skilled and talented workers. During the time workers in investment trusts earn on average 80 percent higher wages than everyone else in finance.

Firms classified as investment trusts or "investeringsforeninger" in Danish, are public listed companies, offering services to private and institutional investors. An investment trust is an association of investment funds, investing largely in stocks, bonds and real estate. Profits thus depend on the current performance of the financial market. Trusts only consist of closed-end funds that offer stable capital and a fixed number of shares. Most trusts operate through banks such as Danske Invest (Danske Bank) and Nordea Invest (Nordea Bank). Other examples of Danish "Investeringsforeninger" are Handelsinvest or Absalon Invest, latter of which consists of nine investment funds (Investeringsfondsbranchen 2016; J.P.Morgan 2016). Investment trusts employ an average of 80 workers (see Appendix III), but serve often as an umbrella of a bank or more than one investment

fund. This structure shows a high-end management or elite character of trusts, employ relatively few financial workers, and most often manage several investment funds. This could justify the ability to pay out high wages in economically upward times generating profits which are more dependable in the functioning of financial market than in other parts of finance. In addition, investment trusts can make large investments, such as in infrastructure projects, private investors cannot afford. This special investment character raises profits and the earning potential; thus investment trusts attract much higher talent when wages are high (Piketty 2014). Hypothetically, one could give reason that higher talented workers enter investment trusts to receive higher incomes than possible in other industries within finance. However, this causality is not clear from the descriptive analysis.

Venture capitals

Like investment trusts, venture capitals have displayed an increase in talent, albeit in a less volatile manner (Figure 10.1). More so, employees in venture capitals have earned increasingly more over the years; in 2013, up to 20 percent more than in the rest of the industry. Rising wages and human capital in venture capitals has been confirmed in the literature and has been studied more elaborately than in other parts of the financial industry (Kaplan and Rauh 2007; Kedrosky and Stangler 2011). The possible underlying argument present for the Danish sector as well is that, relative to other parts of the financial industry, higher and specific analytical skills are required in order to evaluate companies in their early stage (start-ups) (Dotzler 2001). According to Philippon, increasing credit risks and IPOs could be why more skills are needed and why wages in these financial industries are increasing (even though they empirically only prove the link to increasing skills) (Philippon 2007, 2008). The argument explaining higher skilled labour in venture capitals has been debated and some point instead to the importance of specifically social networking skills, influencing the performance and wages of venture capital and private equity firms (Hochberg et al. 2007). High school grades might however not reflect these skills, even though professionals in venture capitals have also increasing cognitive skills.

Increasing wages and talent in the venture capital sector may be a result of industry growth in recent years. In comparison to other economies, Danish venture capital funds have invested increasingly more since 2009. Other countries, however, have shown decreasing or stagnating trends in venture capital investment. Danish venture companies generally invest less in so-called “business angels” and more in follow-up investments for less risky start-up companies, mostly in ICT, Clean Tech and Life Science start-ups (Damvad Analytics and Research 2015). This upward trend of venture capitals is also visible in the Data. They have been constantly employing more workers, specifically from the

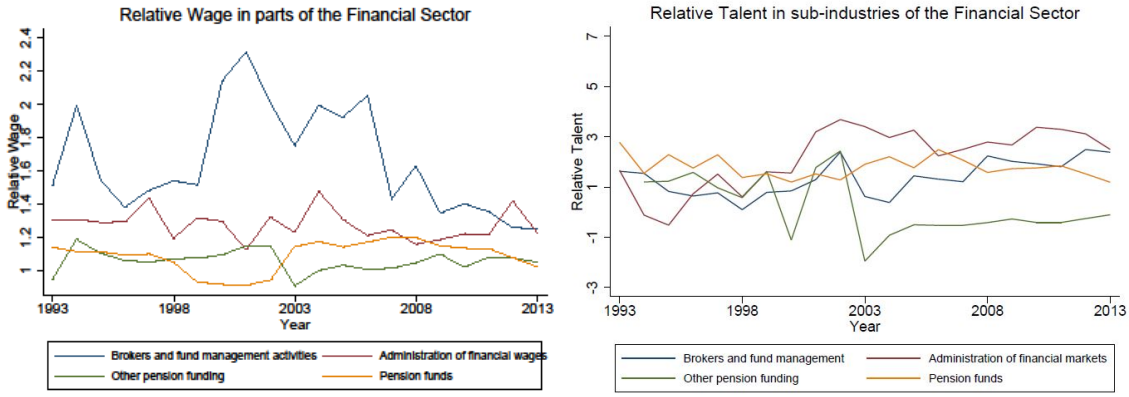
beginning of 2000, where venture capitals gained importance on the financial markets (for size of industries see Appendix III).

To sum up, there are two reasons why a larger venture capital sector can influence higher wages and talent. First, a growing market increasingly attracts more workers in Denmark increasing the competition and thus talent for working in venture capitals. Second, as a successful industry, venture capitals provide enough resources to pay high-talented labour.

b) Industry groups of *"Monetary intermediation", "Insurance and Pension funding"* and *"Other financial services"*

So far, I have analysed 8 sub-branches of the financial industry group, *"Mortgage credit institutes and similar"* in more detail. This section focuses on industry classes within the three outstanding industry groups: "*Monetary intermediation*", "*Insurance and pension funding*" and "*Other financial services*". Again, industry classes are displayed in two different graphs (11.1 and 11.2), after observing two different wage trends in the 9 industry classes. Figure 11.1 presents all four industry classes showing *volatile* relative wages in the last 20 years and Figure 11.2 shows the remaining five industry classes, which follow a more *stable* trend in relative wages. In line with the fourth hypothesis, it should be kept in mind, that this division is helpful to observe a general correlation between wages and skills in financial sub-branches; thus we would expect to see rather volatile talent distribution over the last years in Figure 11.1 and a more stable evolution in Figure 11.2.

Figure 11.1: Volatile relative wages in industry group *"Monetary intermediation"*, "*Insurance and pension funding"* and *"Other financial services"*



Generally Figure 11.1 shows volatile relative wages, with no clear upward or downward trend, in four industry classes, with quite some differences in relative talent, considering the scale of the y-axis. Brokers and fund management earn by far the most within the financial sector (see upper Figure 11.1). This branch includes, following Eurostat definition, workers employed in stock broking, management of mutual funds, other investment funds (such as hedge funds) and pension funds (Eurostat 2008). Wages escalate from about 50 percent higher in 1993 to 140 percent higher than average financial wages in 2001 before converging to the lowest 30 percent higher than average financial wages in 2013. Contrary to human capital assumptions, talent is not particularly high within that industry and fluctuates around 1 point higher than rest of the financial sector.

Workers in administration of financial markets represent the other industry class with earning approx. 40 percent more than an average financial worker, in the beginning and end of the time period. This has demonstrated a stable development in the last 30 years. Administration of financial markets includes "the operation and supervision of financial markets, other than by public authorities", such as for instance the Copenhagen stock exchange (NASDAQ Copenhagen) (Eurostat 2008). Workers in administration of financial markets have quite high talent, higher than for instance brokers and fund managers. There is a recurring finding that is that financial sub-branches, responsible for the management of other areas and branches of the financial sector, generally earn more and have attracted individuals with high abilities. This goes especially true for administration of financial markets.

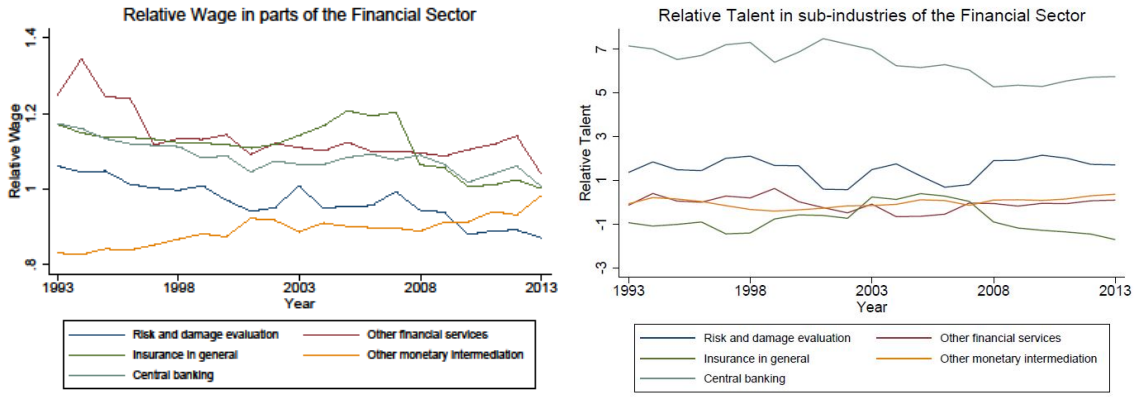
Findings make clear that throughout the entire financial sector the smallest industries, in terms of number of employees in the industry, pay the highest wages (See Appendix III for number of employees in all industry classes). Such as for instance in investment trusts, one of the highest paying industry classes within finance, which consists of on average 80 financial workers. These professionals occupy the elite in the financial sector, managing several other sub-branches in finance, such as investment and pension funds. Other studies seem to support this reasoning, underlying the management- and elite-character of sub-industries such as investment banking attract mostly talented individuals (Rodrigues 2013; Rothwell 2016; Shadab 2008; Shelby 2015).

