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Sickly Insecure?

A Study of Worker Responses to Reduced Job Security Using the Financial Shock That Hit the Norwegian Petroleum Industry

Pernille Engebretsen and Emilie Marie Kjøle

Supervisor: Aline Bütikofer

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NORWEGIAN SCHOOL OF ECONOMICS

Abstract

A large body of literature has sought to examine how job loss affects those who have been displaced following an economic downturn. However, far less effort has been dedicated to investigate the fear-of-unemployment effect which may arise. This thesis contributes to existing literature by investigating how employees respond to reduced job security. Research on the matter tends to be inconclusive in regards to establishing a clear link between job insecurity and health. We exploit the sudden and substantial drop in oil prices that hit the Norwegian petroleum industry in the autumn of 2014, allowing us to identify the effect of reduced job security on sickness absence. In order to address this issue, we take usage of data retrieved from the Norwegian Labour Force Survey. Existing literature suggests that exposure to job insecurity could lead to opposing effects when it comes to health. For instance, it is argued that a tougher labour market represents a health hazard, whereas some believe that job insecurity works as a disciplinary device. We find no evidence suggesting that job insecurity has a causal effect on sickness absence. This result is consistent when subject to a number of heterogeneity tests and is robust to several specification checks. Nonetheless, there may be rational explanations as to why we obtain a null effect, such as the two opposing, non-mutually exclusive effects cancelling each other out.

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Pernille Engebretsen

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Emilie Marie Kjøle

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1 Introduction

We are well aware of the detrimental consequences a recession may entail, after just recently witnessing the rigorous financial crisis of 2007-08. However, the ramification of a recession is not only confined to a substantial decline in economic activity and the rise of unemployment. Also a fear-of-unemployment effect can arise following an economic downturn. In general terms, a large extent of research has been dedicated to examine how job loss affects those who have been displaced, but few have focussed on what this would imply for those who manage to withhold their jobs following a recession. Even though the general perception is that job loss is more severe in comparison, research literature propose that fear of job loss can be equally troubling as the actual event (Lazarus and Folkman, 1984; Østhus, 2012). It is therefore essential not to disregard this particular effect following an economic downturn. Evidence on the matter suggests that exposure to job insecurity could lead to opposing effects when it comes to health. The aim of this thesis is to investigate how employees respond to reduced job security. More specifically: *"How is sickness absence affected when individuals are exposed to a job-related shock threatening their sense of job security?"*

As a result of the changing nature of work over the last decades, job insecurity has emerged as an important issue in the empirical literature, being defined as "the perceived powerlessness to maintain desired continuity in a threatened job situation" (Greenhalgh and Rosenblatt, 1984)[1]. Studies, both in the field of social science and economics, have investigated the matter, and the literature has to a greater extent been able to document that job insecurity represents a health hazard (Ferrie et al., 1998; Ferrie, 2001). The general conclusion drawn from these studies is that the insecurity and worry associated with economic downturns and reorganisations causes negative health effects for remaining employees (Røed and Fevang, 2007). The proposed link between job insecurity and health, suggests that job insecurity increases

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[1]See Sverke et al. (2006) for an extensive overview of empirical literature on this issue.

sickness absence, as indicated in several studies (Ferrie et al., 1998; Sigursteinsdóttir and Rafnsdóttir, 2015; Reichert and Tauchman, 2017). The dominant explanation for this is that the expectancy of a stressful event, is just as much a source of worry as the actual event. However, the link between job insecurity and health is far from certain. In contrast to the suggested effect on absence, a number of existing papers argue that job insecurity may work as a disciplinary device. According to these studies, remaining workers with less secure jobs will avoid absenteeism in order to reduce their chances of becoming unemployed (Leigh, 1985; Askildsen et al., 2005). This hypothesis is supported by Bratberg and Monstad (2015) who in their study found that sickness absence among public employees decreased substantially in the year preceding a financial shock. Reviews from the literature thus propose two competing hypotheses[2] on how job insecurity alter sickness absence behaviour, but the evidence is nevertheless limited. Research tends to be inconclusive, partly due to the choice of data and empirical methods. In addition, the number of published studies is still rather small, and previous studies have often been limited to a single organization or to the public sector. Hence, further research is needed.

How employees respond to reduced job security is perhaps not the most pressing political issue, but granted that job insecurity indeed leads to adverse health effects it should be of utmost interest. In this thesis, we focus on sickness absenteeism, a prominent source of concern for several countries, Norway being no exception. When comparing sickness absence levels, Norway stands out as having one of the highest incidence rates among OECD countries by a clear margin (OECD, 2013, pp.36-40), despite evidence suggesting that the Norwegian population, paradoxically, is healthier than most. In addition, the Norwegian sickness insurance scheme is exceptionally generous, with insurance coverage of 100 percent of earnings from the first day of absence (Markussen et al., 2011). Both accounts imposes a substantial financial burden, seeing as sickness insurance represents one of the largest social welfare programs in Norway, with expenses corresponding to 2.4 percent of GDP

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[2]In literature referred to as stress theory and disciplinary theory.

(OECD, 2013, pp.58). Another troubling aspect is the additional cost associated with forgone labour supply. Therefore, excessive sickness absence puts a strain on public finances, threatening the sustainability of the Norwegian welfare state. Consequently, the notion of sickness absence is of importance and one should further seek to determine the link between job insecurity and sickness absence as it has implications for society as a whole.

In order to determine in which matter job insecurity affects sickness absence behaviour, we exploit a financial shock that hit the Norwegian petroleum industry. In the autumn of 2014, the industry was subject to a sudden and substantial drop in oil prices. Within a year and a half the price of oil fell from USD 114 per barrel to a remarkable low of USD 30 (Sørbø, 2016). After a long period with prosperity, the petroleum industry was now suddenly experiencing adversity. The detrimental consequences following both the sharp fall in oil prices and lower investment levels, have inevitably forced oil companies to undertake mass layoffs in order to endure the vast changes that have occurred within the industry during the last couple of years. Overall, 50,000 jobs have been at a loss in order to withstand the economic downturn and it seems that further job losses will likely occur (SSB, 2017a). Even though conditions have slightly picked up, uncertainty is still prominent in regards to the industry's future prospects. This seems apparent as companies are, still to this day, continuing to announce further cutbacks in personnel[3]. Being exposed to an industry currently experiencing a prolonged period with economic downturn and mass layoffs, will surely have an impact on remaining employees. We would argue that due to an industry currently experiencing financial problems, uncertainty and the possibility of further layoffs, remaining employees will fear that also their jobs are at risk, thus resulting into job insecurity, which in turn affects sickness absence behaviour. Thus, this event serves as a natural experiment, permitting us to in-

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[3]Throughout writing this thesis, media coverage on the matter has been extensive. Just recently, June 12th, the Norwegian online newspaper for economics and business, E24, published an article regarding further layoffs in the oil service company National Oilwell Varco Norway (Lorentzen and Sagmoen, 2017).

vestigate in what way job insecurity may affect sickness absence behaviour. To the best of our knowledge, a study using the financial shock in the Norwegian petroleum industry in this context has not been done before.

As earlier stated, existing literature has provided rather varying conclusions and is inconclusive as to determining the link between job insecurity and health. Some research coincides with disciplinary theory, whereas some agree with the mechanism presented by stress theory. The question of interest is therefore which of these conflicting effects dominate. Complying with the affirmation made by the International Research Institute of Stavanger (IRIS), that sickness absence in heavily oil-dominated industries have increased remarkably, relative to the rest of the economy in the aftermath of the oil crash, we would expect to find a positive relationship between job insecurity and sickness absence. However, our findings suggests that job insecurity has no causal effect on sickness absence. Nonetheless, there may be rational explanations as to why we derive such a result, in which we will return to later.

The remainder of this study unfolds as follows. In section 2 we will provide an overview of the Norwegian petroleum industry and the consequences of the oil price collapse, as well as the institutional setting in Norway in relation to sickness absence. Section 3 presents existing literature on the effects of sickness absence due to job insecurity and stressful events, whereas in the succeeding section we describe the data used. Thereafter, in section 5, we proceed to present our empirical approach, consisting of both a theoretical framework as well as our main specification. The findings from our analyses is presented in section 6 and section 7 provides robustness checks of our main specification. Afterwards, in Section 8 we discuss our results and also address important limitations and implications of our analysis. Lastly, section 9 concludes.

2 Background

2.1 The Shock that Hit the Norwegian Petroleum Industry

The first extraction of oil in 1971 can to some extent be considered as a pivotal turning-point for Norway (Norges Bank, 2015). Prior to the following event, the country's economic prospects were bleak in comparison to other western economies. However, the discovery and extraction of oil would change this matter radically, both in terms of wealth and how the Norwegian economy would be defined for decades to come. Especially since the late 1990s, Norway's economy has greatly benefited, mainly due to a combination of distinctly high oil prices and exceedingly good profitability in the sector, attracting investors. As a result, the Norwegian economy has experienced a prosperous period with growth, and remarkably even showed signs of strength when the financial crisis of 2008 hit the global economy (Norges Bank, 2015). However, to Norway's dismay, another unforeseen macroeconomic shock would have its toll on the economy. The sudden drop and the persistently low oil price level that the global market experienced from the autumn of 2014 would prove to have several unfortunate implications for the country's economy. It came apparent that Norway's economic performance is indeed rather sensitive to fluctuations in the oil price. Even though oil in all its glory has overall brought prosperity to the economy, the general dependency on oil is alarming and worrisome in several respects.

According to data presented by Statistics Norway (SSB), it becomes clear that oil is indeed a dominant feature of the Norwegian economy. In 2013 the sector employed close to 232,000 workers (SSB, 2017a), which entails that roughly 8.6 percent of the Norwegian labour force were directly or indirectly employed in the

petroleum industry and petroleum-related industries[4]. Even though the petroleum sector accounts for only a small fraction of the national labour force, it is nevertheless responsible for generating a considerable portion of GDP. In 2012 it amounted to 21.7 percent (Norwegian Petroleum, 2017b). In addition, oil accounted for about 30 percent of government revenue and more than half of the country's export revenues. This is a testament to the degree of importance that a single commodity has on the overall economy. Without saying, if the petroleum industry is exposed to hardship, which, undoubtedly was the case of the sudden and unexpected fall in oil prices, this will inevitably have consequences not only confined to the sector, but for the economy as a whole. The following proved indeed to be the case. In the aftermath of the plunge in oil prices, economic growth dampened and unemployment was steadily rising.

