



Munich Personal RePEc Archive

# **Expanding the Norwegian Armed Forces in the Time of Corona: Benefit-Cost Analysis in the Context of High Unemployment Rate**

Lindgren, Petter Y. and Presterud, Ane Ofstad

Norwegian Defence Research Establishment

22 January 2021

Online at <https://mpra.ub.uni-muenchen.de/106405/>  
MPRA Paper No. 106405, posted 24 Nov 2021 04:24 UTC

# Expanding the Norwegian Armed Forces in the Time of Corona: Benefit-Cost Analysis in the Context of High Unemployment Rate<sup>1</sup>

## 1 Introduction

The SARS-CoV-2 pandemic, the subsequent government non-pharmaceutical interventions to reduce the transmission of corona virus, and adjusted consumer behavior have resulted in dramatic reductions in demand, production, and employment globally. Unemployment rates have peaked in many countries during the pandemic. Could the Armed Forces in advanced economies exploit this period of high unemployment by providing work to unemployed and strengthen nations' security and defense?

Unemployment is expensive for individuals and societies due to forgone production. Displacement and unemployment also have negative economic effects on workers, in particular in terms of future wages and the likelihood of re-experiencing unemployment spells (e.g. Wachter and Bender 2006; Couch and Placzek 2010). In addition, recessions cause negative wage effects for graduates of high school and college (Altonji et al., 2016; Kahn, 2010).

Facing high unemployment rates, policymakers search for efficient mitigation policies to reduce unemployment and the economic and social costs involved in displacement. One way to fight unemployment is to hire employees in the public sector. Although few economists recommend countering short-term negative business cycles by permanent expansion of the public sector, under certain circumstances such an expansion makes sense. If society plans for more human resources to a specific public sector, regardless of business cycle, a more rapid expansion of the personnel base can make economic sense.

In this article, we investigate the benefits and costs of an expedite recruitment of already planned personnel expansion in the Norwegian Armed Forces. The Norwegian economy has suffered a historically large reduction of gross domestic product in 2Q 2020 (6.3 percent<sup>2</sup>) and the unemployment rate peaked at 15.5 percent in April, up from 3.7 percent in the pre-corona economy. While the unemployment rate has decreased during the 2020 summer and fall, it is still at a historical high level of 6.8 percent.<sup>3</sup>

Prior to the outbreak of the pandemic, the Norwegian government proposed to increase the Armed Forces with 550 man-years – a 3 percent increase in its workforce. We compare two recruitment strategies: an expedite strategy where all personnel is employed July 1, 2020 and a planned strategy where the personnel is hired over the next four years.

The benefit-cost literature deals with labor supply increasing projects and reforms. Bartik (2001) studies policies to improve the employability of unemployed, including business subsidies (see also European Commission 2016). A number of studies examine the benefit-costs of supported work programs (e.g. Bateman 1967; Hill and Wehman 1983). Also, a larger literature discusses whether, and if so, how larger labor supply or increased labor productivity gains should be included in benefit-cost analyses of reforms and investments (Bartik, 2012). In

---

<sup>1</sup> We would like to thank Torbjørn Hanson, Sverre Kvalvik, Kari Røren Strand, and Espen Berg-Knutsen for comments and suggestions for improvements.

<sup>2</sup> <https://www.ssb.no/nasjonalregnskap-og-konjunkturer/artikler-og-publikasjoner/nedgangen-i-norsk-okonomi-i-2.kvartal-er-den-dypeste-ssb-har-malt>

<sup>3</sup> Data on the unemployment rate from: <https://www.nav.no/no/nav-og-samfunn/statistikk/arbeidssokere-og-stillinger-statistikk/nyheter/193-800-arbeidssokere-registrert-hos-nav>. Retrieved Jan 13, 2021.

the context of the defense sector, Hanson and Lindgren (2020, 2019) and Lindgren and Hanson (2019a, 2019b, 2019c, 2018) study the benefits and costs of increasing the special retirement age in the Norwegian Armed Forces, and provides as such a framework for relating employment of older workers in the military to increased labor supply in the economy.

No study, to our knowledge, has however assessed the net gains to society from a pure hiring measure. This article thus contributes to the literature with new insights into how a rapid expansion of a public sector that anyways is to increase in the near future can benefit society.

In a healthy economy without excess unemployment, the value of a marginal increase in labor demand from an investment or reform is perfectly offset by the marginal cost of reduced manpower in the sector or work the employed leave (unless the investment or reform increases the overall labor supply). With high unemployment, however, increased labor demand leads to net benefits for society. It matters that the Armed Forces recruit the new employees from the pool of unemployed or that unemployed people are able to fill positions in jobs that are left vacant by workers who take up positions in the Armed Forces.

To study the net gains to society, we apply an economic model (BEMOD) that sums up the various costs and benefits of both the expedite and the planned recruitment strategies. The results show that the expedite recruitment strategy contributes with positive net gains to the Norwegian society if the period with high unemployment lasts longer than half a year after program start.

The parameter values in BEMOD are uncertain. Thus, we provide sensitivity analyses of the parameters. The net positive benefits of the expedite recruitment plan are robust for most of these sensitivities. The most important sensitivity analyses are concerned with two fundamental assumptions in the model. First, we test what happens to the main results if the Norwegian society does not prefer to increase the number of personnel in the Armed Forces. The calculations show that the labor market must be in a long contraction before it makes sense for society to increase the personnel in a public sector where society has no preferences for increased personnel.

Second, we test for the magnitude of the unemployment reducing effect of expanding the Armed Forces with new positions. In the main analysis, we expect that unemployed are able to fill positions in the Armed Forces or in jobs left vacant by recruits to the Armed Forces. If unemployed and young graduates are unable to fill the increased positions in the Armed Forces, the benefits for society are much smaller of the project.