The Central Bank

As stated, the analysis shows that wages and talent are more concentrated predominantly in smaller industry classes (see Appendix III for number of employees). Employees generally earn more and

have higher cognitive skills than the rest of the financial sector. However, this is not the whole story. Figure 11.2 shows stable wage trends in three industry divisions and presents the central bank as an interesting counter-case. Belonging to the public administration, relative income is only slightly above average, yet it employs the most talented workers in the financial sector and in of the entire economy. It therefore underlies the importance of other factors rather than only income possibilities thus making an industry attractive for talented individuals.

Figure 11.2: Stable relative wages in industry division "*Monetary intermediation"*, "*Insurance and pension funding"* and *"Other financial services"*



It is striking to note that even in an international comparison wages in the *"Danmarks Nationalbank"* are amongst the lowest in Europe. However, the central bank has been attracting constantly new skilled graduates since the 1980s. A couple of reasons appear when trying to explain why particularly skilled and talented workers find central banks so popular. One explanation is outlined as central banks' organizational restructuring in the 80s, which shifted the character of the organization from a public service working environment to central banking in the form of a business (Marcussen 2009). In addition, *"Danmarks Nationalbank"* has since then offered continuous education and skill training within the organization and the chances to work on-leave for international organizations. These assumptions and the differentiation between specific and general human capital, originally developed by Becker, coincide with the fact that central bankers have one of the most extensive job tenure, representing specific human capital, more than twice as extensive that in other industry groups in finance. This concept of a dynamic working environment could appeal specifically to skilled and talented workers who can use and improve their skills during their work. Milton Friedman has already recognized that central banker enjoys much prestige and the central bank is a high-acknowledged

player in the Political atmosphere (Danmarks Nationalbank 2016; Marcussen 2009). In addition, career studies in sociology focusing on network analysis, specifically describe the attractiveness of central banks for future-employees with particular career paths. They most often possess highly professional backgrounds in economics and an open mind towards neo-liberal economic policymaking (Adolph 2013; Epstein 2013; Krippner 2007). In this sense, human capital theory underestimates the importance of other individuals' characteristics - other than here measured as talent - to explain income differences. Thus, from a neo-classical perspective, one cannot explain why, more than other industry classes, the central bank attracts more of the highest talented individuals within the financial sector receiving particularly lower wages. Instead, the model argues, individuals change their job in order to maximize their utility function.

5.2.3 Summary of Results

The empirical findings show that wages and talent in sub-industries *within* finance are not very clearly correlated, as theoretically proposed. Hence, a financial industry paying high salaries does not necessarily imply the parallel employment of high talent and leads to neither reject nor approve the fourth hypothesis. However, some sub-branches follow a parallel trend in wages and talent, but others not at all. One major finding of this section is though that talent and wages vary widely amongst the financial sector. These major differences become especially clear when comparing it to talent levels in the aggregated financial sector (Section 5.1.1), resulting in very low estimates due to an aggregation bias.

The analysis suggests that cognitive skills and wages might be positively correlated; though, also other variables might have an influence. These findings have three major implications. ***The First****: E*ven though the relationship between human capital and wages does not seem as clear as postulated by human capital proponents, certain talents are indeed clustering in some specific industries in times of high wages. However, from this purely descriptive analysis, it can only be assumed which way the causality between talent and wages in sub-industries in finance points. ***The Second***: Sub-sectors, which consist significantly of higher talented workers than the rest of finance and paying out high wages, consist mostly of small, high-end industry classes. ***The Third****:* The financial crisis has had different impacts throughout the financial industry. This becomes clear, when comparing the change of industry size in different industries. In relation to other years, some industry classes have shrunk disproportionally more while others increased more drastically (Appendix III).

These are interesting finding contributing to on-going human capital discussions. Even though analysis on the relationship between wages and human capital in the aggregated financials sector gives a somewhat different picture, disaggregating wages and talent provide more insight into where the wealth and talent is located. The claim of a rising talent-intensive financial sector is calling for more investigation on the individual level. I focus on these finding more thoroughly in the next section, where I analyse individuals' human capital accumulation as well as effects on future income.

5.3 Individual Career Choices in the Financial Sector

This part of the analysis is mostly driven by the inconsistency of previous findings concerning wage and talent allocation in financial industry classes. In this light I employ other methods to investigate patterns of financial workers entering and leaving the financial service industry. And focus on the movement from finance to non-finance to analyse if there are any patterns visible related to individuals' income and talent. The analysis is based on implications from Roy's known model (1951), which assumes individuals rationally choose jobs according to an income-maximization mechanism. It is argued that wage differences can only fully be explained when understanding individuals' industry movement decisions. Hence, I seek to investigate whether individuals working in the financial sector choose specific career paths to optimize their wages, and whether this explains parts of the rising financial wage premium. Following those assumptions, one must expect that individuals change jobs and careers with the aim of optimizing their outcome, as in wages according to their skill levels, following:

H5: Individuals shift industries to optimize their wages in relation to their skill level.

This hypothesis is answered in this section of the thesis, analysing financial career paths and income development respective to talent. In addition, I follow up on studies connecting labour mobility with human capital and wage expectations (see section 3.2.5). In other words, the fifth hypothesis expects that high talented workers take advantage of their talent and enter finance occupations to gain higher wages. In this section, I particularly shift to focussing on the individual level and specific career moves of those entering and leaving finance. The longitudinal panel data, representing the full Danish labour force since 1986, following the same individuals for almost 30 years, offers a great chance to specifically study mobility patterns among financial workers. At most times accurate analysis on individuals' career paths is only limited possible because researchers have only had access to a sample of the working population (Abowd et al. 2012). I will first present a general overview about the

evolution of labour movements between the financial industry and all other economic sectors in recent years. Afterwards, the analysis moves on with analysing the effect these industry-changes have on individuals' income, respectively in relation to their talent. This section concludes with a closer look at the evolution over time of talent and wages of short-term and long-term financial employees, so-called *"stayers"* (in finance) and *"movers"* (entering and leaving finance). Thus, the two following questions guide this third part of the analysis: *Is individuals' income mobility between finance and non-finance dependent on talent endowments? Can we identify major wage and talent trends of stayers and movers?*

5.3.1 Movement *between* Finance and non-Finance

In a broad sense, we can observe a relatively steady annual turnover in the financial labour force of circa 8%, from non-finance to finance and respectively from finance to non-finance, with a significant rise in the years leading up to the financial crisis in 2007/2008 (See Figure 12).

Figure 12: Labour movement in and out of finance

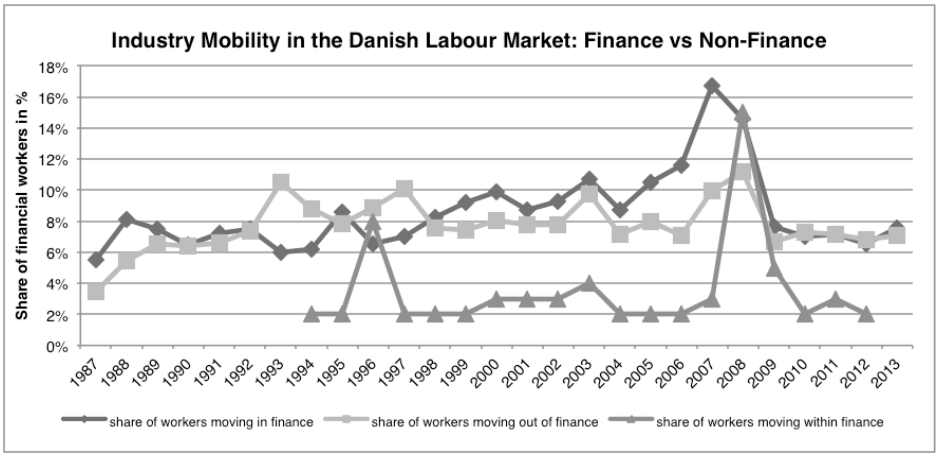


Figure 12 shows the annual turnover of the financial sector from 1986 to 2013. It is measured as the annual share of workers in the financial sector entering and leaving the industry, as well as switching industry classes *within* finance, relative to the number of employees in finance in the respective year. It only includes those entering finance from a non-finance related job. Respectively, those leaving the financial sector are only counted as "leaving" if they take on a job in economic sectors other than finance. Individuals' moving within finance are switching between the 18 industry class in finance,

covered in the last section 5.2.[10] Since the end of the 1980s, labour mobility between finance and non-finance has increased until the beginning of the financial crisis in 2007. However, at the same time, the size of the sector, measured by number of employees, has decreased (See Figure 7 in section 5.1.1).

The above figure suggests that the number of individuals entering and leaving the financial industry depends on the performance of the financial market. During the financial boom to the financial crisis particularly more workers moved into finance; in 2007, 17 percent of financial employees have newly taken on a job in that industry in that particular year. Again, financial workers also most frequently left the sector in 2008 (11 percent). In comparison to previous booming years, and as I point to in section 5.1.1, this trend is intertwined with stagnating financial wages and relative education since 2010. Groes et al. (2014) confirm increasing occupational mobility in the Danish economy occurring in recent years, also known as "turbulence" in the labour market (Kambourov and Manovskii 2008, 2009a; Parrado et al. 2007).

During the financial crisis, industry mobility not only increased between finance and non-finance, but also mostly among industry classes within the financial sector (See above Figure 12). Contrary to other years, where labour mobility was only about 3 percent high, about 15 percent of financial employees switched sub-industry classes within finance in 2008. Proportionally to the industry class size, sub-industries insurance and brokerage/fund management most attracted financial worker during the years 2007 to 2009 (see Network Analysis in Appendix IV).