Even prior to the fall in oil prices in the autumn of 2014, the petroleum sector showed a weakening tendency due to the fact that investments were slowly coming to a halt for various reasons (Norges Bank, 2016, pp. 20- 21). After a period with investments rapidly expanding on the continental shelf during 2002 till 2013, followed a sharp rise in costs, forcing oil companies to enforce cost-reducing measures in regards to operating, maintenance and investments. Meanwhile, several large-scale upgrade projects were near completion. Taking these factors into consideration, this naturally led to a lower activity level in the industry and throughout 2014 investments declined and the projects for investments in 2015 were equally bleak. Then the industry was additionally faced with the sudden and persistent collapse in oil prices, making matters even more dismal as company cash flows and profitability of new investments were considerably reduced (Norges Bank, 2015). At its lowest point, the oil price was fluctuating at around a staggering USD 30 per barrel, a

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[4]Direct employment consists of those who are employed in oil and gas companies and service and supply industries. Indirect employment captures those employed in various sectors that provide goods and services to the petroleum industry, "including wholesale and retail, IT equipment and services, employment agencies, renting of machinery and equipment, hotel and restaurant and legal and accounting services" (Norwegian Petroleum, 2017a).

rather substantial decline compared to pre-shock levels well above USD 100 (Sørbø, 2016), deepening the crisis even further (see Figure 1).

After a long period with prosperity, the petroleum sector was now suddenly experiencing adversity. In order to withstand the economic downturn, many companies were pressured to implement drastic measures, such as mass layoffs and downsizing of personnel in order to stay afloat. The Norwegian Labour and Welfare Administration (NAV) published during 2016 a review capturing the extent of alerted layoffs among businesses (Sutterud, 2016). Businesses are required to inform NAV whenever they plan to undergo personnel cuts exceeding nine employees and during 2015 NAV received an increasing amount of notifications, with a large portion of these retained to oil-related businesses. In fact, over a third of alerted layoffs from January 2014 to mid-2015 came from businesses that are considered to be directly connected to the petroleum industry. Since 2013, 50,000 jobs have been at a loss and it seems that job losses will continue to occur, as several companies are continuing to announce further layoffs (SSB, 2017a). As a result, unemployment has thus risen and conferring with projections set forward by SSB, unemployment was expected to peak in 2016 at 4.6 percent as an annual average, which is high for Norwegian standards (SSB, 2015).

Being exposed to an industry currently experiencing a prolonged period with economic downturn and mass layoffs, will surely have an impact on remaining employees. Tekna[5], a union for technical and scientific professionals in Norway, aimed to map how workers in the petroleum industry personally experienced the downturn and all that it entailed. The union published their report on the matter in the autumn of 2015 and they could affirm that workers perceived their jobs as insecure (Tekna, 2015). As many as 87 percent of the respondents had to some degree been exposed to stressful events such as layoffs, hiring freeze and cutbacks in projects being undertaken in their respective companies. Overall, the general consensus among respondents was that they anticipated further restructuring and layoffs in the years

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[5]Norwegian Society of Graduate Technical and Scientific Professionals

to come. The report also concluded that the majority of layoffs centred amid suppliers to the industry, where over half of the respondents notified that layoffs had occurred in their specific workplace.

To make matters worse, not only has unemployment risen, but also incidents of sickness absence has increased among workers in the petroleum industry. Earlier this year, the Norwegian newspaper Dagens Næringsliv, wrote an article concerning this matter (Blomgren et al., 2017). In the following article, researchers at the International Research Institute of Stavanger (IRIS) were consulted to shed light on the issue. They stated that sickness absence in heavily oil-dominated industries have increased remarkably compared to the rest of the economy in the aftermath of the oil crash. In addition, the researchers further argue that based on the statistics put forward, there might be a possible connection between layoffs and sickness absence in the Norwegian economy. Hence, the impact of the oil crash is not only confined to those let go, but is also relevant for remaining workers.

After several years with prosperity, the petroleum sector and related industries are now coming to grips with the harsh reality; that the petroleum sector is indeed transitioning from strikingly high levels both in terms of investments and oil prices to far more modest levels, which will likely be the new norm. However, the industry has picked up slightly following the downturn and seemingly the worst is over. Even though the petroleum industry will prevail, there is still uncertainty looming when it comes to the industry's future prospects. Cost-reducing measurements such as layoffs are still being conducted, indicating that the economic troubles are far from over.

Figure 1: Quarterly Oil Prices 2010 - 2016
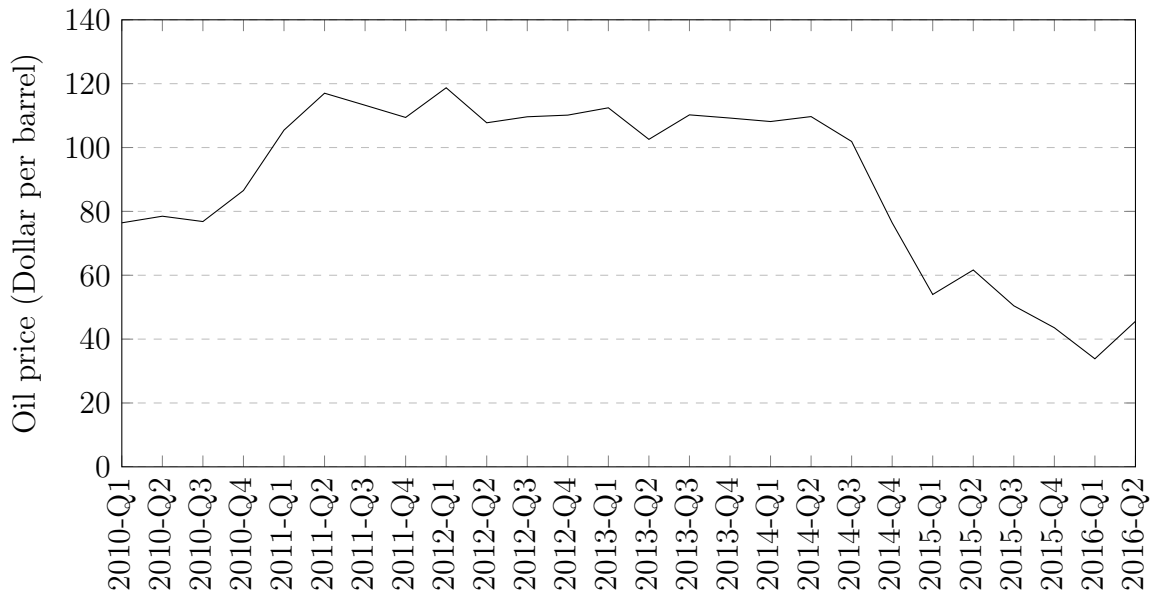
Note: Quarterly oil prices from the first quarter of 2010 to the third quarter of 2016.

Source U.S. Energy Information Administration (2017).

2.2 Sickness Absence in Norway

When comparing sickness absence levels, Norway stands out as having one of the highest incidence rates among OECD countries by a clear margin (OECD, 2013, pp. 36-40), despite evidence suggesting that the Norwegian population, paradoxically, is healthier than most. Another troubling aspect of the Social Insurance scheme in Norway is that long-term sickness absences generally results into disability benefits, which also is a cause of concern. A challenge facing the Norwegian economy is to tackle the issue of high sickness absence rates as it imposes a sizable financial burden and not to mention reduces the labour force, both threatening the sustainability of the Norwegian welfare state. Certified sickness absence has fluctuated around 6-7 percent (Bratberg and Monstad, 2015) and the sickness insurance expenses has been rather stable at an amount equivalent to 2.4 percent of GDP (OECD, 2013, pp. 58). Sickness insurance further constitutes approximately 9.93 percent of the National Insurance scheme, which makes it one of the largest social welfare programs in Norway (Statsbudsjettet, 2017).

Institutional Background

In Norway, sickness insurance is mandatory and subject to regulations set by the Norwegian Insurance Act (Folketrygdloven, 1997). The objective of sickness insurance is to ensure that individuals are financially compensated in the event that they become incapacitated and unfit for work due to sickness. Thus, all individuals in this regard are entitled to daily cash benefits, granted that they have been with the same employer for at least four weeks. However, individuals at the age of 70 or above will not receive sickness pay, and individuals between the ages of 67 and 70 are only entitled to limited sickness benefits (Folketrygdloven, 1997). For absence spells exceeding three days, it is required to provide a medical certificate. The sickness insurance scheme is exceptionally generous, with sickness coverage of 100 percent from the first day and the maximum period of benefits being one year. However, the total amount of paid benefits cannot exceed six times the national basic insurance

amount of 1G in which corresponded to 93 634 NOK on the 1st of May 2017 (NAV, 2017).

When it comes to the question of how the benefit scheme is financed, it is a twofold affair. For the first 16 calendar days, the employer is obliged to finance sick pay, afterwards NAV takes over responsibility, and thus becomes incorporated in the National Insurance scheme (Folketrygdloven, 1997).

Aspects of Sickness Absence in Norway

Statistics obtained on sickness absence shows that the rate of incidents vary across several dimensions. Generally, it is acknowledged that, for instance, women on average have higher sickness absence than men. The notion that absenteeism increases with age is also commonly accepted (Proba, 2016). Furthermore, research results show that the level of sickness absence differs greatly between different industries and professions. In regards to industrial differences, it has been argued that perhaps some industries to a larger extent foster sickness absence. In addition, it has been disputed that the composition and features of the workers could be a factor in explaining the differences among industries (Harung, 2010). According to the Norwegian Labour and Welfare Administration, sickness absence is generally high in the health sector, amounting to 8.1 percent in the first quarter of 2014 (NAV, 2014). On the other end of the scale, we find industries such as mining and extraction (3.4 percent), information and communication (3.3 percent) and real estate activities (3.4 percent) which tend to exhibit fairly low and stable rates of sickness absence[6].

With regards to diagnosis, the most common groups of diagnoses registered are musculoskeletal disorders, respiratory disease and mental illness, such as anxiety, psychological distress and depression (Brage et al., 2012).

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[6]We have compared certified sickness absence rates from the 1st quarter of 2009 to the third quarter of 2016, provided by NAV (NAV, 2016a; 2016b; 2016c; 2016d).

3　Literature Review

As a result of considerable changes occurring in the labour market over the past decades, such as technological development and globalization, job insecurity has emerged as an important issue in contemporary work life, resulting into more research dedicated to this field (Sverke et al., 2006). The current labour market is dominated by frequently more usage of downsizing as a management strategy in order for firms to stay afloat in response to economic downturns, thus creating a source of job insecurity (Østhus and Mastekaasa, 2010). Mainly, the research related to this topic has focused on how displaced workers are affected by job loss occurring due to downsizing. However, far less effort has been made by researchers to establish what this would imply for those who manage to withhold their jobs following an economic downturn. One could argue that survivors of downsizing, will fear that also their jobs are at risk if the source of uncertainty still remains, hence that they expect that further layoffs will be conducted following an economic downturn. Evidence on the matter suggests that exposure to job insecurity could lead to opposing effects when it comes to health. In this section, we will present research literature that will provide insight as to how remaining employees are affected, by establishing the link between job insecurity and sickness absence.