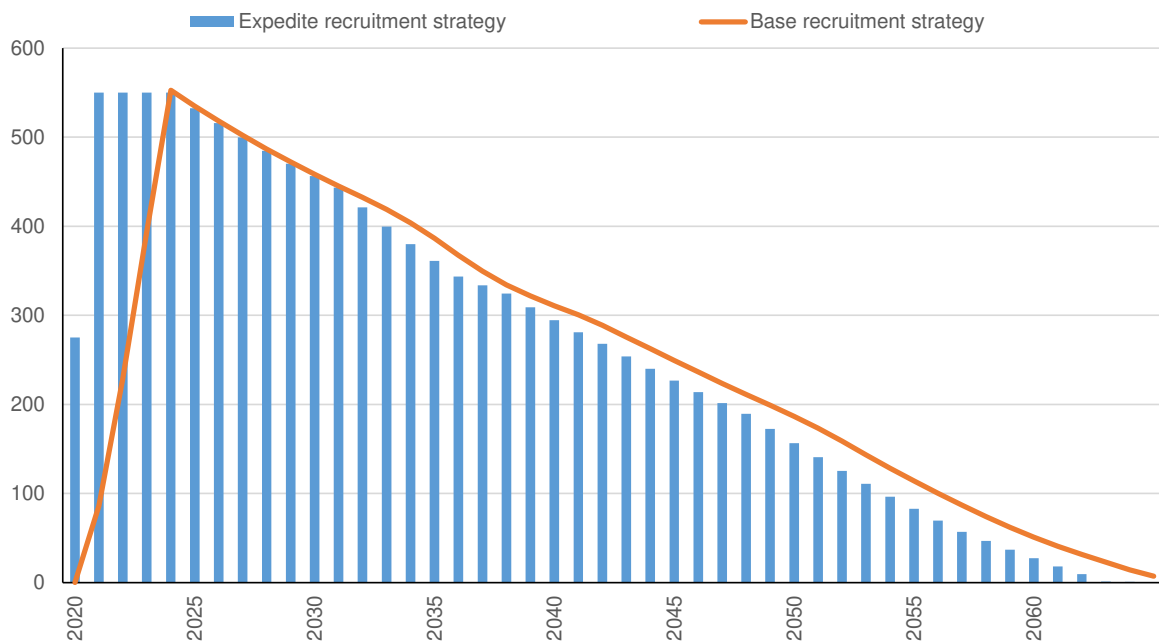
The structure of the article is as follows: we start with a discussion of Norway's security environment and defense plans in section 2 in order to understand the underlying social preferences for more personnel in the Norwegian Armed Forces. Then, to take account of the high uncertainty regarding the economy, we present scenarios of Norway's economic futures in section 3. We proceed by a literature overview of the displacement and recession literatures to first identify the economic costs of the pandemic (section 4), and then the social, psychological, and health-related costs (section 5). Then we present the benefit-cost analysis (BCA) model and the data in section 6. The main results are shown in section 7, while a sensitivity analysis is done in section 8. Finally, we conclude the article in section 9.

## **2 Norway's Security Environment and the Armed Forces' future budgets**

The key pillar in Norwegian security policy is the NATO alliance and the military relationship with the United States. During the Cold War, Norway spent almost 3 percent of its GDP on the Armed Forces and maintained a large mobilization force. In the aftermath of the Cold War, the country enjoyed a substantial ‘peace dividend’, reducing the spending to under 1.5 percent of GDP by 2010 through a substantial downsizing of the Armed Forces. Russia’s annexation of Crimea and the intervention in Eastern Ukraine changed the Norwegian security perceptions of Russia. The neighboring great power’s actions also provoked calls for rearmament among the NATO members. The Armed Forces budget has increased incrementally every year after 2014, and today, Norway spends about 2 percent of its GDP on defense purposes.

Just a month after the first government interventions to obstruct the corona pandemic, the MOD handed over a draft of the next LTP (4-year plan 2021-24) to the parliament (Forsvarsdepartementet, 2020). The draft involved a plan to increase the number of man-years with 550 towards 2024. At the time we initiated the study, we had therefore a reasonable *base recruitment strategy* for society’s preferences for the future size of the Armed Forces. We then built an *expedite recruitment strategy* where the MOD was allowed to accelerate the hiring within the next few months. The two recruitment strategies are shown in Figure 1.<sup>4</sup>

**Figure 1:** Additional personnel in the Armed Forces per year, base and expedite recruitment strategies, 2020 – 2065.



In the expedite recruitment strategy, we model a cohort of recruits mid-way into 2020 and study both their employment in the Armed Forces and their careers after the Armed Forces. Many will leave the Armed Forces before retirement and continue their careers in the private sector.<sup>5</sup>

<sup>4</sup> After debates in the parliament, the MOD was requested to reform the draft. The MOD presented a new draft in October. On December 1 2020, a majority in the parliament agreed on an LTP that contained a much more rapid recruitment of the 550 man-years, with most positions to be filled throughout 2021. The final version of the LTP thus contains a recruitment strategy similar to the expedite recruitment strategy we study in this article.

<sup>5</sup> We hold the number of public sector employees fixed in the analysis. If some former Armed Forces employees find jobs in the public sector, others will be employed in the private sector instead. 20 percent of the recruited