The previous graph of labour movement between finance and non-finance and displaying changes within finance, does not in itself argue against human capital theory. It needs to be assessed with wage and skill development in order to support the current theoretical paradigm dominating human capital theory and empirical implications from the Roy model. Hence, in the next section, I shift method and show income mobility for different income classes within finance and non-finance and respectively for "low" and "high" talented individuals.

5.3.2 Income Mobility: Finance vs. Non-Finance

As outlined in section 3.2.5, research refers to several measurements of income mobility, loosely defined as individuals' change in income over a certain period (Jäntti and Jenkins 2015). One example constitutes the calculation of a correlation coefficient of individuals' income for two chosen years, another is transition matrices showing the shift of different income classes from one year to the other

[10] Hence, those workers entering unemployment, recent graduates and those retiring are not included.

(Atkinson et al. 1992; Bourguignon 2000; Jäntti and Jenkins 2015)[11]. I have chosen to use income transition matrices, which are easy to interpret and offer an excellent visualization method of income mobility. Figure 14.1 and 14.2 display different transition matrices, which show the probability of increasing or decreasing in the income class when entering or leaving the financial sector. It is of particular interest to analyse income chances in finance against non-finance occupations in order to answer the research question of what role talent plays in the financial sector explaining income inequality between finance and non-finance. *In the first step*, I show short-term income mobility in the financial sector and compare results with income mobility in all other economic-sectors. *In the second step*, I analyse long-term income mobility depending on individuals' talent endowments, again in finance and non-finance. Whereas the previous paragraph also discusses *intra-industry* movements in finance, this section analyses only movements *across* finance and non-finance. Moreover, it displays the change in income for the same individual. The income mobility literature also refers to this method as *positional change*, which is particularly suitable to show the evolution of the same individuals' incomes. The value of this rich panel data, on every individual in Denmark, explains why this can be done. In this particular measurement of income mobility, the income class of individuals is distributed relatively to the income of other individuals in the labour market. I determine income classes relative to the income distribution of the whole labour force, including the financial and non-finance sector. Advantages are that it makes income movements comparable when individuals switch between these two. Highest income immobility occurs if every individual is positioned in the same income class before (t-1) and after (t) leaving/entering finance. Thus, perfect immobility would be shown in the diagonal being equal to 1 and implies that everyone is placed in the same income class the first and the second year of measurement. As a feature of measuring income mobility as positional change, perfect immobility does not strictly imply that the individual actually earns the same as before. It only signifies that before and after the individual is placed in the same income class, which is dependent on the distribution of the income in that respective year (Atkinson et al. 1992; Jäntti and Jenkins 2015).

The first transition matrix (Figure 14.1) measures the change in the income distribution over a short period of time, one year before and after entering/leaving the financial sector. Figure 14.2 displays the long-term evolution of wages after working five years in finance and non-finance, separately showing income possibilities for low and high talent. Income groups of all transition matrices are taken

[11] Measuring income mobility constitutes only a small part of my analysis. One has to keep in mind that income mobility measurements bring their own limitations, at times giving different results for different mobility measurements (For more insights on limitations see Atkinson et al. 1992).

respectively to the yearly income distribution of the whole labour force, including finance and non-finance. This makes it possible to compare the transition from columns (t-1) to rows (t).

The left transition matrix in Figure 14.1 displays in columns the income distribution of workers one year **before** entering the financial sector (***moving in***: *income distribution for individual in non-finance*) and in rows one year **after** entering the financial sector **(*moving in*:** income distribution for individual in finance). Respectively the right transition matrix shows in columns the income distribution one year **before** leaving the financial sector (***moving out:*** *income distribution for individual in finance)* and in rows one year **after** moving out of the financial sector (***moving out****: income distribution for individual in non-finance)*. Cells give the probability of changing from one income class to the other. This probability is displayed in percent. To give an illustrative example for Figure 14.1, professionals who belong to the lowest income class before entering finance (>=10th), have a 23 percentage chance of moving up to the next income class (>=25th).

Figure 14.1:[12] Change in income distribution when entering/leaving the financial sector (*short-term*)

Moving in (%)

Income distribution **1 year** after moving into the Financial sector							
Income distribution **1 year before entering** the financial sector (last year in non-finance)		**10th**	**25th**	**50th**	**75th**	**90th**	**Total**
	10th	53.85	23.57	12.39	7.54	2.65	100
	25th	21.71	42.16	21.93	10.51	3.68	100
	50th	10	22.75	37.55	22.01	7.69	100
	75th	5.65	8.52	18.26	44.78	22.78	100
	90th	6.74	3.92	5.65	16.26	67.44	100
	Total	29.23	21.85	17.44	16.45	15.03	100

Moving out (%)

Income distribution **1 year** after moving out of the Financial sector							
Income distribution **1 year before leaving** the financial sector (last year in finance)		**10th**	**25th**	**50th**	**75th**	**90th**	**Total**
	10th	59.57	20.27	10.34	7.38	2.44	100
	25th	30.96	41.52	16.8	8.23	2.5	100
	50th	18.43	29.11	32.15	16.48	3.82	100
	75th	12.58	16.08	19.04	35.12	17.17	100
	90th	10.19	7.78	8	18.42	55.61	100
	Total	30.1	22.55	16.41	16.01	14.93	100

Short-term results are reverse for those entering and leaving finance. Workers are more likely to move upwards the income distribution, when entering the financial sector. Contrary, switching to non-finance related job, workers probably earn less as they move from the financial sector. Another trend is visible in Figure 14.1. The richest and poorest worker, especially in the highest and lowest groups, will most likely stay either rich or poor respectively. Hence, those two group display the highest income

[12] The five income classes used in all transition matrices in this section are displaying the highest income class for the respective group, following: First group: >=10th, 10th to 25th, 25th to 50th, 50th to 75th and last group :75th to 90th. The highest income class was excluded because no individuals moving in and out of finance were part of it.

immobility. When moving into finance in the highest income class, approx. 67 percent stay at the same income level. However, when moving out of finance, fewer but 55 percent still belong to the richest. Contrary, most income mobility, when shifting in and out of the financial sector, occurs in the middle of the income distribution. These income dynamics when the employer enters and leaves the financial sector underlie income chances in the financial sector. On the contrary, the worker loses wages when he leaves the financial sector. In this thesis, however, I focus on the role of talent to explain wage inequality. Hence, in Figure 14.2, I extend income mobility by the concept of human capital, separately showing income mobility matrices for low and high talented individuals.

Figure 14.2: Change in income distribution, staying at least five years in the financial sector and non-finance (long-term)**, by talent**

A: Finance

High talent

Income distribution **5 years after entering the financial sector** & staying in finance at least five years after							
Income distribution **1 year before entering** the financial sector (last year in non-finance)		**10th**	**25th**	**50th**	**75th**	**90th**	**Total**
	10th	5.05	16.3	38.17	24.53	15.95	100
	25th	4.71	16.32	32.98	24.43	21.55	100
	50th	2.14	8.92	23.70	37.25	27.99	100
	75th	0.08	1.36	9.77	36.16	52.63	100
	90th	0.41	0.66	9.76	14.17	81.86	100
	Total	3.82	12.59	30.00	25.59	28.01	100

Low talent

Income distribution **5 years after entering the financial sector** & staying in finance at least five years after							
Income distribution **1 year before entering** the financial sector (last year in non-finance)		**10th**	**25th**	**50th**	**75th**	**90th**	**Total**
	10th	4.14	22.19	46.09	18.63	8.95	100
	25th	2.95	28.08	40.01	22.13	8.84	100
	50th	1.75	12.26	36.66	31.2	18.13	100
	75th	0.92	3.48	13.01	40.49	41.1	100
	90th	0.69	0.69	3.01	17.82	77.78	100
	Total	2.99	17.53	36.32	22.91	20.25	100

B: Non-Finance

High talent

Income distribution **5 years after leaving the financial sector** & staying in non-finance at least five years after							
Income distribution **1 year before leaving** the financial sector (last year in finance)		**10th**	**25th**	**50th**	**75th**	**90th**	**Total**
	10th	21.83	18.69	23.02	23.17	13.28	100
	25th	17.16	22.96	23.07	19.65	17.16	100
	50th	13.69	20.83	25.05	21.92	18.5	100
	75th	6.03	9.04	14.33	33.46	37.15	100
	90th	5.49	3.14	7.71	18.56	65.1	100
	Total	17.01	16.72	20.64	23.28	22.34	100

Low talent

Income distribution **5 years after leaving the financial sector** & staying in non-finance at least five years after							
Income distribution **1 year before leaving** the financial sector (last year in finance)		**10th**	**25th**	**50th**	**75th**	**90th**	**Total**
	10th	25.01	28.74	23.49	14.65	8.11	100
	25th	17.94	32.18	22.65	16.88	10.35	100
	50th	12.34	24.87	27.92	21.56	13.31	100
	75th	8.31	11.35	16.89	30.61	32.84	100
	90th	5.46	4.59	8.47	20.02	61.47	100
	Total	17.57	23.56	21.34	18.77	18.76	100

Figure 14.2 shows the expected probability of advance or decrease in the income distribution after five years of work in finance vs. non-finance. I follow only workers' income for those entering or leaving finance to juxtapose these two resulting income effects. Columns display the income distribution of those workers one year before enter and leave the industry; rows show the income distribution for the same individuals respectively after 5 years in the industry he/she moved in. Cells in Figure 14.2 separately display long-term probabilities of moving up or down the income distribution in finance and non-finance for low and high talented workers. Low and high talent is defined by taking the 50th percentile of the grade distribution as a threshold between the two groups. Hence, low talented worker are those under the annual 50th interval in the grade distribution. Respectively, high talented individuals are above the 50th interval.