While job security earlier was seen as a motivator, researchers rather began to focus on job *in*security as a stressor in the late 1980s (Sverke et al., 2006). Since then, several researchers have tried to shed light on the complexity of the term. According to literature, job insecurity can be both self-perceived and externally attributed (Ferrie, 2001). Subjective job insecurity relies on an individual's self-perception of an insecure work environment (Sverke et al., 2006), and Greenhalgh and Rosenblatt (1984) define such insecurity as "the perceived powerlessness to maintain desired continuity in a threatened job situation". Objective job insecurity on the other hand, describes the circumstantial phenomenon that occurs independently of an individual's own perception (Sverke et al., 2006). According to Ferrie (2001), objective

job insecurity occurs when the study population in focus is believed to be at risk by the researchers. Historically, there have been fewer studies on remaining workers' health because the consequences of job insecurity are far less observable than the effects of actual job loss. While unemployment can lead to obvious consequences, such as the loss of social status or income, job insecurity itself has no clear outcome (Ferrie, 2001). In regards to the link between job insecurity and the effect this has on sickness absence, one could theoretically expect the effect to go in both directions. Generally there are two opposing hypothesis that appear frequently throughout the literature, namely disciplinary theory and stress theory. Disciplinary theory states that job insecurity reduces sickness absence, while stress theory argues that sickness absence will increase as a result (Blekesaune, 2012). The question of interest is therefore which of these conflicting effects dominate. Hence, it is important to analyse this matter empirically. However, existing empirical research is inconclusive in regards to establishing a clear link between job insecurity and sickness absence.

Disciplinary theory proposes that a loss of job security works as a disciplinary device, hence reducing sickness absence. When observing temporal fluctuations in sickness absence, changes in the unemployment level is an important factor to consider. The notion of disciplinary effects is often regarded as a mechanism in explaining the negative association between unemployment and sickness absence (Allebeck and Mastekaasa, 2004). There are various studies that seek to determine the relation between unemployment and absenteeism. For example, Leigh (1985) suggests that when unemployment is high, currently employed workers, fearing job loss, will avoid absences in order to decrease their chances of becoming unemployed. Askildsen et al. (2005) lend support to the insight drawn by Leigh. In their panel data study using Norwegian data, they too reach the conclusion that sickness absence is negatively correlated with unemployment, attributing to disciplining effects. However, beyond establishing a negative correlation between unemployment and absence, empirical evidence is rather limited (Blekesaune, 2012).

A study attempting to identify the effect of reduced job security on sickness absence is a paper by Bratberg and Monstad (2015). In order to determine the following, they exploited a financial shock that hit the public sector in selected municipalities in Norway in 2007. Their research showed that sickness absence among public employees in the affected municipalities, decreased substantially in the year preceding the shock. According to the conclusion drawn from this particular study, the authors state that the evidence is indeed consistent with the hypothesis that reduced job security has a disciplining effect.

The other competing hypothesis in regards to job insecurity and sickness absence is known as stress theory. The following hypothesis claims that job insecurity increases sickness absence (Blekesaune, 2012). One explanation for this particular argument, is that a tougher labour market, in itself, represents a health hazard (Bratberg and Monstad, 2015). In line with this understanding, research has tried to determine to what extent external shocks such as layoffs, unemployment, reorganisation and downsizing affects health and sickness absence among remaining employees (Blekesaune, 2012). Overall, the research literature has to a greater extent been able to document the link between job loss and health as compared to the suggested link from downsizing survival or anticipated job loss to health (Østhus, 2012). According to empirical evidence obtained in the downsizing literature concerning effects on sickness absence, the research is inconclusive, believed to be partly due to choice of data and empirical method (Østhus and Mastekaasa, 2010). In addition, the evidence presented is also rather limited, both in terms of published studies, the fact that evidence is mostly confined to the public sector, and lastly that studies are often restricted to a single organization (Østhus, 2012).

In broad terms, when people are faced with events they perceive as endangering their physical or psychological well-being, stress will surely arise. In the field of occupational stress, research has been able to identify several job stressors, one of them being job insecurity (Østhus, 2012). In the relevant research, job insecurity is considered to be the missing link between anticipated job loss and health risk

(Ferrie et al., 1998). Furthermore, job insecurity seems to be main cause of stress in a post-downsizing environment (Greenhalgh and Rosenblatt, 1984). In addition, a common understanding within stress literature is that the sheer expectancy of a stressful event, such as job loss, is just as much a source of worry as compared to the actual event (Østhus, 2012).

Several studies have concluded that job insecurity have adverse health effects. Sigursteinsdóttir and Rafnsdóttir (2015) examined how the Icelandic bank collapse in 2008 affected sickness absence among retained employees in downsized workplaces following two, three and five years after the shock. The results showed that the bank crisis had negative health consequences for municipality employees. Findings also indicated that these effects grew stronger over time. Interestingly, they also found that sickness absence increased both for employees in downsized as well as non-downsized workplaces. When being asked about the reasons behind their absence, employees answered that is was partly due to stressful situations in the aftermath of the shock (Sigursteinsdóttir and Rafnsdóttir, 2015). This is in line with the work of Røed and Fevang (2007), where the employment and benefit paths of Norwegian nurses were traced. Their results show that large-scale organizational changes, such as downsizing, increased the level of sickness absence and welfare dependency, even in the events where there were no actual layoffs. The relationship between workforce reductions and job insecurity has also been investigated by Reichert and Tauchmann (2017). Using individual level panel data, they examine the link between workforce reduction, subjective job insecurity and mental health for private sector employees in Germany. They found that company-level workforce reductions have negative effects on remaining employees' mental health. Their results show a significant relationship between workforce reduction and job insecurity, demonstrating that job insecurity plays an important role as a mediating variable. In line with the above studies, their findings indicate that not only actual job loss, but also the fear of it, have adverse health effects.

It has been fairly common to presume that organizational downsizing has consider-

able negative consequences, not only for workers that are laid off, but also for those who remain employed, as well as for workers threatened with redundancy (Østhus and Mastekaasa, 2010). The main reason being that downsizing is generally a stressful event for retained workers, when considering possible outcomes from downsizing such as increased workloads or job insecurity. However, Østhus (2012) argues that neither the link from downsizing to increased stress nor the link from stress to poor health is likely to be automatic.

A study by Østhus (2012) on the health effects of downsizing survival and job loss in Norway, found evidence suggesting that neither downsizing survival nor expected job loss (i.e. future downsizing) are important sources of distress. Results from the study also indicate that downsizing survivors, are not on average worse off in regards to their health status compared to individuals who have not experienced downsizing. Therefore, the following lends further support to the hypothesis that downsizing is not an important source of health problems in Norway (Østhus, 2012). The findings presented, differs from previous research that have reported strong adverse health effects of downsizing survival and anticipated job loss. In the same study, Østhus (2012) examines how job displacement effects psychological distress, and he concludes that the true victims of downsizing is in fact the laid off workers rather than downsizing survivors.

Another study giving support to the results presented by Østhus (2012) is a study conducted by Østhus and Mastekaasa (2010). They too reach the conclusion that downsizing has few, if any effect on sickness absence among the remaining workers. However, it is questionable whether these results are valid outside the Norwegian context. Both studies argue that downsizing and job loss may lead to less adverse health effects in Norway due to several aspects, such as strong worker protection arrangements, widespread adherence to the seniority principle in layoff decisions, in addition to a generous and universal unemployment benefits scheme. Therefore, one might argue whether or not Norwegian workers truly experience job insecurity in the truest sense.

4 Data

In the forthcoming section, we will present an overview of the data used in relation to our empirical analysis. Thereafter, we will provide further insight in regards to our sample and lastly conclude this section by discussing some of the limitations of our data set.

Our empirical analysis relies mainly on the Norwegian Labour Force Survey (LFS) conducted by the Norwegian Centre for Research Data (NSD) on behalf of SSB[7]. Since our aim in this thesis is to analyse the link between commodity prices, perceived job insecurity and sickness absence, we also obtain data on quarterly crude oil prices, measured in dollars per barrel, for the first quarter in 2010 until the third quarter in 2016 (see Figure 1) (U.S. Energy Information Administration, 2017).

4.1 The Norwegian Labour Force Survey

The main objective of the survey is to lend data on employment and unemployment, in addition to provide data on the labour force participation in different sections of the population (SSB, 2017b). The LFS has, from its establishment in 1972, evolved to become an important source of determining the current state of the labour market as well as providing insight as to the developments seen. The survey follows international standards of classification and is conducted in all EU/EEA countries, and is frequently used in comparing labour markets (Berge, 2012).

The survey is conducted on a quarterly basis, with survey participants being randomly chosen from the Norwegian population based on a register of family units. In general, the sample consists of roughly 24,000 individuals. Among the selected

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[7]The data applied in the analysis in this paper are based in "Labour Force Survey 2010-2016". The data are provided by Statistics Norway, and prepared and made available by the NSD - Norwegian Centre for Research Data. Neither Statistics Norway, nor NSD are responsible for the analysis/interpretation of the data presented here.

family units, only family members between the ages of 15 to 74 are eligible to participate in the survey, complying them to answer questions regarding their employment situation during a specific reference week. The survey has a panel component in the sense that each respondent is required to take part in the survey eight times during a period of two years (Blekesaune, 2012). The collection of data is partly obtained through computer-assisted phone interviews, whereas demographic data and information on educational attainment are retrieved from administrative registers (SSB, 2017b). Usually, the respondent is the same individual as the observation unit. However, if for some reason the observation unit is unable to participate in the survey, proxy interviews are conducted where near family members answer on behalf of the observation unit. The case of indirect interviews amount to around 14 percent of all conducted interviews.

Since 2006, the questionnaire has become more comprehensive by including questions regarding absence from work. However, this is rather limited considering the fact that the survey's main purpose is to provide information regarding employment and unemployment. In the LFS an individual's sickness absence is merely a by-product from a singular question regarding why the specified actual man-hours worked differs from the stated contractual working hours in the current reference week (Berge, 2012). In addition, the measure of sickness absence is restricted to absence during the whole reference week. As a provider of absenteeism statistics, the LFS has several weaknesses. For instance, the survey fails to provide information regarding diagnosis, whether sickness absence is self-certified or certified by a physician and also, quite often, the survey falls short in documenting the length of sickness absence. Meanwhile, despite the survey's clear shortcomings, the LFS contains an abundant amount of information both regarding employment and individual specific characteristics, such as gender, age, educational attainment, occupation and industry association.

4.2 Our Sample

Our analysis investigates Norwegian Labour Force Surveys from 2010 to the third quarter of 2016. During the following time span, the survey has been conducted twenty-six times and includes 508,952 observations. However, our analysis does not rely on all of the following observations. We will now subsequently describe the restrictions and modifications made.