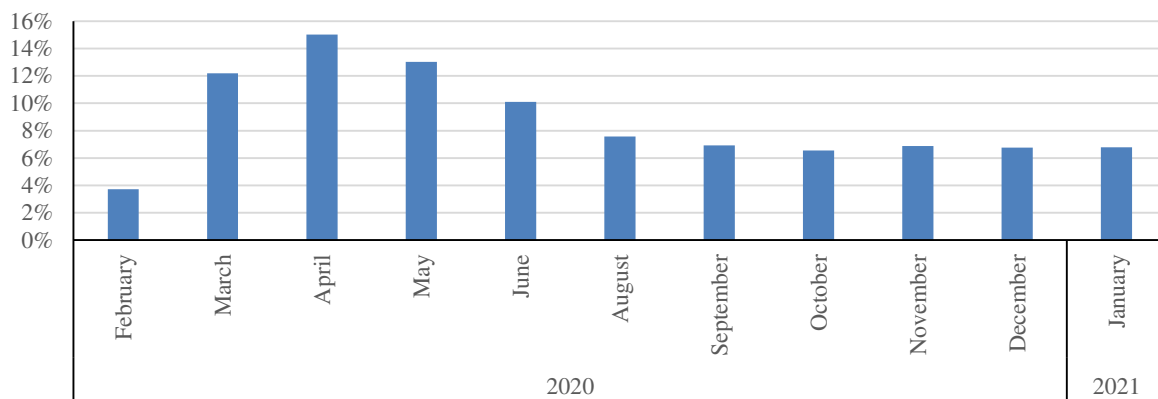
The same amount of personnel is recruited in the base reference strategy, but they are hired at a different time. Thus, we construct two groups of potential Armed Forces hires: 1) 550 man-years per year available in the latter half of 2020 and 2) 550 man-years per year available over the 2021-2024 period. These two groups differ slightly in age, since recruited personnel are modeled to be 20-24 years old for short-term contracts and 25-49 years old for long-term contracts. Thus, the expedite and the base recruitment strategies in figure 1 both exhibit a decline in the number of Armed Forces personnel over time, with a slightly delayed profile for the base reference alternative. Group 1 is hired in the Armed Forces while group 2 works in the private sector in the expedite recruitment strategy, and vice versa in the base recruitment strategy.

### 3 Norway's Economic Futures

The benefits of the expedite recruitment strategy are related to the unusually high unemployment rate in the Norwegian economy due to the corona pandemic. The most significant variable for the analysis is therefore how long the recession and the spike in unemployment last.

It is difficult, if not impossible, to predict the future (Taleb, 2007; Tetlock, 2017; Tetlock and Gardner, 2015). What we knew in March and April 2020 was that the Norwegian economy was in the midst of a serious recession. Figure 2 shows the development in the unemployment rate in Norway. The unemployment rate saw a spike in the March – June period with a rapid decrease in number of unemployed towards the summer, and has been stable at a relatively high level during the fall and the winter.

**Figure 2:** Unemployed as share of labor force. Includes fully unemployed, partly unemployed and jobseekers on employment measures by the Norwegian Labour and Welfare Administration.



Source: Unemployment numbers from Norwegian Labour and Welfare Administration (nav.no), labor force numbers from Statistics Norway (ssb.no). Data retrieved Jan 13, 2021. Note that data does not contain numbers for July.

Instead of attempting to forecast a likely development of the Norwegian economy and the labor market, we operate with four scenarios for the unemployment rate going forward. In scenario A, we assume that the bad condition in the Norwegian labor market only lasts 6 months after

---

personnel are assumed to be on short-term contracts (ends at age 35) and the rest on permanent contracts (retirement age 67 years). Quit rates are estimated by Lillekvelland and Strand (2015).

the expedite recruitment strategy starts. In scenario B, we assume that the high unemployment rate lasts for a year after this strategy starts. In scenario C, we extend the bad conditions in the labor market one additional year, and finally, in scenario D, we assume four years of a worsened labor market. The scenarios and the labor market conditions can be seen in table 1.

**Table 1:** Overview of the condition in the labor market, scenario A–D, high (red cells) and low (green cells) unemployment rates

Scenario	1 <sup>st</sup> 6mo	2 <sup>nd</sup> 6mo	3 <sup>rd</sup> 6mo	4 <sup>th</sup> 6mo	5 <sup>th</sup> 6mo	6 <sup>th</sup> 6mo	7 <sup>th</sup> 6mo	8 <sup>th</sup> 6mo
Scenario A	Red	Green	Green	Green	Green	Green	Green	Green
Scenario B	Red	Red	Green	Green	Green	Green	Green	Green
Scenario C	Red	Red	Red	Red	Green	Green	Green	Green
Scenario D	Red	Red	Red	Red	Red	Red	Red	Red

#### 4 The Economic Cost of Displacement

A large literature in economics study the effects for individuals of job displacement and graduation from high school and higher education into a recession. The literatures deal primarily with economic effects, but also contain studies on psychological, social and health-related effects of displacement. In this section, we review the economic effects, while in section 5 we review other effects. The focus on displacement resulting from mass layoffs and business closings reduces the selection problem because such displacement resemble a quasi-experimental situation where there is no association between the likelihood of experiencing layoff (treatment) and the consequences of the layoffs (effect).<sup>6</sup> The strong designs of the studies reviewed in this section and the next section minimize the problem with causality that haunts many BCAs (Nardinelli, 2018). That said, the studies we review here may not be externally valid for the unusual business cycle downturn and extremely rapid spike in unemployment rates during the corona pandemic. The labor economics literature is nevertheless the best (and only) place to look for effects of displacement and graduation into recessions.

From these literatures, we derive parameter estimates to be used as inputs in the BCA modeling. For displaced workers, the economic effects involve lost income both due to a period outside the formal labor market and due to a negative impact on the wages earned later when re-entering the labor market as well as increased likelihood of re-experiencing unemployment. Recent studies always identify short-term effects of displacement, and sometimes long-term and permanent effects, but the magnitude varies between countries and industries. In a study of young German workers, Wachter & Bender (2006) find that initially the wages fall on average with 15 percent after the displacement, but that the effect is zero after five years. Couch & Placzek (2010) estimate that the wages in the US (Connecticut) are reduced by 12 percent six years after displacement. Huttunen, Møen, & Salvanes (2011) find a high increase in the likelihood of permanently dropping out of the labor force in Norway, but a relatively small long-term decrease in wages – 3.6 percent – for workers who find jobs in other firms.

For cohorts graduating into a poor economy, the literature is pointing to a negative effect on their careers and life earnings. Studying the 1980s recession in the U.S. labor market, Kahn

<sup>6</sup> The literature separates between individuals being fired (separation), voluntary quits and (mass) displacements. The latter economic phenomenon interests us here.