Disregarding the division between high and low talent for now and focusing again on the financial sector compared to non-finance, the long-term income trend is similar to short-term income mobility when comparing finance and non-finance. In line with Figure 14.1, workers in finance have a higher chance of moving up income classes than they have in non-finance. Reversely formulated, the chance that income will decrease employed in non-finance economic sectors is higher. These findings suggest that individuals' income in the Danish economy after leaving the financial sector is not path-dependent. Instead, financial workers get lower incomes when they leave and switch to a non-finance occupation.

Results show that talent has a higher importance implying higher earnings after 5 years in the financial sector than in non-finance. Separating income mobility for high and low talent confirms the original human capital hypothesis that, from a long-term perspective, high talent facilitates moving up the income distribution within finance. Particularly, high talented individuals entering the financial sector, and who belong to the lowest income class, are most likely to raise their income by two income classes (38.17 percent). In line with those findings, low talented workers in finance are less mobile than high talented ones, thus supporting hypothesis 5. These results are shown for all income classes, except for those who earn the most. In other words, findings underlie high-income chances in the financial service industry, even more so when highly skilled. In addition, these income dynamics are independent of previous earnings in non-financial jobs and show the industry-specificity of finance being able to pay high wages. Furthermore, higher labour mobility for higher skilled and talented workers is also documented in recent research on about the Danish labour market (Groes et al. 2014).

This presents us with somewhat of a dilemma: We know that talent implies a higher chance of great earnings after 5 years in finance, and as there is a general turnover of 8% between finance and non-

finance, it would support original assumptions of finance as a sector that attracts talented individuals increasing their income. Yet looking at finance as an aggregate sector, its talent level relatively is lower than non-finance. The next section is providing an answer to this question.

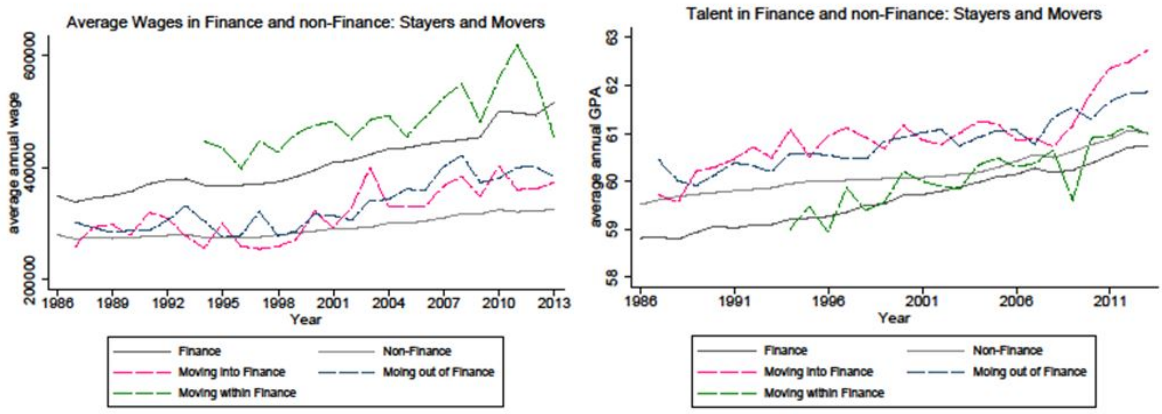
5.3.3 The Financial Sector Revisited: Stayers and Movers

As the title indicates, the answer lies in the data on those individuals who stay and those who move out of finance; more precisely, what we can say on the length of time talented individuals stay in finance. In order to answer the fifth hypothesis (individuals shift industries to optimize their wages in regards to their level of talent), I further elaborate upon characteristics of those leaving and entering the financial service industry over the last years in Figure 15 and 16, which is determining for why finance as a whole has a relatively low talent level. Furthermore, both graphs add a time perspective, revealing the evolution of wages and talent of stayers and movers respectively.

Figure 15 gives insights into the allocation of wages and talent in the financial sector, for those leaving and entering it and for those changing occupation between sub-branches within the financial sector. Average wages are measured annually and shown in the left graph. For movers the wage is measured one year after moving into finance, and respectively one year after leaving finance. Talent is measured in average high school GPA at the same time and displayed on the right side. The dotted lines indicate the labour flow of workers entering and leaving finance as well as switching industry groups *within* the financial industry. Whereas previous transition matrices, helping to plot income mobility between finance and non-finance, have included all employees' movements across the whole period in one matrix, the following two graphs will allow us to identify a time trend concerning wages and talent of stayers and movers.

Figure 15 clearly shows that those people moving into finance are increasingly more talented than the current work force in finance and non-finance. Contradicting earlier assumptions, it shows also that the most talented individuals' leave the financial sector respectively, inheriting comparable ability to those entering every year. This is very interesting because it shows that the labour turnover in the financial sector is the most talented workers in the Danish economy. In other words, talented individuals choose indeed a career in finance, though they move out of the industry as well. On the contrary, individuals switching industries within finance inherent average talent, fluctuating between the stock of finance and non-finance. This follows the same upward trend as average talent in finance and non-finance.

Figure 15: Wages and Talent of Movers and Stayers[13]



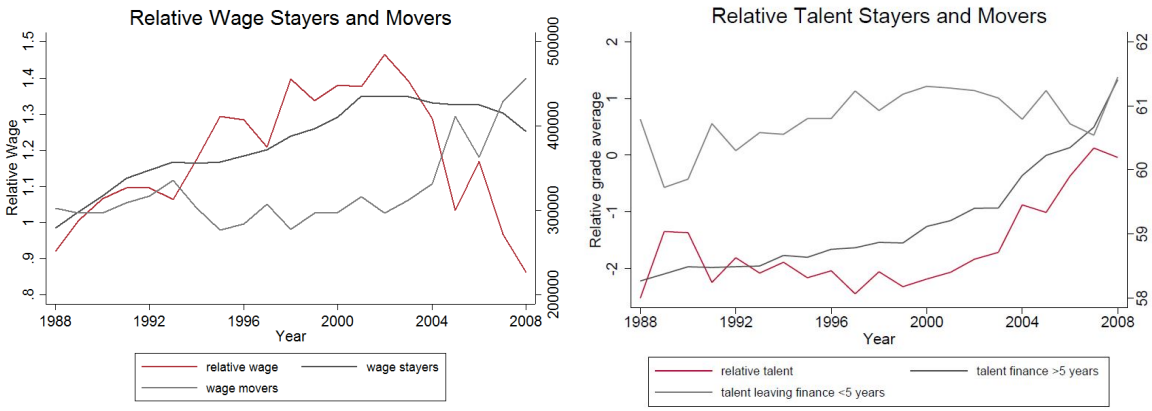
The Roy model explains occupational choices as a rational process of optimizing income dependent on skills needed for the occupation. Contrary to these assumptions, Figure 15 as well as earlier displayed income matrices, following the same individuals, shows that those leaving the financial sector earn much less compared to before in finance, even though they are the most talented in the economy. In line with those findings, the figure suggests that even though workers switching into finance are more talented on average than those already working in the industry, they again decide to leave. This leads to the fact that the financial labour force is less talented than in the non-financial sector. Moreover, it explains in more detail earlier, maybe surprising, results from the aggregated industry analysis (See Section 5.1). Strikingly, we see that wages are still much higher for those staying in the financial sector. Even though they seem to be the less talented ones compared to those in the rest of the Danish economy.

Furthermore, Figure 16 shows talented people leave finance after a while in comparing wages and talent for long-term stayers in finance (more than five years) and short-term movers (leaving the financial sector before five years) to non-finance. The focus on movers, which leave the financial sector is crucial and adds an additional layer of explanation, revealing that especially short-term movers are particularly higher-talented than financial worker choosing a long-term financial career. Methodologically, relative wages are calculated as average yearly wages for stayers divided by average yearly wages of movers to get a direct wage comparison of these two groups. Relative talent is measured as average GPA of stayers minus average GPA of movers; both relative measurements are shown in the red line, absolute average wages and talent in grey respectively for movers and

[13] It should be noted that average wages and grades of finance and non-finance include respectively those entering into finance and those leaving into non-financial economic sectors.

stayers. It is important to note that the time frame is limited to 2008, as this is the last year where it is possible to estimate from the panel data if an individual stayed for at least five years in the financial sector.

Figure 16: Long-term Stayers vs. Short-term Movers



In such, findings show that talented financial workers do not choose a long-term career in finance. Most of them leave within five years, earning less afterwards. As the upper right graph reveals, looking at increasing relative talent, however, long-time workers in finance are somewhat catching up to those leaving the financial sector. They become increasingly more talented up to the financial crisis. Though, it is first in 2007 that workers with a long-term career in finance are as skilled as those leaving. Furthermore, relative wages of long-term stayers are up to 50 percent higher than of those leaving the financial sector. This changes to a downward trend up to the financial crisis.