For our purposes, we restrict the data set in various ways. The largest adjustment made in this regard, is that we limit our sample to only include individuals associated to certain industries. The LFS operates with a standard industrial classification (SSB, 2008)[8], which is used to assign individuals to their respective industrial sector. In order to address the issue of whether or not job insecurity has a causal effect on sickness absence, we use oil prices as a source of exogenous variation in job insecurity. It is therefore useful to distinguish between industrial sectors where the importance of oil price developments seemingly vary. Therefore, we have constructed what we dare to consider as two main opposing industries that differ in regards to the degree of exposure to oil price developments and to what extent this may impact the respected industries. We further refer to these industries as the treatment and control group, whereas the treatment group consists of an industry where the price of oil is an important determinant, compared to the control group, which by design, should be seemingly indifferent to this facet.

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[8]Statistics Norway uses a revised industrial classification, SIC2007. The standard has a hierarchical structure. The categories at the highest level are called sections, which are alphabetically coded categories. "The sections subdivide the entire spectrum of productive activities into broad groupings, such as "Agriculture, forestry and fishing" (section A), "Manufacturing" (section C) and "Information and communication" (section J). The classification is then organized into successively more detailed categories, which are numerically coded: two-digit divisions; three-digit groups; and, at the greatest level of detail, four-digit classes."(Department of Economic and Social Affairs, 2008). The LFS only provides information down to the two-digit divisions.

Since we exploit the financial shock that hit the Norwegian petroleum industry, employees in this industry will naturally serve as our treatment group. However, the standard industrial classification does not feature a further specification fully capturing the extent of the Norwegian petroleum industry. Thus, we make this distinction ourselves. Luckily, several studies before us have taken on the task of defining the petroleum industry based on the LFS. A study by Brunstad and Dyrstad (1997) argued that the most petroleum relevant occupational groups were in relation to manufacturing of fabricated metal products, machinery and equipment and lastly building and construction. When relating this understanding to the standard industrial classification used in our data set, we define the following industrial divisions as belonging to the petroleum industry: extraction of crude petroleum and natural gas, mining support service activities, manufacture of coke and refined petroleum products, manufacture of basic metals, repair and installation of machinery and equipment, and lastly land transport and transport via pipelines.

In comparison, the chosen control group is the information and communication industry. This seems sensible, considering that this industry is likely unaffected by the sharp drop in oil prices. By focusing on these two industries that differ with regards to the extent oil price plays a defining role, we are better able to estimate the effect job insecurity has on sickness absence. An argument supporting our usage of the information and communication industry as a control group, resides on the fact that, according to statistics made by NAV, the following industry has shared a similar trend with the petroleum industry in regards to sickness absence in recent years (NAV, 2016a; 2016b; 2016c; 2016d)[9] . In both relevant industries, sickness absence has generally been stable at relatively low levels. This matter also coincides with our data. A depiction of how sickness absence has evolved during our selected time span is presented by Figure 2. Based on the figure, it becomes apparent that the industries showcase resembling developments in sickness absence before the large change in oil price in 2014. As shown, the levels are somewhat

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[9]We have compared certified sickness absence rates from the 1st quarter of 2009 to the third quarter of 2016, provided by NAV.

higher in the treatment group, but the trends are quite similar. However, it is necessary to mention that the industries eventually diverge in this regard around the year shift from 2014 to 2015. This also happens to be around the time where the petroleum industry experienced a turn for the worse. Hence, this gives us some first indication that sickness absence in the treatment and the control group differ around the time of the sharpest price change, indicating that there might be an effect (see Figure 2). When considering descriptive statistics of the data, it is apparent that the treatment and control group consists of a similar sample of individuals when it comes to individual characteristics such as gender and age distribution. However, they differ slightly when it comes to the degree of educational attainment (see Table 1). Since the sample of individuals is fairly homogenous when comparing the treatment and control group, we can with some certainty state that it is reasonable to believe that there are no other underlying factors that may drive our results, thus affecting sickness absence.

Figure 2: Sickness Absence 2010 - 2016
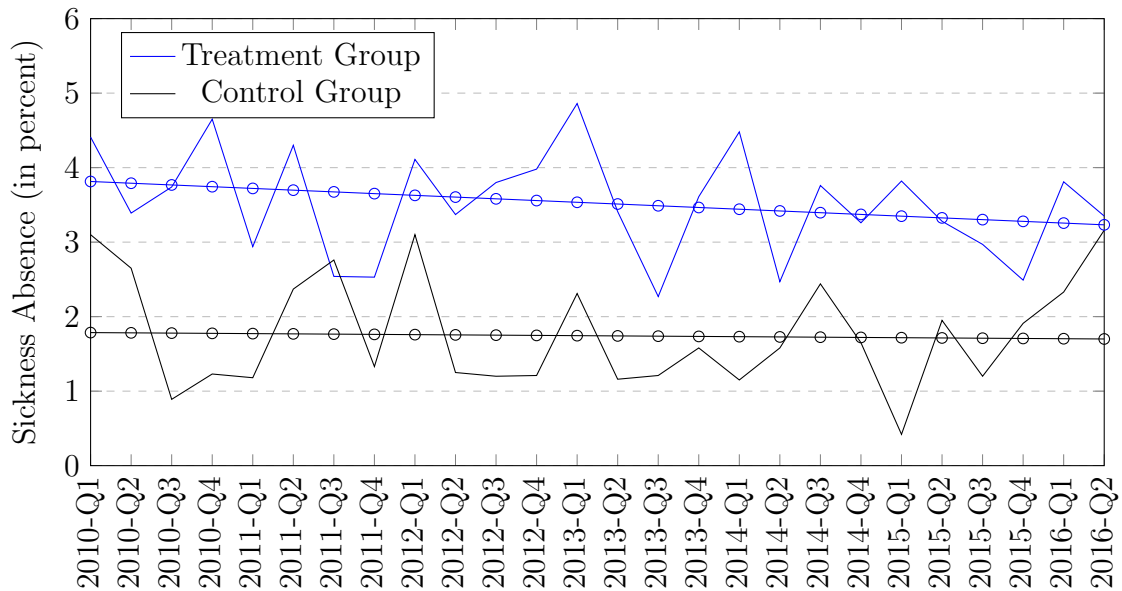
Note:Sickness absence observations from the first quarter of 2010 to the third quarter of 2016.*Source:* The Norwegian Labor Force Survey

Table 1: Background Characteristics

	Sum	Mean Treatment	Mean Control
Men	18045	0.84	0.77
Female	4067	0.16	0.23
Primary and Lower secondary	3139	0.17	0.07
Upper Secondary	10524	0.55	0.30
Higher education	8449	0.28	0.63
Age 18-30	3419	0.15	0.16
Age 31-44	8333	0.34	0.48
Age 45-57	7469	0.36	0.27
Age 58-67	2891	0.15	0.09
N	22112		

Note: All variables are indicator variables equal to 1, otherwise 0.

In the LFS, the information and communication industry consists of activities such as publishing and telecommunications. For our purpose, we restrict this industrial sector to only include the following activities: telecommunications and computer programming, consultancy and related activities and finally information service activities. Thus, we decided not to incorporate activities related to publishing, programming and broadcasting in our control group. The reason behind excluding this particular fragment of the industry is due to the fact that during our relevant time frame, several companies within these subsectors have been subject to hardship, which eventually resorted into layoffs[10]. Prior to this section, we referred to earlier research indicating that layoffs induces job insecurity, hence resulting into adverse health effects. By excluding activities prone to uncertainty in the form of fear of job loss, we are better able to isolate what effect job insecurity, caused by the deteriorating oil prices, has on sickness absence.

After restricting our data with respect to industrial classification, we are left with a sample comprising of far less observation units. Otherwise, our remaining modifications of the data set are trivial. For instance, we only consider individuals between the ages of 18 to 67[11]. In addition, we restrict the data to individuals with only a singular employer and who are permanently employed. This leaves us with a final sample consisting of 22,112 observations units, where the treatment group comprises 15,704 individuals and our control group includes 6,408 individuals (see Table 2).

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[10]Publishing, journalism and the entertainment industry has experienced disruption in recent years mainly due to the steadily rising usage of digital media. Several Norwegian media companies, such as *Dagbladet*, *VG*, *Bergens Tidende* and *TV2*, have experienced hardship in this regard, ultimately ending with layoffs and further layoffs are expected to follow in the years to come (Smedsrud and Brække, 2016).

[11]As explained in Section 2, individuals of the age 67 or above are not entitled to ordinary sickness benefits.

Table 2: Summary of Sickness Absence Incidence

	Observations	Incidence	Mean	Standard deviation
Treatment group	15704	554	0.03	0.16
Control group	6408	114	0.01	0.07
N	22112	688		

Note: The sample includes all sickness absence incidence for the Petroleum and the Information and Communication industry from the first quarter of 2010 to the third quarter of 2016.

4.3   Limitations of the Data

There are several apparent limitations of the LFS which may affect our analysis as well as our results. One drawback, which has already been addressed, is the fact that the measure of sickness absence is rather limited seeing as sickness absence is not a major focal point of the survey. Therefore, details concerning matters of potential interest such as diagnosis and certification are intentionally left out. Another potential source of concern is related to the sample selection. Although survey participation is fairly high, the survey has seen an increasing tendency of non-response rates among participants during the last decades, going from a recorded level of 10 percent in 1991 to 20 percent in 2012 (SSB, 2017b). It is commonly agreed upon that survey participation is associated with factors such as educational attainment and health status (Østhus, 2012). Thus, this may result in a sample consisting of fewer individuals with health problems and an underrepresentation of individuals with low levels of education, potentially leading to what is referred to as selection bias. If this is the case, proper randomization is not achieved and the sample obtained is not representative of the population. However, the LFS satisfies a high degree of reliability and quality due to its large sample size and random selection.

According to a report by IRIS, the Norwegian petroleum industry is present in all parts of the country, with the exception of thirteen municipalities (IRIS, 2015)[12]. However, we know that the sudden drop in oil prices impacted municipalities in various degrees. Those greatly impacted, were municipalities residing in the western and southern region of Norway, where a higher portion of total employment is linked to oil and gas activities (Norwegian Petroleum, 2017a). We would therefore expect that job insecurity is more prominent in heavily oil-dominated municipalities, since the severity of the shock becomes more apparent. This reasoning seems sensible, considering that businesses in Rogaland and Hordaland had the largest share of

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[12]415 of Norway's 428 municipalities had residents employed in petroleum related industries at the end of 2014 (IRIS, 2015).

alerted notices of layoffs in the aftermath of the financial shock (Sutterud, 2016) [13]. Since the aim of this thesis is to investigate how employees respond to reduced job security in the form of sickness absence, it would have been convenient to study municipalities greatly impacted by the economic downturn. In the LFS, municipalities are classified into municipality classes, tallying up to seven classes in total, based on industrial link and centrality (SSB, 1994)[14]. Accordingly, it would have been a useful feature, in our case, if the LFS had provided information of the specific municipality in which respondents worked in, rather than the overall municipality class. However, this is not possible due to protection of privacy.