(2010) finds a strong long-run, negative impact on wages. Altonji, Kahn, & Speer (2016) expands the scope with a study of 1979–2011, and estimate the impact on first-year wages to be 10 percent, with the effects fading out over the next 7 years. The reason is lower employment, in particular full-time employment, as well as persistently lower wage rates. Oreopoulos, von Wachter, & Heisz (2012) find that recessions in Canada have a persistent but not permanent effect on wages, with stronger effects for the youngest workers than for workers with several years of work experience. They suggest that the negative effect is due to less well matches between employer and employee, and that job mobility towards better matches explain reduction in the effects over time. The results are replicated for a number of advanced economies, Japan (Genda et al., 2010), the UK (Gregg, 2001; Gregg and Tominey, 2005), Germany (Schmillen and Umkehrer, 2017) and Austria (Brunner and Kuhn, 2014). A study from Sweden find evidence for long-term negative effects of displacement on employment, unemployment rates and earnings, and confirms that past unemployment spells lead to more vulnerability in new recessions (Eliason and Storrie, 2006). Evidence from Norway shows that young people increase their likelihood of future unemployment (Raaum and Røed, 2006) and that workers are more vulnerable (Haaland, 2018) if they graduate into a recession. Men are more vulnerable, and in particular, men with lower cognitive abilities (Haaland, 2018).

Studies show that displacement and recessions have a tendency to “scar” unemployed and young workers. But why is it so? In general, labor economics explain differences in wages with human capital (Becker, 1964, 1962; Mincer, 1974; Oi, 1962), deferred compensation (Lazear, 1979), efficiency wages (Krueger and Summers, 1988), fairness considerations (Akerlof and Yellen, 1990, 1988), search models (Christensen et al., 2005), matching theory (Jovanovic, 1979) and signaling (Akerlof, 1970; Spence, 1973). The literature we review on displacement and recessions targets primarily 1) the accumulation (and lack thereof) of various types of human capital, 2) search and match problems, and 3) signaling, as reasons for the negative economic effects.

If human capital matters and workers have mostly general human capital (applicable in any job), we expect no or small reduction in wages from displacement. If workers instead have a lot of firm specific human capital, we expect a larger reduction in wage. Moreover, if human capital is task- or industry-specific, and workers cannot find jobs with the same tasks or within the same industries, we expect negative short-term and long-term effects. Thus, in their study of displacement from Norwegian manufacturing plants, Huttunen et al. (2011) find evidence for human capital to be partly firm specific and partly industry-specific. Workers who are able to find jobs within the same multi-plant firms experience small wage reductions, whereas workers who have to look for jobs in other firms in and outside their industry have negative impact on wages. Likewise, Kahn (2010) proposes that the recession effect on graduates stems from a combination of lack of human capital accumulation and matching: with a thinner labor market, there are fewer options for graduates. On average, we expect them to find less optimal matches, and the consequence for the long-term is the continuation of less-than-optimal accumulation of human capital. Khan contrasts this theory with search models, and posits that the thin labor market alone can only have short-term effects. If the search mechanism was the only mechanism in operation, workers could switch to better-suited jobs once the recession is over, and the negative effect would only be short term.

Oreopoulos et al. (2012) suggest that the reason why the differentials between cohorts experiencing booms and busts decrease over time is exactly the same mechanism: workers, in

particular highly educated workers, are able to exploit job mobility to increase wages. Brunner & Kuhn (2014) support this mechanism: they find that 75 percent of the difference is explained by bad matching in the recessions.

A third argument for scarring of workers is related to the seminal work on information asymmetry and signaling in markets, for instance for goods (Akerlof, 1970) and jobs (Spence, 1973). Gibbons & Katz (1991) propose that employers exploit potential workers' unemployment history as a signal about their abilities. Experimental studies have provided evidence for this theory, i.e. it is harder for workers with prior unemployment history to be hired (Eriksson and Rooth, 2014; Kroft et al., 2013; Oberholzer-Gee, 2008).

Taken together, from this literature review, we derive four effects to model. First, the unemployed suffer from a lack of ability to improve their human capital by on-the-job learning as well as losing already acquired skills and knowledge. The expedite recruitment will reduce this negative effect. We term the effect 'Mitigating human capital loss'. Second, the expedite recruitment strategy will also reduce the signaling scar of the newly employed and let people who otherwise would spend their time outside the labor market to match with the Armed Forces or with employers that lose employees to the Armed Forces. This results in better matching and less friction in the labor market. We term this effect 'Improved matching and less signal scarring'. Third, since job tasks in the Armed Forces on average require a great deal of defense-specific human capital, society will lose these investments if personnel later leave the defense sector to take up jobs in the civil sector. This effect is greater if the retention rate between workers hired in the expedite alternative is lower than in the reference alternative. We term this effect 'Less return on the defense-specific human capital investments'. The fourth effect is also related to the human capital of the newly hired personnel: people hired to the Armed Forces arrive with knowledge and skills suited for the job they used to do in the civil (non-defense) sector. The Armed Forces will exploit their general and possibly task-specific human capital, but some of the newly hired personnel's initial human capital will be firm- and industry-specific human capital. This will over time be lost to them and society. We term this effect as 'Exploitation of existing human capital'.

The two former effects are positive effects of the expedite recruitment strategy, and together, they sum up to the overall effects on wages and employment by displacement and recessions identified in the labor economics literature. The latter two effects are potentially negative effects of the expedite recruitment strategy and is due to the peculiar nature of defense production in the Armed Forces. Much of the tasks in the production of defense and military services are distinct from civil sector tasks. We continue with the specifics of the calculation in section 6. In the next section, we review the psychological, social and health-related effects of displacement.

## **5 The Psychological, Social and Health-Related Costs of Displacement**

The displacement literature is filled with studies on the psychological, social and health-related costs of becoming unemployed due to mass layoffs. We summarize the findings shortly below. Workers experience a worsening in the subjective well-being after being laid off (Clark et al., 2001; Clark and Oswald, 1994; Winkelmann and Winkelmann, 1998). This psychological cost of scarring is estimated to be higher than the costs involved in income reduction (Winkelmann and Winkelmann, 1998). The psychological effect takes place even after a worker has found a new job (Clark et al., 2001). We term this effect "Positive psychological effect".