In summary, Figure 15 and 16 display a key finding; namely that even though wages are much higher when workers stay in finance, the most talented leave the sector again. In this sense, the public debate is correct insofar as the financial sector has done a good job of attracting talented individuals, but failed to keep them, thus leading to an overall lower level of talent relative to non-finance. We can say that findings lead to reject the fifth hypothesis; though we have to keep in mind that increasingly more talented individuals are moving into finance. This could explain why some have pointed towards a rising skill-bias because increasingly more highly talented individuals are indeed choosing occupations within finance. As this section suggests, however, they are less prone to stay. In sum, it is not purely to maximize earnings driving individuals to shift industries.

5.3.4 Summary of Results

Findings reject that the financial sector is moving towards an increasingly talent-intensive service industry. My analysis suggests that instead of staying in finance and gaining more wages over the years, numerous talented workers choose to leave the financial sector and accept lower wages. Furthermore, the findings put forward in this section show that workers do not only move between industries to increase their wages respective to their talent, at last not as their only driver. This section has uncovered income and skill dynamics concerning career choices of financial workers. Findings add to earlier sections by shifting the focus to the individual level of the labour market. Two main implications are worth pointing out. ***First***, the financial crisis triggers high mobility between finance and non-finance and also among industry classes within the financial sector. We do not know if this is voluntary or involuntary labour movement. Still wages remain higher than in non-finance even throughout the financial crisis. However, they differ widely within the financial sector: Brokerage and fund management are particularly attractive to those individuals moving within finance, offering even higher wages compared to other branches within finance during the crisis. ***Second***, expected income is much higher when workers stay in the financial sector even though the analysis shows that high talented people once again leave the industry. Moreover, the analysis shows that higher talented worker have indeed a higher chance of moving up the income distribution within the financial sector than those with lower talent, even further compared to high talent in non-finance. These findings imply that talent is somewhat more valued in the financials sector. However, the analysis points to evidence that there is no significant skill-bias or should we say “talent-bias” in the financial sector because many high talented individuals choose a job outside of the financial sector after some time.

6. Discussion & Limitations

My findings both follow and dispute existing literature within the field, so how can we make sense of this incoherence? Findings give insights into the relationship between talent and wages in the Danish financial sector and build upon previous studies in other countries, which focus on wage and skill allocation in the financial market. I have structured the discussion in such a way that each finding from every section is revisited in light of other scholarly literature that has talked about these points, while I attempt to formulate a deeper meaning of my findings.

6.1 Discussion of Findings

6.1.1 An Industry Perspective: No Skill-Bias in Finance

The first part of the analysis shows that there is no skill-bias in the financial sector in Denmark. This thesis contributes to previous work uncovering reasons for increasing wages in the financial sector, which have focused on the importance of skill and talent, from a pure aggregated industry perspective comparing the financial industry with non-financial sectors.

The findings of the first part of the analysis follow the reasoning of Böhm et al. (2015), who also disprove a rising skill bias in Sweden, and Bell and van Reenen (2010) and Lindley and McIntosh (2014), who do the same for the UK. Contrarily, these findings conflict with Célérier and Vallée (2015), who conclude that rising talent explains much of the increasing finance wage premium in France. Surprisingly, considering the results in the United States, United Kingdom, France and Sweden, which find that the financial sector attracts indeed more talent (measured in academic achievements) than other sectors in the economy, I find that cognitive skills in the Danish financial sector are lower than in the rest of the Danish economy; though these were catching up and increasing over time, at least up to the financial crisis sparked in 2008. However, measuring human capital in terms of educational achievements shows that Danish financial professionals are slightly and increasingly better educated, in line with previously described results, although the educational requisites are much lower compared to international trends.

Possible reasons for the diverging results from the case presented may include the fact that different countries have different educational systems. In Denmark a more egalitarian system can be a cause for “more equal” test result scores and thus similar GPAs of graduates. Also, some research focuses instead on GPAs from other educational levels, such as university. In addition, in Denmark more students get the chance to continue with a university degree, whereas in the United States or the

United Kingdom an investment in college education is very costly, though more research is required to shed light on national differences in educational motivations and results. The mentioned studies have proven useful to making results from the industry-level analysis generalizable and comparable to other national financial sectors in recent years.

The research question takes its inspiration mainly from ***human capital theory***, which explains income differences as due to differences in productivity, which arise because of varying skill allocations in the labour market. Human capital is multifaceted and can take the form of knowledge, skills or abilities. Since McKinsey's postulation of a "war of talent", firms have realized the importance of attracting and keeping talent for increasing productivity and maintaining their competitive advantage (Michaels et al. 2001). In the analysis, I measure individuals' human capital using the final high school GPA as a measure for talent and cognitive skills, arguing that this variable could define a significant skill-bias in the financial sector as it determines students' future career choice after high school. In addition I control, in keeping with the tradition of the human capital mode by Becker, for other general human capital endowments; namely length of education and labour market experience. Vigorous discussions exist on the importance of on the one hand both, cognitive and non-cognitive skills, and on the other hand general and specific human capital, for the prediction of wages. Nevertheless, the GPA is an innovative measurement at hand from the Danish administrative data. The results of this thesis conflict with classical human capital perceptions. It is neither individuals' talent (GPA) nor skills measured in education (university degree), which explains major income increases between the financial versus non-financial industries.

Apart from human capital theory, this thesis relies heavily on the assumptions of the ***Roy model*** underlying an occupational self-selection mechanism depending on skill and income expectations. In the first part of this analysis, I show that, considering the Roy model, the importance of talent is not going up for workers choosing finance-related careers; thus somewhat going against the income-maximisation assumptions of the model. My findings show that finance is not as attractive for talented workers as other industries outside of the financial sector might be (Data shows that many financial professionals switch to the public sector or manufacturing industry). The results also demonstrate, however, the existing knowledge-gap that can be help to explain the phenomenon of rising wages in finance; although we can exclude a substantial skill-bias, following from this analysis.

6.1.2 Intra-industry Differences in Finance: Wage and Talent Disparity within Finance

The findings of the second part of the analysis suggest that wages and skills differ largely within the financial sector, even if only in a few sub-branches, such as investment trusts, which attract disproportionally many talented professionals earning about 80 percent more than others in finance, up to the financial crisis. However, no explicit correlation between wages and skills across the industry can be found. The analysis draws on the significance of studies focusing on intra-industry wage differences in the economy. However, no studies have so far focused on differences within finance in the same comprehensive way, as this thesis has. Thus, the findings relate to a large amount of literature explaining intra-industry wage differences due to either individual endowments (talent and skills) or firm and industry specific characteristics (Abowd et al. 2012; Barth et al. 2016; Card et al. 2013; Krueger 1986; Stijepic 2016). The findings coincide with those of Abowd et al. 2012 and Barth et al. 2016, which point to the importance of the firm and industry you work in, in determining the pay. In line with these findings, this thesis reveals the importance of sub-branches in the financial sector in partly explaining the rising wages in the industry. This analysis adds an additional layer to revealing the importance of individuals' characteristics, particularly talent, which the first part of the analysis has found, cannot explain the rising finance wage premium in an aggregated way. Thus, these findings imply that there is greater attractiveness of certain financial sub-sectors than others when it comes to enticing talented graduates and workers. One reason could indeed be higher earning opportunities in certain branches, such as in the case of investment trusts or brokerage and fund management related jobs. Others consider industry-specific characteristics to affect wage structures, such as working conditions (Krueger 1986). The second part of the analysis explains that these firms paying high wages and attracting the most talented professionals are often smaller, which implies that fewer people are sharing higher revenues and providing the means to pay a higher income. In addition, these industry groups can mostly be characterized as the "high-end" financial firms being very influential in the financial market or in managing other financial sub-branches. However, it might be questioning whether pay structures in larger industries are skewed by the large sums earned by a small percentage of employees. Complicating matters, central banks pay one of the lowest wages in the financial sector, and yet continuously attract the highest talented and educated workers in Denmark. This suggests that other determinants than wages are at play, which could influence individuals' working preferences. For example, in the case of the central banks it could be that they offer an attractive working environment for skilled and ambitious professionals and other benefits which compensate for a comparatively lower salary. Furthermore, compared to other countries,

Denmark has an extensive progressive tax system, which might give higher incentives to work in the public sector, a sector many financial professionals move to after some years, which constitutes much of the Danish economy and offers a stable working environment. This argument has been proven right for other countries than Denmark (Wren 2013).

6.1.3 Individuals' Career Moves: The Story of Talented Workers leaving Finance

A significant part of this thesis investigates the career choices of financial workers, in order to gain insights into their selection mechanisms and the importance of talent for finance related jobs, which is mostly addressed in the third part of the analysis. The results show that income-maximisation is not the only influential motivation for choosing a career. An increasing number of studies have sought to explain variations among financial wages at the micro level but not many have had access to such extensive panel data to do so. Given the existing literature, the findings of this thesis extend previous research on financial career paths of Ivy League graduates in the United States to a full picture of Danish financial workers and their occupational choices. Because prestigious financial jobs in the United States recruit students from so-called "target-schools", which are almost all Ivy League schools, these case studies focus on a small, very highly educated percentile of employable candidates. Though, it might be important to consider complications of comparing trends in the United States and Denmark, related to cultural, economic, political and social differences. However, when analysing careers in the whole financial sector, I find similar patterns, suggesting that talent is not the major determinant driving individuals' career choices. ***The Roy model*** can further explain these findings specifically labour flows. At first, results in section 5.3 seem to be in line with Roy's assumptions, in the sense that workers entering finance are increasingly more talented. Contrary to this though, a similar number of capable financial workers are simultaneously leaving the sector; earning less in the "non-financial" industry and having a lower chance of increasing their wealth. Thus, the findings challenge the traditional economic assumptions from the Roy model, even though it provides a very suitable framework focusing on individuals' preferences when explaining income differences - but ultimately does not fully hold true for career paths in the financial sector.