Another issue that appears is regarding the usage of proxy interviews. Even though most respondents are directly interviewed through phone interviews, some are also indirectly interviewed through other members of the household. The use of such proxy interviews might lead to measurement problems. For instance, due to proxy interviews, employment is on average underestimated, indicating that reported sickness absence in such events might be lower than the actual case (SSB, 2017b). Furthermore, the LFS does not allow us to follow the same individuals over time. We mentioned briefly that respondents are required to participate in the survey in eight consecutive quarters. However, we are not able to identify the respondents. Thus, our sample may consist of the same respondents over several quarters perhaps influencing our average estimates on sickness absence.

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[13]Rogaland, Oslo and Hordaland stood for a large portion of notified layoffs received by NAV during 2015. Rogaland had twice as many alerted notifications as compared to Oslo which had the second highest amount, followed closely by Hordaland (Sutterud, 2016).

[14]The Standard Classification of Municipalities 1994 used in the LFS divides municipalities into the following seven classes: Class 1: Primary industry municipality, Class 2: Mixed agriculture and manufacturing municipalities , Class 3: Manufacturing municipalities, Class 4: Less central, mixed service industry and manufacturing municipalities, Class 5: Central, mixed service industry and manufacturing municipalities, Class 6: Less central service industry municipalities, Class 7: Central service industry municipalities.

Since the LFS does not explicitly specify a petroleum industry, it is uncertain whether we have been able to capture the industry in all its entirety. Our definition relies solely on activities that are considered to be directly related to the petroleum industry. Meanwhile, we are aware that the petroleum industry also consists of several indirectly related industries, such as wholesale and retail. However, these industries also deliver goods and services to other industries. We are therefore unable to distinguish between deliveries to the petroleum industry and deliveries to other industries. Thus, we are forced to disregard industries indirectly related to the petroleum industry, limiting us to only consider a fraction of the industry. In addition, the LFS provides no further information allowing us to verify that the respondents are indeed employed in oil-related industries.

5 Empirical Approach

5.1 Empirical Framework

Our empirical approach relies heavily on the concept of a natural experiment, meaning that we take advantage of an exogenous shock, limited to only affecting a subset of individuals. This feature allows us to study the effect of the shock on our outcome of interest (Butler and Mayer, 2015). Applying this understanding to our analysis we exploit the financial shock that hit the Norwegian petroleum industry roughly extending from mid-2014 to the start of 2016, serving as our source of exogenous variation in job security. Thus, this event allows us to investigate in what way job insecurity may affect sickness absence behaviour. Within this framework, it is common to refer to those exposed to the shock as the treatment group and conversely those unaffected as the control group. In order for our design to be valid, it is necessary that the allocation of individuals to either the treatment or control group is as good as random. In addition, the two groups need to be similar in terms of both observed and unobserved factors that may influence the outcome of interest. Only then are we able to identify the causal effect of treatment (Angrist and Pischke, 2015).

Applying this understanding to our analysis, we distinguish between industrial sectors that differ in regards to whether or not the specific industry was affected by the sudden and sharp fall in oil prices. In this context, the petroleum industry is a sufficient treatment group since it will inevitably be affected by the oil price, merely by definition. Meanwhile, our choice of comparison group relies heavily on the assumption that the workers confined to the particular industrial sector are never or much less exposed to the causal event, hence the crash in oil prices. To the best of our knowledge, the information and communication industry is seemingly mostly unharmed by the oil price shock. Thus, workers in the following industry will unlikely experience job insecurity in the same sense as those employed in the petroleum

industry, which experienced an economic downturn, thus creating uncertainty.

We have previously argued as for why the information and communication industry serves as an adequate control group in our circumstance. As mentioned earlier, the two groups consists of a similar sample of individuals in respect to observable background characteristics (see Table 1). In addition, the chosen control group should also display the same parallel pre-trend as the treatment group when it comes to sickness absence (see Figure 2). Both industries have exhibited similarly low and stable sickness absence rates prior and throughout the period of interest for our analysis. By focusing on these two industries that differ with regards to the extent oil prices plays a defining role, we are better able to estimate the effect oil prices has on sickness absence through the stressor, job insecurity. When addressing the crucial assumption that the causal event is indeed exogenous, it seems certain to conclude that this is fulfilled. The sudden and abrupt drop in oil prices was both impossible to anticipate and individuals, being unable to influence this, considers the oil price as given.

5.2 Our Model

In accordance with our empirical strategy, we estimate equation 1 using a basic ordinary least squares (OLS) specification[15]. Using quarterly data extending from 2010 until the third quarter of 2016, we estimate the intention-to-treat (ITT) [16] effect from the following regression model for individual i in period $t = 1,...,26$:

$$Y_{i_t} = \alpha_0 + \alpha_1 T_{i_t} + \delta oilprice + \beta(oilprice \times T_{i_t}) + \gamma X + \lambda D_y + \theta D_q + \varepsilon_{i_t} , \quad (1)$$

where Y_{it} represents our outcome variable, indicating whether or not an individual i is absence from work due to sickness at time t. The variable T_{it} is an indicator variable, equal to one if the individual is treated, thus meaning employed in the affected petroleum industry in period t, and zero if otherwise. Quarterly oil price is also incorporated into our model, corresponding respectively to the observation unit at time t.

In order to measure the extent to which the exposure of the shock have affected sickness absence, we can interact quarterly oil prices with the treated individuals. The coefficient β in front of the interaction term is our estimate of interest and measures the causal effect of oil prices on sickness absence.

In addition, we control for yearly and seasonal variation in sickness absence, expressed accordingly by the variables D_y and D_q. X represents a vector of controls,

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[15]By minimising the sum of squared residuals, OLS will give us unbiased estimates of the effect of a change in the independent variables, ceteris paribus. Unbiased estimates are achieved when the model is linear in parameters, consists of a random sample, and the error term is homoscedastic and not serially correlated. The crucial assumption for causal inference is the zero conditional mean assumption which states that the error term needs to be normally distributed with a mean of zero, E(u,x) = 0 (Woolridge, 2014).

[16]It is only the intention to treat that has been randomly assigned, not whether the individual actually experience job insecurity. We therefore estimate the effect on average across individuals with higher and lower likelihood of being affected by job insecurity.

that includes age, gender, educational attainment, corporate ownership, company size, municipality type and lastly type of employment contract (full-time/part-time).

6 Results

In the following section, we will present the results retrieved from our analysis. Results from our main specification, shown by Equation 1 in the preceding section is presented first. Thereafter, we examine possible heterogeneity effects. We divide the sample by gender, age, educational attainment, municipality class, corporate ownership, company size and lastly by full-time and part-time employees to study whether the effect varies across these dimensions.

6.1 Main Specification

Table 3 presents the estimated effect of our variable of interest, namely the interaction term of oil price and the chosen treatment group, on our dependent variable sickness absence using our main specification (see Equation 1). Our outcome variable, sickness absence, indicates whether or not an individual is absence from work due to sickness in the particular reference week in which the Labour Force Survey was conducted. The coefficient gives us the estimated effect that job insecurity has on sickness absence. In addition, robust standard errors are included.

Table 3 shows that the estimated coefficient is quite precisely zero as both the coefficient is small and the robust standard errors are small. Thus, the evidence presented in Table 3 implies that reduced job security does not have any effect on sickness absence. However, there are several factors that could possibly explain this result. In Section 8, we will address this issue by discussing how job insecurity might still be of importance, even though our estimates indicate zero effect on sickness absence.

Table 3: Effect of Oil Price on Sickness Absence Using the Full Sample (Baseline Estimate)

	Sickness Absence
Interaction term	0.000041
	(0.000097)
N	21930

Note: The dependent variable is sickness absence incidence (measured in weeks). In the interaction term we have interacted quarterly oil prices with the treated individuals. We control for yearly and seasonal variation in sickness absence, age, gender, educational attainment, corporate ownership, company size, municipality class and type of employment contract.

Robust standard errors in parentheses

$^*p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

6.2 Heterogeneity Tests

Gender

Previous research address how sickness absence differs in regards to gender. Several studies show that women have a general tendency of higher sickness absence, a result persistent across countries (NOSOSCO, 2015)[17]. Various explanations as to why this might be the case has surfaced among researchers, still there is no overall consensus in regards to this matter (Piha, 2013). For instance, some studies indicate that the variation arises due to differences in work conditions, family burdens or perhaps different occupational distributions between genders (NOSOSCO, 2015). Meanwhile other studies, find no such indication. Therefore, it seems suggestive to consider women and men separately when addressing the issue of sickness absence.

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[17]Nordic Social Statistical Committee

In addition, when considering gender, few studies have shown that job insecurity varies between women and men (Sverke et al., 2006). This provides yet another reason as for why it is sensible to test for whether the effect of our variable of interest differs when dividing our sample by gender.

The results are presented in Table 4. The effect of oil price in connection with our treatment group, is pretty accurately zero and insignificant on a 10 percent level for both genders. However, we notice that the estimated coefficients differ for men and women, whereas the coefficient is positive for men and negative for women. Nevertheless, the estimates are rather small and close to zero. In combination with small robust standard errors, it is sufficient to conclude that the effect of interest coincides with the result from our main specification. Hence, meaning that oil price, serving as our source of exogenous variation in job security, has zero effect on sickness absence when considering men and women separately. However, we note that a large portion of our sample consists of men.

Age

There also exists an abundant amount of research examining the association between age and sickness absence. A rather prevalent generalization is that sickness absences tends to increase with age (NOSOSCO, 2015). However, this conclusion is debated and not all studies lend further support to this understanding. Meanwhile, some research indicates that the positive linear association between age and sickness absence is only apparent for long-term sickness, mainly reflecting decreasing work ability and increasing burden of disease in older age (Joensuu and Lindström, 2003; Piha, 2013). In this respect, age seems to increase the risk of long-term absences regardless of gender, however evidence suggests that the association is more forceful among men.

In relation to job insecurity, the vulnerability to job loss may vary across this dimension. When considering circumstances in the petroleum industry, several companies have resorted to layoffs as a response to the current economic downturn. We have

previously mentioned that in Norway there is widespread adherence to the seniority principle in layoff decisions (Østhus and Mastekaasa, 2010), implying that certain age groups are more at risk for job loss following layoffs. In addition, studies have found evidence indicating that older employees may, to a larger extent, experience job insecurity (Sverke et al., 2006). They are more vulnerable to job insecurity since it may be more difficult for this particular segment to find new employment. Taking these argumentations into consideration, we test whether by dividing the sample by different age categories lead to a different result compared to the finding obtained by our main specification. We operate with the following age categories: 18-30, 31-44, 45-57, and lastly 58-67.