The labor economics literature has identified several social costs of displacement. In the following sections, we discuss the literature's findings on the effects on the divorce rate, children's education and the criminality rate. In the United States, there is a causal link between layoffs and higher divorce rate (Charles and Stephens, Jr., 2004). They also show that it was not income reduction per se, but more likely the information about the partner revealed by layoff that caused marriage dissolution. Eliason (2012) finds that displacement result in an increase in the risk of divorce in Sweden to be 13 percent for men, and half of that for women (but the latter is not statistically significant). Rege, Telle, & Votruba (2007) estimate that Norwegian marriages where husbands lose their jobs in plant closure had an 11 percent higher rate of dissolution than those working in non-closing plants. Their results indicate that the reason is *not* reduction in income but rather the decline in the husband's attractiveness as a main breadwinner. They do not find the same effect on the divorce rate when the wife suffers from plant closure. Since the studies are based on Scandinavian data, we can expect the results to be externally valid for men employed in the expedite recruitment strategy. The effect is termed 'Lower divorce rates'.

A smaller literature investigates whether life outcomes of displaced workers' children are affected as well. In the US, only small causal effects on children's long-term outcomes such as education and income are found (Hilger 2016). Another study on the US finds that parental job loss increases the probability of grade retention among children with 15 percent (Stevens and Schaller, 2011). When youth finish high school, their education progress is vulnerable to parental job loss, mostly because of the financial loss of layoffs (Coelli, 2011). For adolescents, parental job loss prior to labor market entry leads to a more intensified job search and thus these children increase their labor supply with 9 percent compared to children whose parental job loss happens after labor market entry (Fradkin et al., 2019).

In Canada, children of displaced fathers have about 9 percent lower earnings as adults than peers (Oreopoulos et al., 2008), while in Norway, Bratberg, Nilsen, & Vaage (2008) find significant effects on earnings and employment for laid off workers, but no effect on earnings of the next generation. Rege, Telle, & Votruba's (2011) estimates suggest that paternal job loss causes a 6 percent reduction in grade score, while maternal job loss has a non-significant positive association with children's score. The effects are largest in municipalities with "mediocre performing labor markets" and among fathers with "low pre-displacement earnings" (Rege, Telle, & Votruba, 2011: 1463). The reasons for the difference between strong income effect in Canada and no income effect in Norway, may be "due to the generally high intergenerational earnings mobility and the compressed wage structure in Scandinavian countries" (Rege, Telle, & Votruba, 2011: 1464). This may also explain that there is an effect on children's grades but not on their future earnings. Moreover, Rege, Telle, & Votruba (2011) find no mitigating effect of father's income and work experience. Instead, supported by several studies showing that the mental distress from displacement is harder on men, they hypothesize that the effect on grades is due to father's loss of identity as an important worker in the family due to the displacement itself. The expedite recruitment strategy is therefore expected to have no effect on how the fathers' act vis-à-vis their children in the case of unemployment and then subsequent recruitment into the Armed Forces.

The third social effect of displacement is more criminality. Economists have for a long time been interested in the relationship between displacement and crime rates, as job loss increases the relative value of criminal acts (Becker, 1968; Ehrlich, 1973). Evidence from the United

States shows that higher unemployment rates increases crime rates (Lin, 2008; Raphael and Winter-Ebmer, 2001). A study from Norway contributes to this literature by showing that charge rates among displaced workers increase with 20 percent, and the effect is relatively large for property crimes (Rege et al., 2019). The effect is however small in our context since the absolute criminality rates among potential hires to the Armed Forces is expected to be low. We include the effect as ‘Less criminality’.

Finally, the labor and health economics literatures discuss the implications for workers’ health of mass layoffs. In the United States, it is documented that job displacement lead to 10-15 percent increase in mortality over the long run, meaning 1-1.5 years for middle aged persons, but small effects for older persons (Sullivan and Wachter, 2009). Kuhn, Lalive, & Zweimüller (2009) find that plant closure lead to a strong increase in sickness benefits and expenditures to antidepressants and related drugs and hospitalization due to mental health problems for men. However, they find little increase in overall health expenditure.

Evidence from Scandinavia suggests that mortality can increase due to displacement. Browning, Moller Dano, & Heinesen (2006) found no evidence for displacement causes stress-related hospitalization in Denmark. A larger and broader follow-up study on a range of different diseases proves, however, causality between displacement and higher overall mortality and mortality “caused by circulatory disease; of suicide and suicide attempts; and of death and hospitalization due to traffic accidents; alcohol-related disease; and mental illness” (Browning & Heinesen, 2012: 599). Evidence from Sweden shows a short-term effect of 44 percent increase on overall mortality among men from job displacement but no significant change in risk for females or in the long-run (Eliason and Storrie, 2009). In their study of disability benefits up-take, Rege, Telle, & Votruba (2009) find that workers over the age of 40 experiencing displacement increase the likelihood of dying within the next years with 14 percent. As in the psychological literature reviewed above, the study also finds that diagnoses of mental disorders are more prevalent among those starting to receive disability benefits following plant downsizing. We term this effect ‘Reduced mortality’.

## **6 The BCA Model and Data**

### *6.1 Benefit-Cost Analysis*

BCA is a ‘systematic process of calculating the benefits and costs of policy options and projects’ (Atkinson et al. 2018; in the context of Armed Forces, see Melese, Richter, and Solomon 2015). The method calculates the effects – i.e. the benefits and costs for a society – and thus goes beyond the expected profit analysis that corporations conduct. Although in many cases increased net profits in the private sector are equal to societal gains, the presence of market failures certainly erases the equality sign.