Thus, the first analytical part adds to results provided by Böhm et al (2015), who study financial career choices using administrative and military data in Sweden. This thesis contributes with new results showing limitations of explaining financial career paths solely through income-maximisation, on a more elaborated micro-level. Most studies in the United States have documented that an increasing amount of MBA graduates take on a job in the financial sector. Still, Shu (2015), similar to my results, finds that

a higher GPA actually decreases the probability of entering finance after graduation. He moreover documents, having had access to survey data from graduate students, that those who choose a job in the financial sector upon graduating also tend to focus more on developing their social skills during university, rather than their academic grades. Oyer (2008a) analyses career paths of becoming an investment banker graduating from Stanford and finds, in line with this thesis, no support for a pure determination based on skills. Instead his findings leave him with the conclusion that "investment bankers are made by circumstance rather than being born to work on Wall Street" (Oyer 2008a: 2602). He additionally argues for the importance of finance-specific skills. These arguments coincide with the results presented in the last part of my thesis, which show that skilled individuals increasingly enter, but also leave the financial sector after some time and do not necessarily strive for a long-term financial career. These findings are indeed relevant following a recent trend where many recent graduates only receive two-year contracts in the financial industry as analysts (Roose 2014). A further analysis, perhaps compiled with another type of data (qualitative interviews), could have revealed more information as to which "types" of individuals tend to only enter the field of finance for a short period of time.

The findings of the last part of this thesis are based additionally on previous results from income mobility studies. Concepts such as income transition matrices used to display income inequality (Atkinson et al. 1992), have been proven very useful in displaying the expected evolution of wages in finance and non-finance, not used before to study wage evolutions in the financial sector. These findings are in tandem with the results of standard mobility studies, which find that generally lower skilled and higher skilled individuals at both extremes are less mobile than workers distributed in the middle (Groes et al. 2014). In addition, mobility concepts make it possible to analyse the interaction of talent and wages at the more micro level. Again, we are led to the conclusion that what drives financial workers is not only maximising their income. Instead, they accept lower wages when moving out of the financial sector, also perhaps with a more long-term perspective in mind. These results are new to research on wage dynamics in the financial sector and call for further research at the individual level. Potential reasons for talented individuals leaving the financial sector can point in many different directions. In recent years, financial jobs, especially in investment banking, received much public attention because of their long working hours and overall stressful working environment. Many in-depth interviews show that specifically working in finance allows little work-life balance. Several young analysts revealed in interviews that they advise other financial employees to choose a different industry or leave while it is possible (Roose 2014).

Outside of the scope of this thesis, new findings of this study raise follow-up questions:

i.) Why does the financial sector fail to sustain high talented worker within its industry?

ii.) What individual or industry-specific characteristics, if skill and talent alone cannot provide answers, can explain high wages for long-term careers in finance?

These findings need to be addressed in further research, using specifically panel datasets, but also survey data or in-depth interviews to explain the findings and reveal new insights.

6.2 Theoretical Implications of findings

The findings of this thesis have shed light on ***human capital theory***. This theory, based on neoclassical assumptions of rational actors, has been seen to fail in explaining wage increase in the financial sector. I am not the first to point a critique. Scholars subscribing to various backgrounds from psychology to social science have expressed similar claims. Thaler, for instance, argues in his recent book that individuals do not at all act rational, but instead "misbehave" (Thaler 2016). Reasons for "misbehaving" are various. Behavioural economists have shown in assorted experiments that increasing income is only valued up to a certain amount and until a specific point of time. After this point, additional factors gain importance over income in determining career choices, as is suggested from the results of this thesis to be the case for the financial industry in Denmark. In addition, individuals might choose a different occupation and industry as an altruistic choice (Benhabib et al. 2004; Fehr et al. 2009).

Individuals' movement decisions could be related to other cultural factors, which are neither captured by human capital assessments. We see some part of the possible answer from survey data and in-depth interviews cast light on other factors than skills. Some of the motivations that drive graduates into finance involve how "banks have made themselves the obvious destinations for students at the top-tier college who are confused about their career" and who describe themselves as "PHD - poor, hungry and driven", valuing wealth and status (Roose 2014). However, some in-depth research shows that often financial workers might earn a lot of money but give up their entire personal freedom; thus eventually opting to work in another more stable industry. Thus, financial working culture has perhaps only changed in minor ways in the aftermath of the financial crisis and could hypothetically be a driver for individuals leaving the financial sector (Roose 2014). Also, the marginal productivity-hypothesis inherent in traditional economic models, and amongst others, gives rise to two primary problems. First, it is hard to actually measure productivity empirically, and thus the relationship between productivity

and wages is hard to prove. Second, the theory misses to include additional factors, not related to marginal productivity, such as institutional settings or demand and supply factors (Herr and Ruoff 2014).

In addition to a critique of the theoretical model and traditional economic assumptions, empirical human capital functions, introduced originally by Mincer (1974), opens itself to critique because it fails to measure the full range of individuals' "knowledge, skills or abilities". According to Thaler (2016), this can only be reached using additional surveys or in depth-interviews to compliment quantitative data analysis. These additional methods could add to further understanding of the individuals' career and monetary-related choices, and might prove human capital theory to be true, when incorporating non-cognitive skills. Such skills have been proven in recent studies to be very influential in the choice of entering a financial career (Deming 2015). Studies which include non-cognitive human capital, such as individuals' motivation, have mostly access to other data sources than administrative data. This could include internal university surveys, which limits the sample size. Thus, a major advantage of this thesis is the access to nationwide data coverage of the entire labour market, at least for most variables.

With everything being said, human capital theory is still very influential and can guide various research studies. Theoretical assumptions of the neoclassical economic model help identifying the research problem and developing clear hypotheses around the causal relationship between income inequality and skills. Doing so, I follow previous studies in the first section on how to analyse the relationship between skills and wages in finance. The second and third sections extend classical approaches, having found their results to be insufficient, by introducing a new intra-industry and individual perspective, but continuously relying on the importance of specifically talent in the labour market.

Using the ***Roy model*** in the analysis has moved the focus of studying increasing wages to the individual level. The theoretical framework was very helpful to study sectoral choices and thus industry differences in wages. Moreover, it built the basis of the findings, which are new in the research field, namely in showing that individuals can value other occupation- related factors other than salary when leaving the financial sector. It should however be stated that the model used in this paper explaining career choices is quite simplified and only includes endowments of skills and income maximization as major variables influencing a career change. It is clear that these variables alone cannot explain higher wages in finance compared to in the non-financial sector.

In sum, considering the findings of this thesis and previous research, it is questionable whether economic models, relying solely on the importance of skills for determining wages, offer the only right approach to studying wage dynamics and income inequality. A growing intersection of economics with other research areas, such as social science and psychology, shows that the question is too complex to rely only on one discipline's perspective in the analysis, including a very limited inclusion of variable (in this case with skill intensity being emphasized). Instead, a more elaborated theoretical model needs to be used to understand financial income inequality in deductive and quantitative driven research. Models should be extended to include, aside from economic factors, also social and political drivers influencing income inequality, such as socio-demographic background and institutional and country-specific settings. However, it needs to be acknowledged that this thesis has provided results on the individual level, which can be used as an interesting starting point extending current use of theory and empirics to understand individuals' career choices.

6.3 Methodological Limitations of Findings

In using human capital variables in explaining income differences in a Mincerian wage equation limitations to regressions used in section 5.1 are common. Endogeneity occurs due to possible correlations of human capital measures and the error term, a recurring problem in empirical regression models. In the wage equation, this has been shown mostly by the problem of education being endogenous to other factors, such as socio-economic background, inherent ability or school specific characteristics. Many labour economists solved this "ability bias" by adding IQ as a proxy for measuring general human capital, additionally at the level of education. These variables are omitted from previous studies when traditionally focusing on the effect of educational attainment and labour market experience on income. Hence, they are opposed to an omitted variable bias. In addition to using the GPA, individual fixed-effects were used in section 5.1.2 to estimate the finance wage premium, which solves the problem of unobserved time-constant variables. However, other unobserved characteristics in my model can very well be correlated with human capital measurements. These variables could include individuals' motivation or unobserved abilities not taken into account by grades, the factor I used for human capital.

Another common disadvantage of ordinary wage equations and human capital theory is the assumption that an additional year of schooling leads to a proportionally higher pay. These claims also count for the measurement GPA and might be a reason why I did not find a positive significant influence.

The given dataset from Statistics Denmark provides an exceptional chance to include an additional variable to commonly used proxies for human capital accumulation, namely the final high school GPA, which was used to generate new findings in the field of research. The analysis uses all range of data accessible in the administrative panel dataset ranging back to 1986. However, measuring cognitive skills or often referred to as “talent” in the form of academic achievements naturally has its own limitations. It might be questionable if it captures actual “ability” useful in the financial sector. Also, it poses challenges when comparing among schools or even classes. This thesis circumvents these generalization problems by using the final high school GPA, specifically designed to compare grades of students throughout the whole country before entering higher education after secondary school. However, one disadvantage is clearly that using final high school grades restricts the analysis of financial workers to those individuals who have finished high school; though the most extensive talent measurement at hand.