The results presented in Table 5 shows however no diversion in this sense. Overall, the effect is estimated to be close to zero and insignificant across all age categories. However, for the younger age categories the estimate is weakly negative, whereas for the older age categories the estimates are positive. Meanwhile, it is worth noting that the coefficients are largest for the oldest age categories, namely individuals between the ages of 45 to 67, giving slight support to the insight drawn from the discussion above.

Educational Attainment

According to existing literature, education may influence subjective job insecurity (Sverke et al., 2006; Näswall and De Witte, 2003). The explanation for this being that individuals with lower educational attainment depend strongly on their present job due to fewer relevant alternatives in the labour market. This dependency makes the threat of unemployment more distressing (Sverke et al., 2006). In addition, several studies have found that absence rates tend to be lower for individuals with higher education levels (Joensuu and Lindstrøm, 2003), and that low educational attainment may predict future sickness absence behaviour (Piha, 2013). Since the Norwegian petroleum industry consists of many workers with low educational at-

tainment[18], we want to investigate whether years of education have any effect on sickness absence. We therefore divide our sample into three different levels of education, specified as Primary and Lower secondary school, Upper secondary school and Higher education[19].

The results are presented in Table 6, columns 1-3, respectively. We find positive and insignificant estimates, still close to zero and with small standard errors, as in our man specification. Thus, differences in educational attainment does not seem to have any particular effect on sickness absence. Additionally, we note that the estimate for Upper secondary education is even smaller and closer to zero than the other levels of education.

Municipality Class

In our sample, municipalities are divided into seven main classes. The two criteria for the classification of municipalities are industrial link and centrality (SSB, 1994). Municipalities in class 3 are mainly dominated by manufacturing and/or oil extraction, mining and quarrying and we would believe that since this is the case, those residing in this particular municipality class will be exposed to job insecurity. It would therefore be of interest to see whether the treatment effect differs, when dividing the sample by municipality class.

As we can see from our findings in Table 7, column 2-8, estimates in columns 2,3,4,5 and 6 are still positive and close to zero. These coefficients reflect the effect of oil price on sickness absence in Primary industry-, Mixed agriculture and manufacturing-, Manufacturing-, Less central, mixed service industry and manufacturing-, and Central, mixed service industry and manufacturing municipalities. Estimates from columns 7 and 8 are slightly negative. These coefficients reflect the effect of the oil price on sickness absence in Less central service industry-, and Central ser-

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[18]Primary and Lower secondary-, and Upper secondary education (see Table 1).

[19]Primary and Lower Secondary school entails 10 years of schooling or less, Upper Secondary school entails 11-13 years of schooling and Higher Education entails 14 years of schooling or more.

vice industry municipalities. Majority of the estimates are insignificant with small standard errors, however, we note that the estimate for Mixed agriculture and manufacturing municipalities in column 3 is significant at the 5 percent level. Since the estimate is small, the effect is economically insignificant. Further, we notice that the standard errors of the estimate for Primary industry municipalities in column 2 are relatively higher compared to the other municipality classes. Hence, we retrieve similar point estimates as our main specification, namely that treatment has zero effect on sickness absence when we divide our sample by different municipality classes. Even when we restrict our sample to only include individuals working in municipalities dominated by manufacturing and/or oil extraction, mining and quarrying, our estimate corresponds to the findings from our main specification.

Corporate Ownership

A comparison of the private and public sector will also be of interest when we examine possible heterogeneity effects. Because downsizing processes usually are carried out differently in the two sectors, individuals may experience contrasting levels of job insecurity. While employees in the private sector are more frequently laid off due to excessive labour, employees in the public sector are rather moved to other units of the organization (Østhus and Mastekaasa, 2010). Thus, because public sector workers are generally more sheltered from incidents of layoffs, they may feel less insecure than private workers during unstable times. Consequently, the effect of job insecurity could be greater for individuals employed in the private sector than employees in the public sector. In order to investigate this matter further, we divide our sample by corporate ownership. When considering public ownership, we include all employees working in municipality, county and state administrations.

Table 8 shows that estimates are close to zero and insignificant, with small standard errors. We note that the sample size is smaller and that the standard errors increase somewhat when restricting the sample to public sector employees only, compared to our main specification. As earlier, these results indicate that we are not able to

detect a causal link between oil price and sickness absence.

Company Size

In the aftermath of the considerable and sudden drop in oil prices, the petroleum industry has experienced a period characterized by instability and turbulence. In response, companies were forced to take action regarding the rising costs in order to withstand lower investments and oil prices. An immediate reaction, ensuring cost reductions, was to implement layoffs, which suggests that companies are gradually transitioning to the new reality expected to prevail in the industry. Through extensive media coverage, it came apparent that layoffs were being announced by several companies throughout the industry. A publication made by NAV in 2016 regarding alerted layoffs in the period from 2014 to mid-2015, reported that a large portion could be attributed to oil-related businesses (Sutterud, 2016). In the same publication, it becomes evident that mostly large companies alert of possible layoffs. Thus, it seems that the decision of layoffs depends partially on company size and one could argue that companies are affected in various degrees of the economic downturn when considering this particular dimension. Therefore, it is of interest to divide the sample by company size in order to determine whether or not the effect differs in this respect.

Table 9 shows us the result after dividing the sample by company size. Our division is done in the following manner: small-sized companies have 1-49 employees, medium-sized companies have 50-99 employees, and lastly large-sized companies consists of more than 100 employees. For medium-sized companies, we find a significantly negative coefficient at the 1 percent level. That is, an increase in oil price leads to a decrease in sickness absence. However, the effect is small and the effect therefore economically insignificant. In contrast, the effect of oil price on sickness absence in small-, and large-sized companies is insignificant.

Full-time/Part-time Employee

There are competing claims in the literature on how different types of employment contracts influence job insecurity and sickness absence. Some researchers argue that part-time workers experience greater job insecurity than full-time workers. If part-time workers feel that they are less important for the organisation compared to full-time workers, they may have a greater sense of job insecurity when organisations need to downsize (Sverke et al., 2006). In contrast, Näswall and De Witte (2003) found that part-time workers are less insecure than full-time workers, while other researchers find mixed results on the matter. Research is also unclear when it comes to the relation between part-time and full-time workers and sickness absence. While there are no clear differences in overall absence, working part-time may serve as a predictor of disability pensions, thus indicating that there may be differences in health (Gjesdal and Bratberg, 2002).

We find it interesting to examine our outcome variable when considering these two types of employment contracts. We therefore divide our sample by part-time and full-time workers. Our estimates are presented in Table 10. Similar to previous results, we find no significant effects of treatment on sickness absence. As earlier, the estimates are positive and close to zero, with small standard errors.

Table 4: Effect of Oil Price on Sickness Absence by Gender

	(1) Baseline Estimate	(2) Men	(3) Women
Interaction term	0.000041	0.000079	-0.000064
	(0.000097)	(0.000084)	(0.000246)
N	21930	17907	4023

Note: The dependent variable is sickness absence incidence. In the interaction term we have interacted quarterly oil prices with the treated individuals. The Baseline estimate is presented in Column 1. Each column represents a separate regression, divided by gender (women (Column 1) and men (Column 2)). Robust standard errors in parentheses.

$^*p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

Table 5: Effect of Oil Price on Sickness Absence by Age

	(1)	(2)	(3)	(4)	(5)
	Baseline Estimate	18-30	31-44	45-57	58-67
Interaction term	0.000041	-0.000024	-0.000012	0.000176	0.000358
	(0.000097)	(0.000178)	(0.000124)	(0.000154)	(0.000342)
N	21930	3376	8264	7418	2872

Note: The dependent variable is sickness absence incidence. In the interaction term we have interacted quarterly oil prices with the treated individuals. The Baseline estimate is presented in Column 1. Column 2-5 represents a separate regression, divided by age categories (18-30 (Column 2), 31-44 (Column 3), 45-57 (Column 4) and 58-67 (Column 5)). Robust standard errors in parentheses.

$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

Table 6: Effect of Oil Price on Sickness Absence by Educational Attainment

	(1)	(2)	(3)	(4)
	Baseline Estimate	Primary and Lower secondary	Upper secondary	Higher education
Interaction term	0.000041	0.000258	0.000007	0.000019
	(0.000097)	(0.000414)	(0.000148)	(0.000108)
N	21930	3111	10406	8413

Note: The dependent variable is sickness absence incidence. In the interaction term we have interacted quarterly oil prices with the treated individuals. The Baseline estimate is presented in Column 1. Column 2-4 represents a separate regression, divided by educational attainment (10 years of schooling or less (Column 2), 11-14 years of schooling (Column 3), 14 years of schooling or more (Column 4)). Robust standard errors in parentheses.

$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

Table 7: Effect of Oil Price on Sickness Absence by Municipality Class

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Baseline Estimate	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7
Interaction term	0.000041	0.000500	0.000680*	0.000340	0.000113	0.000250	-0.000419	-0.000109
	(0.000097)	(0.003928)	(0.000331)	(0.000465)	(0.000411)	(0.000153)	(0.000441)	(0.000130)
N	21930	598	743	2353	1609	7117	1049	8461

Note: The dependent variable is sickness absence incidence. In the interaction term we have interacted quarterly oil prices with the treated individuals. The Baseline estimate is presented in Column 1. Each column represents a separate regression, divided by municipality class 1 to 7. (Primary industry municipalities (Column 2), Mixed agriculture and manufacturing municipalities (Column 3), Manufacturing municipalities (Column 4), Less central, mixed service industry and manufacturing municipalities (Column 5), Central, mixed service industry and manufacturing municipalities (Column 6), Less central service industry municipalities (Column 7) and Central service industry municipalities (Column 8)). Robust standard errors in parentheses.

$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

Table 8: Effect of Oil Price on Sickness Absence by Type of Ownership

	(1)	(2)	(3)
	Baseline Estimate	Public	Private
Interaction term	0.000041	0.000369	0.000035
	(0.000097)	(0.001018)	(0.000087)
N	21930	491	21439

Note: The dependent variable is sickness absence incidence. In the interaction term we have interacted quarterly oil prices with the treated individuals. The Baseline estimate is presented in Column 1. Each column represents a separate regression, divided by type of ownership (public ownership (Column 2) and private ownership (Column 3)). Robust standard errors in parentheses.