The core concern of BCA is the efficient use of society’s scarce resources. BCA is frequently used when analyzing the effects of public investments in infrastructure projects (Calthrop et al., 2010; Department of Transport, 2011; Eliasson, 2009; Venables, 2007), the health sector (Bleichrodt and Quiggin, 1999; McIntosh et al., 2010; Wang et al., 2003) and environmental policies (Atkinson et al., 2018; Nordhaus, 2006; Stern, 2006). In the field of military projects, BCA has for instance been applied to study a potential increase in the special retirement age of military personnel in the Norwegian Armed Forces (Hanson and Lindgren, 2020).

BCA has several analytical cousins, such as cost-effectiveness analysis, cost-utility analysis, and risk-benefit analysis.<sup>7</sup> Specifically, BCA calculates both benefits and costs in monetary terms, making it possible to compare the benefits and costs in the same currency. Sometimes certain benefits or costs are difficult (perhaps impossible) to estimate and are incorporated into the analysis through a qualitative assessment. In this study, however, we have estimated and translated all costs and benefits to US dollars (USD) and are thus able to complete the comparison. As Nardinelli (2018) reminds us, a pure qualitative analysis is problematic because of the inherent interest in comparing the different effects. We argue that leaving some effects for qualitative assessments are also challenging to the overall conclusions, since it is impossible to compare qualitative assessments with quantitative calculations. Thus, we have aimed for full quantification of all effects despite the uncertainty about the value of parameters. We conduct a sensitivity analysis securing a broad understanding of the sample space for important parameters in the model.

## *6.2 The value of defense production*

This study concerns how Norwegian society's resource allocation is improved and/or deteriorated by an expedite recruitment strategy in the Armed Forces. The main effect is increasing value added by reducing the number of unemployed and increasing the production of defense goods and services. Thus, a key question is what is the value of defense production of new employees in the Armed Forces? A common response in valuation of public service production is to equate the cost of production (input) with its value (output) (Aaberge et al., 2017). The value of the defense sector is notoriously challenging to estimate as it provides public goods like security, national sovereignty and safety (security hereafter), i.e. services not available in the market, leaving us with no estimates of price and value.<sup>8</sup> The defense sector shares this characteristic with much public welfare production. Estimates for public service production show that Norway, and the Nordic countries in general, score high on public technical efficiency (Afonso et al., 2005; Angelopoulos et al., 2008). This means that equating the cost of defense production to the value of security can be a meaningful exercise.

In addition to the lack of market signals, it is hard to evaluate to what extent a nation's Armed Forces actually provides security or if it is rather the nation's allies that provide the valuable public goods. Perhaps it is the lack of interest to challenge peace and sovereignty among potential enemies and threats (see Hanson (2019b) and Hartley and Solomon (2015) for further exploration)? Moreover, since the Norwegian government plans a gradual increase in the defense budget, the social utility of the additional funding is perhaps also growing the next four years. An immediate jump in the budget as in the expedite recruitment strategy will then translate into a smaller increase in social utility than the costs. We believe, however, that the gradual increase the next four years has more to do with budget constraints in public budgets than a gradual increase in the social utility of defense spending. Thus, in the main results, we assume that society appreciates an increase in defense spending in 2020 to the same extent as a gradual increase over the 2020–2024 period.

Although we appreciate the complexity of estimating the value of defense production, we follow here the standard approach by treating the cost of the new employees (i.e. wages,

---

<sup>7</sup> For an example of a cousin of BCA applied to the field of military economics, see Green and Zeckhauser's (2019) performance and cost analysis.

<sup>8</sup> See Hanson (2016, 2019) for a more in-depth treatment.

pension, and personnel materials) as the value added for society. This move aligns with the recommendations by the Norwegian Ministry of Finance on goods and services not provided in the market (Finansdepartementet, 2014). We investigate the sample space of this value in the sensitivity analysis.

### 6.3 *The opportunity cost of employment*

To employ unemployed may come with a social cost, namely the unemployed’s value of the time available for non-market work such as household production and leisure. What is the value of this? Much discussion in labor economics and the BCA literature on the use of unemployed workers concerns the reservation wage as an estimate on the opportunity cost of labor supply. The reservation wage is the minimum wage a worker requires in order to provide labor in the formal labor market. Surveys show that the reservation wage is slightly above the market wage (Feldstein and Poterba, 1984; Jones, 1989). Results from methods deriving the reservation wage from market wages show a ratio close to market wages, e.g. 91 percent (Mohanty, 2005) and 80 percent (Hofler and Murphy, 1994).

Other studies argue instead that the value of leisure matters in BCAs.<sup>9</sup> Some suggest that the value of leisure can be negative for unemployed. Mishan and Quah (2007: 69) write that due to the cost of unemployment stigma, unemployed workers may be “prepared to pay to be employed even where no wage at all is offered to him”. In the seminal treatment of unemployment in BCAs, Haveman and Krutilla (1967: 389) suggest “involuntary leisure has a zero benefit”. Finally, Haveman and Farrow (2011: 3) discuss that involuntarily imposed leisure may “convey disutility”. These claims of a potential non-positive value of time differ substantially from the estimates of the reservation wage in the macroeconomics and labor literatures. One reason for this may be that the reservation wage contains more than the time forgone when accepting a job.

Chodorow-Reich and Karabarbounis (2016) model the opportunity cost of employment (as a share of the marginal productivity),  $z$ , as the sum of public benefits that the unemployed forgo upon employment,  $b$ , and forgone value of nonworking time,  $\xi$ . We add two more variables,  $c$ , which is the costs related to working, such as commuting costs and arranging child-care, and the stigma or negative effects on life satisfaction (see e.g. Frey and Stutzer (2002)) of unemployment,  $s$ :

$$(1) \tilde{z} = b + \xi + c + s,$$

where  $\tilde{z}$  is the reservation wage as a share of market wage (instead of marginal productivity). The value of nonwork time,  $\xi$ , includes the values of household production and leisure. Mas and Pallais (2019: 122) point out that going from pre-tax to post-tax consideration appraises the value of  $\tilde{z}$ . We seek to apply net values because that is what rational workers care about. The net approach highlights also the role of taxation in magnifying the value of nonwork time in the reservation wage.