This thesis follows an industry perspective, uncovering differences in wage structures between industries and within the financial sector. Thus, I code different industries to the most detailed level using the Europeanised NACE industry classification. Due to the limited scope of this thesis, I do not incorporate occupational differences, which is coded in several studies using ISIC classification to measure task specific human capital (Barth et al. 2016; De Beyer and Knight 1989; Nawakitphaitoon 2014; Stijepic 2016). This is reasonable, as this thesis has put its focus on general human capital. Another logical step would be to incorporate additionally the demand side of the labour market and to match employee with employer data. This would help to differentiate sub-branches of finance further into different firms and analyse if firm-specific characteristics can help to explain trends in income and employee mobility. It is hoped that these questions will be addressed in further research looking into the relationship between financial wages and skills.

7. Conclusion

This thesis poses the research question of whether it is talent that explains ever-increasing employee salaries in the financial sector in Denmark; a complex assignment, which is addressed in a multi-level analysis going beyond previous research on income disparity in finance. Hence, this thesis studies income and talent dynamics in the financial sector at three levels, moving from a broad industry perspective to the individual perspective. Findings show that wages in the Danish financial industry relative to all other economic sectors are increasing to the same extent as in the United States and

other European countries. The complex relationship between increasing wages and skills in the financial sector has been broadly discussed in recent studies. However, none have yet provided a convincing answer. The three major findings of this thesis that aim to help answer this question are as follows. ***First*****,** studying the relationship between skills and wages on a pure industry level, the analysis shows that in Denmark talent can neither explain the rising finance wage premium nor the reasons for individuals taking on a job in the financial sector. Nonetheless, the second sub-sector analysis of the financial sector reveals ***the second major finding,*** namely the existence of talent and wage clustering in some branches of finance, such as investment trusts and brokerage/fund management, in some of the time period. However, not all sub-branches show an explicit positive relationship between cognitive skills and wages. The third section analyses individuals' career choices over the period of 30 years and confirms original income-maximization assumptions from the Roy model by showing that the expected income increase is much higher in finance, particularly for highly talented individuals. Contrary to this, ***the third finding*** shows that finance fails in sustaining a talented labour force because most talented workers are leaving the financial sector after a short period of time, choosing to rather accept lower wages in non-finance related jobs and lower chances of increasing their income in the long run.

This thesis shows that human capital models, used in previous empirical studies to uncover the relationship between earnings and individuals' skills, does not account for major increases in financial wages over the last years. Much in the income discrepancy remains unexplained and needs to be addressed in future research using other indicators of human capital, such as finance-specific cognitive- or non-cognitive skills. Moreover, the findings of this thesis show the need to study the phenomenon of increasing wage inequality at the micro level, especially when focusing on individuals' skill endowments, as aggregated studies so far have only provided insufficient results. The results moreover underline the relevance of studying income dynamics in finance, as this has implications for policy-makers responsible for coming up with pension schemes and tax systems. It could be argued that raising salaries of finance workers is not at all justified if higher talent and skill concentration in the industry cannot explain the increasing wage premium. However, showing no major changes in the aftermath of the financial crisis, it could even be argued further that practices in this industry must be kept in check, as there is evidence of a market failure that calls for policymakers to regulate high wages in finance.

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Appendix

I. Coding manual

A: Coding for main economic sectors of interest

Note: The table shows the coding for main economic sectors of interest after Danish Industry Classification from 1993, 2003 and 2007. It develops coherent variables throughout the entire period.

1. **"Financial and insurance industry":**
   - 2007: 640000-669999
   - 2003: 650000-679999
   - 1993: 650000-679999
2. **Consultancy: "Business consultancy activities"**
   - 2007: 702200
   - 2003: 741490
   - 1993: 741490
3. **Legal sector: "Legal activites"**
   - 2007: 691000
   - 2003: 741100
   - 1993: 741100
4. **"Manufacturing"**:
   - 2007: 060000-322000
   - 2003: 151100-372000
   - 1993: 151100-372000
5. **IT**: **"IT and information service activities"**
   - 2007: 620000-632900
   - 2003: 722200 724000 721000 723000 300200 726000
   - 1993: 722000 724000 721000 723000 300200 726000
6. **Oil**: **"Oil refinery etc."**
   - 2007: 191000 192000
   - 2003: 231000 241400 101000 102000 103000 32000
   - 1993: 231000 241400 101000 102000 103000 32000
7. **Public sector:**
   - 2007: 841100-889990
   - 2003: 751100-926219, 926290-950000, 990000
   - 1993: 751100-853290

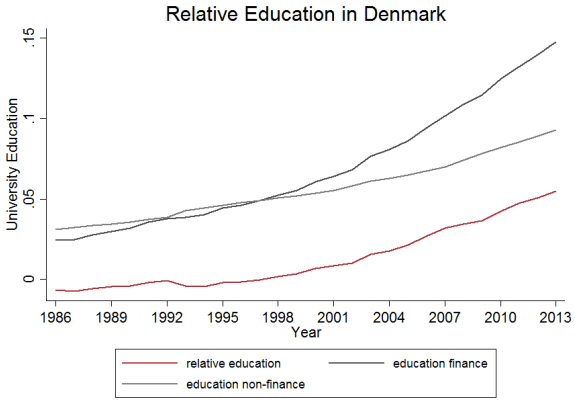
B: Coding Manual Industry groups and classes in "Finance and Insurance"

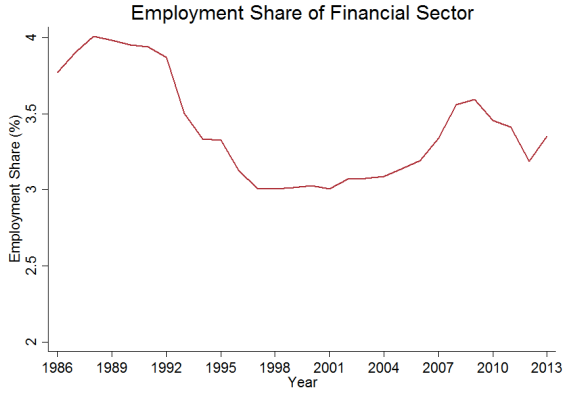
Note: The table shows the Danish Industry codes used to create Industry groups and classes for "Finance and Insurance" in a timely comprehensive manner.

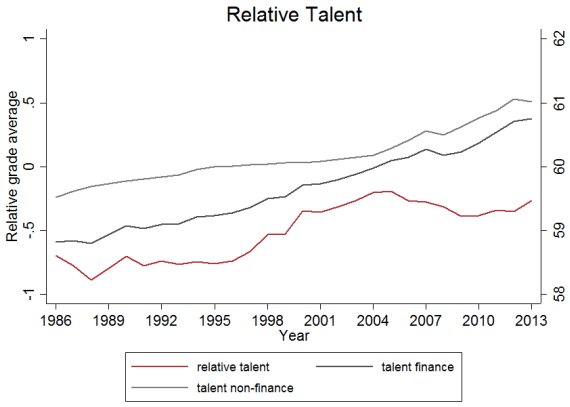
	2003	**2007**
Industry group 1: Monetary Intermediation	641100-651100	641100-641900
Central banking	651100	641100
Other monetary intermediation	651200	641900
Industry group 2: Mortgage credit institutes and similar	652230-652395; 652100; 741500	642010-649900
Holding companies	652340/741500/652340	642010/642020/642030
Trust	652310/652315	643010
Money market funds	652250	643020
Investment funds	652320	643030
Venture Capitals	652325	643040
Financial leasing	652100	649100
Mortgage credit institutes	652230	649210
Other credit institutes/companies	652240	649220
Other financial services	652270/652330/652395	649230/649240/649900
Industry group 3: Insurance and Pension funding	660100-660310	651100-653020
Insurance in general	660100/660310	651100/651200/652000
Pension funds	660210	653010
Other pension funding	660290	653020
Industry group 4: Other financial activities	671100-672090	661100-662900
Administration of financial markets	671100	661100
Brokers and fund management activities	671200	661200
Risk and damage evaluation	672090	662100/662900
Activities of insurance agents and brokers	672010	662200
Other financial services	671300	661900

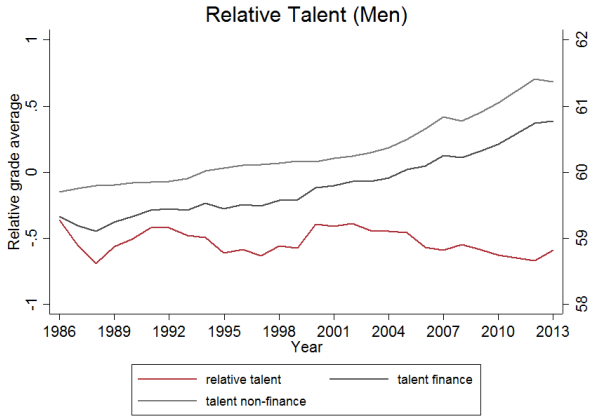
II. Relative wages and talent

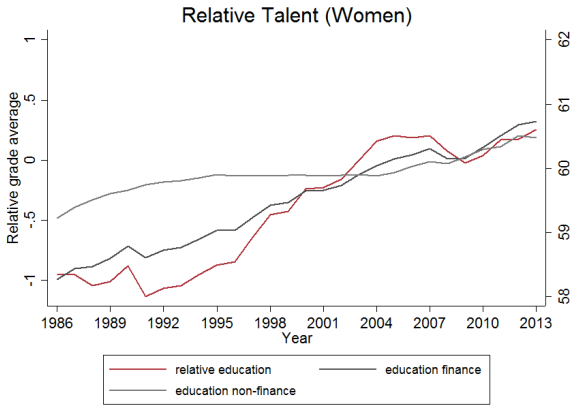
Note: These graphs show the same measurements as described in section 5.1.1 including an extended sample, considering the full time-period from 1986 to 2013.