$^*p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

Table 9: Effect of Oil Price on Sickness Absence by Company Size

	(1)	(2)	(3)	(4)
	Baseline Estimate	Small-sized	Medium-sized	Large-sized
Interaction term	0.000041	0.000234	-0.000816**	0.000125
	(0.000097)	(0.000132)	(0.000303)	(0.000129)
N	21930	7997	2243	11690

Note: The dependent variable is sickness absence incidence. In the interaction term we have interacted quarterly oil prices with the treated individuals. The Baseline estimate is presented in Column 1. Each column represents a separate regression, divided by company size (small-sized companies with 1-49 employees (Column 2), medium-sized companies with 50-99 employees (Column 3) and large-sized companies with 100 or more employees (Column 4)). Robust standard errors in parentheses.

$^*p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

Table 10: Effect of Oil Price on Sickness Absence by Type of Employment Contract

	(1)	(2)	(3)
	Baseline Estimate	Full-time	Part-time
Interaction term	0.000041	0.000042	0.000197
	(0.000097)	(0.000086)	(0.000570)
N	21930	20562	1368

Note: The dependent variable is sickness absence incidence. In the interaction term we have interacted quarterly oil prices with the treated individuals. The Baseline estimate is presented in Column 1. Each column represents a separate regression, divided by type of employment contract (full-time (Column 2) and part-time (Column 3)).

Robust standard errors in parentheses.

$^*p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

7 Robustness Checks

We perform several specification checks on our main specification in order to verify the robustness of our finding. If our point estimate is robust, it is evidence of structural validity in our main specification. A source of concern is whether we have correctly specified the treatment and control group in our main specification. First, we consider the effects when changing the composition of our treatment group. Second, we test whether the baseline estimates are robust to alternative control groups. Furthermore, we re-specify the interaction term, altering the treatment dummy to equal one if the observation unit is exposed to an oil price under the threshold of USD 50. Lastly, we examine whether our null effect is robust when we redefine our dependent variable.

Treatment and Control Group

As earlier mentioned, a pitfall of our data is that the standard industrial classification used to identify individuals working in affected groups, does not explicitly specify the petroleum industry. Since we were forced to make this distinction ourselves, a source of concern is whether we have specified the treatment group in our main specification correctly. The industry divisions included might differ with regard to their relevance to the petroleum industry, consequently affecting our estimates. Thus, our results may be sensitive to the inclusion or exclusion of some industry divisions. In order to test this, we first re-estimate our main specification by changing the composition of our treatment group. We run several regressions where we omit one specific industry division for each regression. Table A1 presents the results for these exclusions. We find that the effects on sickness absence are quite similar to our baseline estimate. Estimates are weakly positive and statistically insignificant with small standard errors, however when we exclude Land transport and transport via pipelines from our defined treatment group, the estimated effect becomes negative. We also re-estimate the model by omitting one additional affected industry division each time we run the regression. In the end, our treatment group only consists of the industry

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division Extraction of crude petroleum and natural gas. As shown in Table A2, when altering our definition of the treatment group in this manner, our estimates give very similar results as those shown in Table A1. Hence, our main specification estimate, is robust to the inclusion and exclusion of industry divisions in the treatment group.

Another concern is related to the definition of the control group in our main specification, and whether the information and communication industry gives reliable baseline data to compare our results with. Consequently, we investigate this by first letting the whole sample serve as the control group. By doing this, we investigate whether the main specification estimate is robust when all industrial sectors are included. Secondly, we also test this by separately letting each industry sector serve as the control group. Results are presented in Tables A3 and A4. As before, these findings are similar to the result from our main specification. While there is some variation in the signs of the coefficients, estimates are still insignificant and close to zero, apart from the estimate for industrial section M which represents Professional, Scientific and Technical activities (shown in Column 3, Table A4) which is significant at the 5 percent level. Overall, we find that the estimates from the re-specified control groups are similar to the estimate from our main specification, providing support for our choice of comparison group and thus our null effect is robust in this regard.

Threshold

We want to examine whether the sense of job insecurity became more acute after the oil price dropped below a critical threshold, and may therefore prove to have a more prominent effect on sickness absence. In our main specification we included quarterly data of observation units well before the steep reduction in oil prices, in order to capture how incidence of sickness absence varies following the fluctuations in oil prices. Before the oil price sharply plummeted, the petroleum industry thrived with oil prices well exceeding USD 100 per barrel, and at that time few would have anticipated the sudden and extensive decline in oil prices. A turning point

for the Norwegian petroleum industry came after the oil price fell below USD 50 during 2015. The last time the industry experienced such levels was in early 2009 (U.S. Energy Information Administration, 2017). However, the economic downturn continued to deepen, and at its lowest point the oil price barely amounted to USD 30 (Sørbø, 2016). We would argue that surpassing the critical threshold of USD 50, solidified the seriousness of the particular oil price shock, especially considering that the oil price declined substantially in a short amount of time[20]. An increase in job insecurity among workers in the petroleum industry following the considerable blow is not entirely unheard of. We, therefore, redefine the interaction term in our main specification, thus altering the treatment dummy to equal one if the observation unit is exposed to an oil price under the threshold of USD 50.

We estimate the following model

$$Y_{i_t} = \alpha_0 + \alpha_1 T_{i_t} + \delta(oilprice < 50) + \beta(oilprice < 50 \times T_{i_t}) + \gamma X + \lambda D_y + \theta D_q + \varepsilon_{i_t}, \quad (2)$$

Table A5 presents the estimated treatment effect in this setting. Compared to our main specification, the estimated coefficient is slightly larger and the same applies for the standard error. We notice that the estimate is negative, however, still close to zero as our baseline estimate. Hence, our main results are robust to a non-linear oil price effect.

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[20]Within a year and a half the price of oil fell from USD 114 per barrel to a low of USD 30 (Sørbø, 2016).

Re-specification of the Dependent Variable

Even though our analysis so far suggests that fluctuations in oil prices has no effect on sickness absence incidence, perhaps job insecurity has a greater impact on a different outcome of interest. Consequently, we investigate whether the length of sickness absence is affected. In this setting, our dependent variable, Y_{it}, measures the number of weeks an individual is absence from work due to sickness. We regress the length of sickness absence on the same independent variables as in our main specification.

We estimate the following model

$$Y_{i_t} = \alpha_0 + \alpha_1 T_{i_t} + \delta oilprice + \beta(oilprice \times T_{i_t}) + \gamma X + \lambda D_y + \theta D_q + \varepsilon_{i_t} \,, \quad (3)$$

From Table A6, we remark that the estimated treatment effect differs from our main specification in several respects. For instance, both coefficient and standard errors are noticeably larger in comparison. In addition, the estimate is negative. Nevertheless, the estimate is insignificant. Hence, we are not able to state a causal effect of oil price on the length of sickness absence, corresponding to the result derived from our main specification regarding sickness absence incidence. This lends further support to the conclusion of a null effect of job insecurity on sickness absence robust for two different measures of sickness absence.

8 Discussion

We will in the following section present a discussion of our results. Furthermore, we address some of the limitations of our analysis and lastly we address the implications of our study.

8.1 Discussion of the Results

In our analysis, we estimate the intention-to-treat (ITT) effect of job insecurity on sickness absence behaviour in Norway. The result obtained, is statistically insignificant and our point estimate is extremely small, indicating that job insecurity, induced by the unfortunate development in oil prices, has no significant effect on sickness absence. This finding is consistent when subject to heterogeneity tests and is robust to several specification checks. As earlier stated, existing literature has provided rather varying conclusions and is inconclusive as to establishing a clear link between job insecurity and health. Our findings gives support to earlier studies presented by Østhus (2012) and Østhus and Mastekaasa (2010), where they conclude that downsizing, serving as the source of insecurity, has few, if any effect on sickness absence among remaining workers.

There are several factors that could potentially explain why our results deviate from the literature claiming that job insecurity imposes adverse negative health effects, the simplest being that job insecurity has no causal effect on sickness absence. Another possible explanation for our null result is that our presumed source of insecurity, namely the sharp and sudden fall in oil price, turns out to have no effect on remaining workers own perception of job insecurity and thus, consequently, has no impact on sickness absence behaviour. However, we need to acknowledge that individuals differ in regards to how they respond to stressful events.

Another plausible mechanism explaining our null result, is that job insecurity simul-

taneously causes two opposing effects. On the one hand, job insecurity may lead to attendance pressure thus resulting into less sickness absence. The logic behind this reasoning is that remaining workers will avoid absenteeism in order to reduce their chances of becoming unemployed. Hence, job insecurity works as a disciplinary device (Bratberg and Monstad, 2015). However, it is acknowledged among scholars that job insecurity is a stressor and thereby represents in itself a health hazard, thus inducing an increase in sickness absence (Ferrie et al., 1998; Blekesaune, 2012). As follows, perhaps our estimated effect is merely a result of these two opposing mechanisms cancelling each other out, therefore suggesting that job insecurity has no effect on sickness absence.

Another aspect worth mentioning is that institutional characteristics may suppress the sense of job insecurity. Norway is known for its generosity on several accounts. For instance, Norway prides itself on having strong employment protection legislation, widespread adherence to the seniority principle in layoff decisions, as well as generous social security benefits and strong unions. Due to these features of the Norwegian state, one could argue that individuals to a lesser extent experience the urgency and implications that job insecurity entails, and thus influence sickness absence behaviour. Relating studies done by Østhus (2012) and Østhus and Mastekaasa (2010) argue that institutional characteristics such as those in Norway may lead to less adverse health effects. This argument implies that perhaps our result is only suited to address the Norwegian context. Therefore, we need to be critical as to whether our findings can be generalized to countries with far less extensive social schemes.

In our analysis, we recognize that we are limited to consider only the short-run effects job insecurity may have on sickness absence behaviour, since data available to us after the shock is insufficient to test for long-run effects. If circumstances would have permitted us to consider how job insecurity affects sickness absence behaviour in the long-term, perhaps we would have reached a different conclusion. Researchers before us have argued that the effect job insecurity has on sickness

absence may vary over time (Bratberg and Monstad, 2015). They propose that a threat to job security provides workers with an incentive to reduce absence in the short run, but that prolonged insecurity involves negative health effects that dominate in the longer run. Meanwhile, they also suggest that job insecurity is a temporary phenomenon, as it is likely that the sense of insecurity will gradually fade in line with the persistence of a stressful event, implying that short-term effects are likely stronger compared to long-term effects (Østhus and Mastekaasa, 2010). Hence, our result may be sensitive in regards to the time perspective. In addition, we need to consider the possibility that perhaps our result would have been different, if we had employed for example registry data on sickness absence.

8.2   Limitations of the Estimation Strategy

Until now, we have discussed how possible mechanisms might help us in understanding why we obtain a null effect. However, we cannot ignore that there are methodological limitations possibly undermining the credibility and reliability of our results. When employing an empirical approach based on the concept of a natural experiment, several conditions must be fulfilled in order to make causal inference. Thus, we need to be critical when addressing the issue of whether our research design is sufficient in this matter.