With (1) in hand, it becomes easier to dissect the relevant social costs of employment. Public benefits<sup>10</sup> (net of taxes) play a role in workers’ reservation wage but can hardly be a relevant

---

<sup>9</sup> Bartik (2012) refers to these as a different tradition than the reservation wage scholars.

<sup>10</sup> Unemployment benefits net of taxes, but also net of the public benefits that comes along with employment, e.g. unemployment and disability insurance as well as pension. In Norway, unemployment leads to substantial

social cost. When workers move into jobs and out of the pool of unemployed, society does not lose anything from paying less public benefits. The workers lose the consumption opportunity from the public transfer of benefits, but they receive a higher wage to allocate to desired spending. Society loses, however, from the lost nonwork time that workers could allocate to at least household production purposes, other non-market production and leisure. The stigma or unhappiness contribution of unemployment,  $s$ , is already operationalized by the ‘psychological effect’ discussed in section 5. Finally, society loses when  $c > 0$ . If average commuting time is one hour per day and the workers value commuting time as half of the gross wage (see Small 2012), then commuting cost is equivalent to increasing  $\tilde{z}$  by 0.06 (Mas and Pallais 2019: 122). Child-care costs are quite expensive many places in the world, but in Norway, there is close to universal coverage to a highly subsidized price (Aaberge et al., 2017). A spell of unemployment is therefore unlikely to affect the choice of use of publicly financed child-care services.

The literature estimates  $z$  to 0.45–0.5 prior to Hagedorn and Manovskii (2008) and 0.73–0.92 after (Mas and Pallais 2019: 123; see also Chodorow-Reich and Karabarbounis 2016). Mas and Pallais (2019) estimate  $\tilde{z} = 0.58$ . The taxes are lower for the group they study than the group we study. Higher effective taxes reduces the opportunity cost of unemployment which means raising the  $\tilde{z}$  (i.e. the magnifying effect of  $\xi$  in net terms). Ceteris paribus, we expect a higher  $\tilde{z}$  for the Armed Forces personnel. The wage level (real and potential) of the Armed Forces employees is also higher than the ones studied by Mas and Pallais (2019). It is not clear whether  $\tilde{z}$  is expected to be independent of the wage level. Mas and Pallais' (2019) estimate of  $\tilde{z}$  includes public benefits. These are calculated to be 6 percent of after-tax marginal product (Chodorow-Reich and Karabarbounis, 2016). In Norway, the unemployment benefit is at a relatively high level, has a high take-up rate for eligible workers and has almost universal coverage. This means that we need to deduct a higher percent than in the U.S. studies.

At the same time, we have to add the cost of commuting. Last, Chodorow-Reich and Karabarbounis (2016) find that workers’ reservation wage is sensitive to the business cycle, with lower values of  $z$  under recessions;  $b$  is counter-cyclical while  $\xi$  is pro-cyclical. Since we discard  $b$  in this BCA, we expect therefore an even higher pro-cyclicality in the social cost related to the reservation wage. On the basis of these evaluations, the opportunity cost of employment is here set to 0.5 of the net wage level. We conduct a sensitivity analysis of this assumption in section 8 where we test how the net gains to society change when the value of leisure is negative, zero and close to 1.

#### *6.4 The effect on the number of unemployed by the recruitment strategies*

A critical assumption of the calculations is that an additional recruit to the Armed Forces reduces the number of unemployed with one person. This assumption is based on a view that the Armed Forces primarily hire young people before entering higher education and middle-aged adults experiencing less demand in the civil labor market. What happens to the overall results if the Armed Forces target workers with skills that there are high competition for in the labor market?

In general, unemployed have higher than random likelihood of getting employed when new positions are offered in the labor market (Persky et al., 2004). The reason is that they have more

---

likelihood of up-take of disability benefits (Rege et al., 2009), but the age groups most vulnerable are too old for the project studied in this article.

time to search and often more to gain from employment. If we assume that they have two times the random likelihood, they have 14 percent chance of getting employed directly when the Armed Forces hires. Moreover, unemployed can also find jobs that become vacant when already employed move to the Armed Forces (Persky et al., 2004). Such job chains multiply the likelihood for unemployed to be employed when the Armed Forces hire new personnel. In the sensitivity analysis in section 8, we test the conclusions of the analysis with four such chains (56 percent likelihood), two chains (28 percent likelihood), and no chains (14 percent likelihood). We disregard any potential productivity increases from these job chains because of the uncertainty in the parameter values (see Bartik 2012).

### *6.5 The Marginal Cost of Public Funds*

An economic efficiency perspective on the BCA means that we are not interested in the face value of changes to public finances, but the costs associated with the use of society's resources. Public spending requires taxation, which introduces a wedge into optimal production, work, and consumption decisions compared to a non-taxation situation. This wedge results in a social loss even when individuals behave rationally. Distortions to the optimal allocation of resources associated with taxation is termed the marginal cost of public funds (MCF).

The MCF argument stems from a literature concerned with the financing of public goods – initiated by Pigou (1947) and further developed by among others Diamond and Mirrlees (1971), Stiglitz and Dasgupta (1971), Mayshar (1990), Ballard and Fullerton (1992), Fullerton (2003), and Atkinson et al. (2018). The argument is a critique of the Samuelson (1954) rule, which states that the optimal level of provision of public goods is when the marginal cost (MC) equals the marginal benefit (MB). The critique adds the MCF to the MC side of the equation, so that the marginal cost of resources *and* the public financing of those resources equals the MB.

Lump-sum taxes have non-distortionary characteristics, that is, they do not exhibit substitution effects. Some argue that the income effect of lump-sum taxes induces labor supply and thus is efficiency-improving (see Sandmo 1998).<sup>11</sup> Pigovian taxes reduce negative externalities and are as such efficiency-improving. All other taxes are distortionary in the traditional sense. A tax system is, however, deliberately chosen to include distortionary taxes, such as income, consumption, wealth, and capital taxes, because of equality concerns. Thus, the efficiency-reducing effect of the taxes is not a necessity of financing publicly provided goods per se, but rather a consequence of society's aversion for inequality. Seen in this light, it becomes less straightforward to apply the Pigovian distortion perspective when deciding the BCA criterion for calculating societal net benefits of a project or reform.