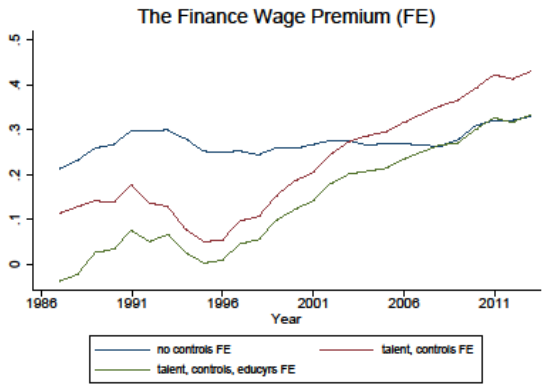




The Finance Wage Premium using fixed effects

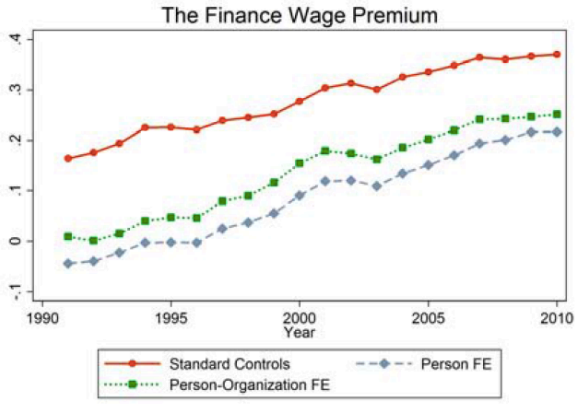
Note: These graphs show the Finance wage premium for Denmark and Sweden, estimated as in section 5.1.2, accounting for individual's fixed effects.

Finance Wage Premium (Denmark)



Source: Statistics Denmark (2016)

Finance Wage Premium (Sweden)



Source: Böhm et al. (2015)

Probit Choice Regression: Swedish Labour Market

Table 3: Probit Occupational Choice Regressions

This table reports probit regressions of choosing to work in finance as opposed to other sectors. In the first column the finance dummy is regressed on predicted cognitive ability and their interaction with a year trend for both genders. Controls are a quadratic in potential experience, the year trend, and a sex dummy. Column (2) adds years of schooling interacted with a year trend. In the third and fourth column the subsamples of males is used together with actual cognitive ability (different scale than the predicted ones) and non-cognitive ability. Columns (5)-(8) repeat the analysis for 30 year olds. T-statistics below the coefficients. *,**,*** indicate significance at the ten, five, and one percent level. Source: Swedish Defence Recruitment Agency (Rekryteringsmyndigheten) for persons enlisted between 1983 and 2010, Military Archives (Krigsarkivet) for persons enlisted between 1969 and 1983. Swedish population data LISA from Statistics Sweden.

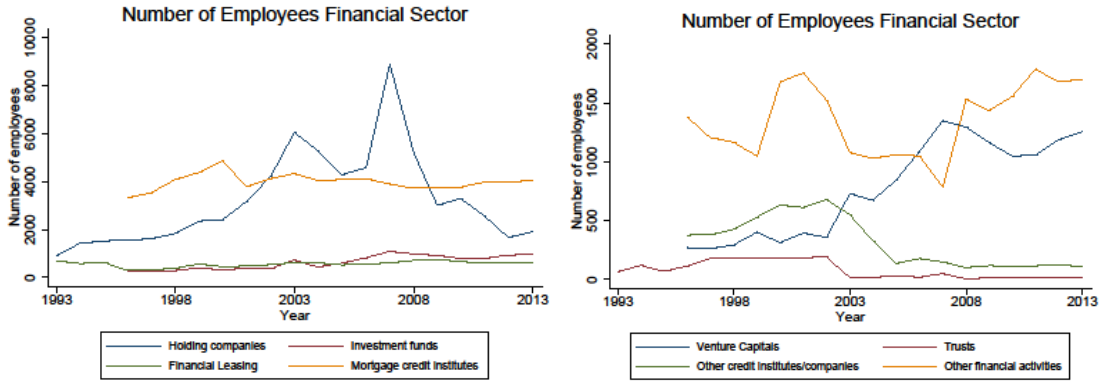
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(pred) cog	0.0527***	0.138***	1.633***	2.090***	0.378***	0.749***	1.631*	2.579***
	(8.70)	(18.72)	(12.38)	(14.16)	(12.75)	(20.33)	(2.38)	(3.35)
year # (pred) cog	-0.0000226***	-0.0000652***	-0.000778***	-0.00103***	-0.000185***	-0.000372***	-0.000786*	-0.00129***
	(-7.47)	(-17.77)	(-11.81)	(-14.03)	(-12.51)	(-20.16)	(-2.29)	(-3.36)
noncog			-0.125	-0.217			4.671***	3.937***
			(-0.87)	(-1.50)			(6.11)	(5.09)
year # noncog			0.000108	0.000146*			-0.000786*	-0.00129***
			(1.51)	(2.01)			(-2.29)	(-3.36)
yearsofschool		-2.026***		-0.953***		-8.620***		-4.028***
		(-21.02)		(-8.57)		(-17.76)		(-6.74)
year # yearsofschool		0.00102***		0.000523***		0.00432***		0.00207***
		(21.13)		(9.42)		(17.80)		(6.93)
Observations	31,382,865	31,378,421	20,025,822	20,004,843	1,239,733	1,239,690	722,399	721,831
Sample	Both	Both	Men	Men	Both 30 yo	Both 30 yo	Men 30 yo	Men 30 yo
Sex dummy	Yes	Yes	N/A	N/A	Yes	Yes	N/A	N/A
Pot experience	Yes	Yes	Yes	Yes	No	No	No	No
Year trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Böhm et al. (2015)

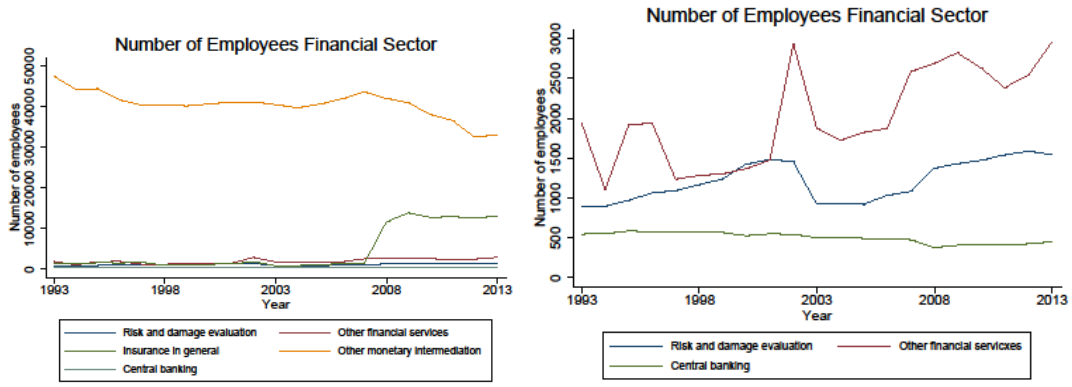
III. <u>Intra-industry differences:</u> Number of Employees in Industry Classes in "Finance and Insurance"

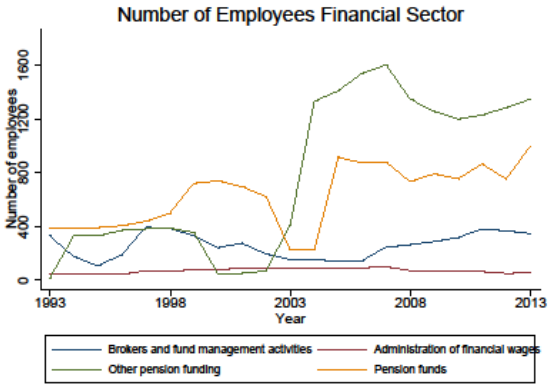
Note: These graphs show the number of employees, measured yearly in all financial industry classes.

<u>Industry group:</u> "Mortgage credit institutes and similar"



<u>Industry group</u>: ""Monetary intermediation", "Insurance & Pension funding" & "Other financial activities"





IV. Individuals' career choices

A: Snapshot of labour mobility within the financial sector during the financial crisis (2007-2009)

Note: The figure shows a directed network with individuals moving during the financial crisis to other industry classes within finance. Because financial sub-sectors differ widely in its size, (measured as number of employees), I exclude the following four largest industries: holding companies, mortgage credit institutes, other financial services and other financial activities. The network is created in two steps. First, I calculate a transition matrix for the individuals changing industries within finance between 2007 and 2009. This gives a transition matrix, which displays the probability of changing jobs within branches in finance. In step two, I use the software UCINET, which helps plot social networks from matrices. This visualization tool helps identify those sub-sectors of finance, which attracted most workers during the financial crisis. The size of the nodes measures how many individuals enter that specific branch of finance.