In our analysis, our source of exogenous variation in job security, was the unexpected and steep drop in oil price which the Norwegian petroleum industry experienced some years back. One defining feature in this experimental setting, is that the source of job insecurity is only confined to workers in the petroleum industry. We have reason to believe that individuals in our defined comparison group are subjectively unconcerned by the adverse development seen in oil prices, since this commodity is of limited importance for the particular industry. In addition, during our relevant period, the comparison group does not experience any events causing distress and insecurity. However, in Norway, a fair amount of businesses

are connected to the petroleum industry in terms of being suppliers of goods and services, and will therefore be indirectly affected when there is adversity. We know for instance that the petroleum industry is, among other things, provided with IT-services, which partly constitutes our comparison group. Hence, it is possible that there is a "spill over of fear", thus our estimated effect would display a downwards bias. However, when performing tests for robustness by altering and redefining our comparison group, the estimated effect hardly differed and the result implied that oil prices, thus job insecurity, has close to zero effect on sickness absenteeism.

Since we exploit an arbitrary event to study what effect job insecurity has on sickness absence, we construct our treatment and control group post hoc. This trait may suggest that, despite assuming that the natural intervention was randomly assigned, the two groups are not comparable in terms of risk aversion, motivation and job characteristics. We have previously established that our two groups consists of fairly similar individuals when it comes to observable characteristics. However, we cannot neglect the possibility that the differences in average sickness absence may be due to unobserved differences between the two groups.

8.3   Implications of the Study

The analysis provide a rather consistent picture; oil prices has no significant effect on sickness absence, suggesting that there is no causal link between job insecurity and sickness absence. This implies that even though a fear-of-unemployment effect may arise following an economic downturn, it will be of far less importance for the economy as a whole compared to actual unemployment, since the notion of job insecurity seemingly leads to no adverse outcome. However, we cannot disregard the possibility that perhaps attendance pressure offsets adverse health effects. If this is the case, job insecurity may indeed be a health hazard even though our estimate suggests otherwise. Therefore, from an economic point of view, job insecurity may still have important policy implications as sickness insurance represents a great fi-

nancial burden, thus, a source of concern for several countries. However, we need to address the question of whether our result can be generalized. Even though our result coincides and lends further support to previous research (Østhus and Mastekaasa, 2010; Østhus, 2012), these studies are also based on Norwegian data, which may partly explain why we end up with similar results. Institutional characteristics, such as those in Norway, may suppress the sense of job insecurity, thus leading to less adverse health effects. Therefore, perhaps our result is only suited to address the Norwegian context and cannot be generalized to countries with far less extensive social insurance schemes. Hence, additional research from a wider range of countries is needed in order to determine the causal link between job insecurity and sickness absence.

9 Conclusion

Generally, a large body of literature has sought to examine how job loss affects those who have been displaced following an economic downturn. However, far less effort has been dedicated to investigate the fear-of-unemployment effect which may arise. Existing literature has to a greater extent been able to document that job insecurity represents a health hazard, such as Ferrie et al. (1998) and Røed and Fevang (2007). However, previous research tends to be inconclusive in this regard, partly due to the complexity of causal processes that may link job insecurity and sickness absences. Bratberg and Monstad (2015) found that sickness absence among public employees decreased substantially in the year preceding a financial shock, while Østhus and Mastekaasa (2010) conclude that downsizing, has few, if any effect on sickness absence among remaining employees.

This thesis provides an empirical study of the causal effect job insecurity has on sickness absence. Our empirical approach relies heavily on the concept of a natural experiment, meaning that we take advantage of an exogenous shock, limited to only affecting a subset of individuals. We exploit the sudden and substantial drop in oil prices that hit the Norwegian petroleum industry in the autumn of 2014, serving as our source of exogenous variation in job security. Thus, this event allows us to investigate in what way job insecurity may affect sickness absence behaviour. To the best of our knowledge, a study using the financial shock in the Norwegian petroleum industry in this context has not been done before.

We find no evidence suggesting that job insecurity has a causal effect on sickness absence. This result is consistent when subject to a number of heterogeneity tests and is robust to several specification checks. Nonetheless, there may be rational explanations as to why we obtain a null effect, such as the two opposing, non-mutually exclusive effects cancelling each other out.

Our findings lend further support to previous research claiming that job insecurity has no effect on sickness absence, in accordance with Østhus and Mastekaasa (2010) and Østhus (2012). However, a common feature of these studies is that they rely on Norwegian data. The extent to which these findings can be generalized to other countries with far less extensive institutional characteristics, is not clear. Therefore, more research is needed taking this into consideration.

The adversity the Norwegian petroleum industry experienced since the autumn of 2014 has been particularly interesting to study, since the sudden and substantial collapse of oil prices came as a shock for the Norwegian economy. In order to withstand the economic downturn, many companies were pressured to implement drastic measures. Since 2013, 50,000 jobs have been at a loss and it seems that job losses will continue to occur. While writing this thesis, several companies have announced further layoffs, indicating that the economic troubles are far from over. The effects of the shock is still ongoing, as the petroleum industry is now coming to grips that transition to the new norm is inevitable. We are therefore unable to capture the full extent of the possible effect job insecurity might have on sickness absence. Thus, we are limited to only consider the short-run effects, however, research indicates that prolonged insecurity involves negative health effects that dominate in the longer run. If circumstances would have permitted us to consider how job insecurity affects sickness absence behaviour in the long-term, perhaps we would have reached a different conclusion.

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11 Appendix

Table A1: Effect of Oil Price on Sickness Absence when Omitting One Specific Industry Division

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
	Baseline estimate	Land transport	Repair and installation	Manu.metals	Manu.petroleum	Mining	Extraction
Interaction term	0.000041	-0.000006	0.000067	0.000071	0.000039	0.000039	0.000015
	(0.000097)	(0.000089)	(0.000089)	(0.000088)	(0.000086)	(0.000093)	(0.000094)
N	21930	16867	19854	20611	21797	18202	18699

Note: The dependent variable is sickness absence incidence. In the interaction term we have interacted quarterly oil prices with the treated individuals. Each column represents a separate regression, when changing the composition of our treatment group. We omit one specific industry division for each regression (Land transport and transport via pipelines (Column 2), Repair and installation of machinery (Column 3), Manufacturing of Basic Metals (Column 4), Manufacture of coke and refined petroleum (Column 5) and Mining support service activities (Column 6) and Extraction of crude petroleum and natural gas omitted (Column 7)). Robust standard errors in parentheses

$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

Table A2: Effect of Oil Price on Sickness Absence when Omitting One Additional Industry Division

	(1)	(2)	(3)	(4)	(5)	(6)
	Baseline estimate	1 division excluded	2 divisions excluded	3 divisions excluded	4 divisions excluded	5 divisions excluded
Interaction term	0.000041	-0.000006	0.0000016	0.000067	0.000062	0.000089
	(0.000097)	(0.000089)	(0.000091)	(0.000094)	(0.000095)	(0.000109)
N	21930	16867	14791	13472	13339	9611

Note: The dependent variable is sickness absence incidence. In the interaction term we have interacted quarterly oil prices with the treated individuals. Each column represents a separate regression, when changing the composition of the treatment group. We omit one additional affected industry division for each regression (Land transport and transport via pipelines (Column 2), Land transport and transport via pipelines/Repair and installation of machinery (Column 3), Land transport and transport via pipelines/Repair and installation of machinery/Manufacturing of Basic Metals (Column 4), Land transport and transport via pipelines/Repair and installation of machinery/Manufacturing of Basic Metals/Manufacture of coke and refined petroleum (Column 5) and Land transport and transport via pipelines/Repair and installation of machinery/Manufacturing of Basic Metals/Manufacture of coke and refined petroleum/Mining support service activities (Column 6). Column 6 only includes Extraction of crude petroleum and natural gas).

Robust standard errors in parentheses.

$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

Table A3: Re-specification of the Control Group when using Alternative Industry Sections

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	The whole sample	Section A	Section D, E	Section F	Section G	Section H	Section I
Interaction term	0.000040	-0.000121	-0.000122	0.000131	-0.000036	0.000100	-0.000185
	(0.000058)	(0.000156)	(0.000121)	(0.000079)	(0.000068)	(0.000116)	(0.000111)
N	249599	17762	19010	34861	49943	21824	21055

Note: The dependent variable is sickness absence incidence. In the interaction term we have interacted quarterly oil prices with the treated individuals. Each column represents a separate regression, when using different sections as the control group (Section A includes Agriculture, Forestry and Fishing Section (Column 2), Section D and E represents Electricity, Gas, Steam and Air conditioning supply (Column 3), Section F includes Construction (Column 4), Section G includes Wholesale and retail trade (Column 5), Section H includes Transportation and Storage (Column 6) and Section I includes Accommodation and Food service activities (Column 7)).

Robust standard errors in parentheses.

$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

Table A4: Re-specification of the Control Group when using Alternative Industry Sections

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Section K	Section L	Section M	Section N	Section O, P, Q	Section R	Section S
Interaction term	-0.000067	0.000179	0.000151*	0.000154	0.000047	0.000018	-0.000083
	(0.000092)	(0.000160)	(0.000074)	(0.000088)	(0.000062)	(0.000127)	(0.000128)
N	21775	17670	29361	27349	104679	18428	19484

Note: The dependent variable is sickness absence incidence. In the interaction term we have interacted quarterly oil prices with the treated individuals. Each column represents a separate regression, when using different sections as the control group (Section K represents Finance and Insurance activities (Column 1), Section L represents Real estate activities (Column 2), Section M represents Professional, Scientific and Technical activities (Column 3), Section N represents Administrative and Support service activities (Column 4), Section O, P, Q represents Public Administration and Defence, Compulsory Social Security, Education, Human health and Social work activities. (Column 5), Section R represents Arts, Entertainment and recreation (Column 6) and Section S represents other service activities. (Column 7)).

Robust standard errors in parentheses.

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Table A5: Re-specification of the Interaction Term using Threshold

	Oil Price under the Threshold of USD 50
Interaction term	-0.007495
	(0.006146)
N	21930

Note:The dependent variable is sickness absence incidence. We re-specify the interaction term in our main specification, so that the treatment dummy is equal to one if the observation unit is exposed to an oil price under the threshold of USD 50. We control for yearly and seasonal variation in sickness absence, age, gender, level of education, corporate ownership, company size, municipality class and type of employment contract. Robust standard errors in parentheses.

$^*p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

Table A6: Re-specification of the Dependent Variable

	Length of Sickness Absence
Interaction term	-0.1063075
	(0.059485)
N	668

Note: The dependent variable is length of sickness absence (measuring weeks of absence). In the interaction term we have interacted quarterly oil prices with the treated individuals. We control for yearly and seasonal variation in sickness absence, age, gender, level of education, corporate ownership, company size, municipality class and type of employment contract. Robust standard errors in parentheses.

$^*p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$