Taxes lead therefore to both efficiency and distributional gains and losses. Bos, van der Pol, and Romijn (2019) suggest that the MCF of general tax revenues could be assumed to equal 1, meaning that the efficiency losses are perfectly offset by the distributional gains in the current tax system. It is however an empirical question whether the general tax system is able to offset the loss with positive effects on the income distribution. A handful of countries apply MCF in BCAs, including the United States and Scandinavian countries. US Office of Management and Budget (OMB) (1992) recommends applying a 1.25 MCF. Sweden applies a 30 percent MCF

---

<sup>11</sup> It is unclear to us how the increase in labor supply from lump-sum taxes is an efficiency gain. Generally, any deviations from first-best allocations in a non-tax situation should be considered suboptimal.

for use in the transportation sector (Trafikverket, 2016). In Denmark, the Ministry of Transportation recommends to use 20 percent MCF (Transportministeriet, 2015). Few other countries apply an MCF (Boardman et al., 2006).

In Norway, the Ministry of Finance recommends to apply an MCF of 1.2 (Finansdepartementet, 2014). Christiansen (2015) criticizes this suggestion because the recommendation does not consider a) that the tax system is construed partly because of distributional concerns, b) that the goods and services provided can stimulate economic activity and labor supply, and c) that investments in infrastructure and human capital can increase productivity. The project studied in this article increases labor supply, but this value is already included in the BCA. It is therefore only critique (a) that is relevant here. We choose to apply the recommendations from the Ministry of Finance, because all other BCAs in Norway rely on this assumption about the MCF. This choice ensures therefore that the analysis is comparable to other BCAs conducted on Norwegian public reforms, projects, and investments.

### 6.6 The BCA Model

The BCA model contains 12 effects.<sup>12</sup> The societal effects (SE) per worker category  $i$  (short-term military personnel, long-term military personnel, private sector personnel, unemployed) and year  $t$  are calculated as follows:

$$\begin{aligned} \Delta SE_{it} = & \Delta V_{it}n_{it} + \Delta M \left( (1 - t_{wi})w_{it} + (1 - t_{pi})p_{it} \right) n_{it} + \Delta L_{ut}n_{ut} + \Delta HV_{kt}n_{ut} \\ & + \Delta qV_{it}n_{ut} + \Delta m_iV_{it}n_{fit} + \Delta \frac{sV_{it}b}{y}n_{it} + \Delta \gamma n_{kit} + \Delta \psi n_{ut} + \Delta \phi \beta d \\ & + \Delta \frac{B_c}{N_{15-79}} g \alpha \beta n_{it} + \Delta \beta \pi Q e_i n_{ut}, \end{aligned}$$

where  $V$  is the value added per worker.  $n_{it}$  is the number of personnel in group  $i$  and year  $t$ .  $M$  is the MCF.  $w$  is the wage level.  $p$  is the pension level.  $t$  is the tax rate for wages and pension.  $L$  is the value of leisure.  $H$  is the human capital loss.  $V_k$  is the value added among private sector workers.  $n_{ut}$  is the number of unemployed.  $q$  is the parameter for percent gain from less scarring and better matching.  $m$  is the multiplier for defense-specific human capital loss when leaving the Armed Forces.  $n_{fit}$  is the number of people leaving the Armed Forces in year  $t$ .  $s$  is the share of the human capital that is not in use in the Armed Forces.  $b$  is a parameter that multiplied with the value added per work equal the value of this human capital.  $y$  is the number of years that this human capital linearly deteriorates to zero.  $\gamma$  is the time spent in education and courses after being hired by the Armed Forces.  $n_{kit}$  is the number of new personnel in the Armed Forces.  $\psi$  is the psychological cost of mass layoffs.  $\phi$  is the increased likelihood of divorces.  $\beta$  is the mitigation factor of the recruitment strategies of the Armed Forces.  $d$  is the social cost of divorces.  $B_c$  is the public budget to the police, prison and court system.  $N_{15-79}$  is the number of males aged 15 to 79.  $g$  is the male share of those incarcerated.  $\alpha$  is the estimated increase in criminality of mass layoffs.  $\pi$  is the man-years lost due to mass layoffs. Finally,  $Q$  is the discounted value of the sum of QALY multiplied with the respective life expectancies per worker group. The  $\Delta$  sign stems from subtracting the values in reference alternative from the expedite recruitment strategy.

<sup>12</sup> For more details on the model and analysis, see Lindgren et al. (2020a, 2020b) and Lindgren and Presterud (2020a, 2020b, 2020c, 2020d).

The model then sums up the discounted values of  $SE$  per group and year:

$$\Delta SE = \sum_{i=1}^4 \sum_{t=0}^T \frac{\Delta SE_{it}}{(1 + r_t)^t},$$

where  $r$  is the discount rate as suggested by the (Finansdepartementet, 2014), 4 percent the first 40 years, and then 3 percent, the four groups are Armed Forces employees on short-term and long-term contracts, private sector employees and unemployed.

We describe the data employed in this paper in Appendix A.

## 7 Main results

The main results from the BCA are shown in figure 3. In scenario A, the expedite recruitment strategy represents a loss of almost 10 million USD to the Norwegian society. Scenario B – D are positive, with approximately 10, 45 and 75 million USD, respectively. To increase the number of personnel in the Armed Forces in Norway has therefore a positive effect if the unemployment rates are higher than the normal rate until at least June 30, 2021. The longer the unemployment rate is high, the more positive the social value of the expedite recruitment strategy.

Value added of the formerly unemployed is the key positive effect. To employ planned personnel in 2020 instead of gradually in the 2021–2024 period has more value for society when the unemployment rate is high.

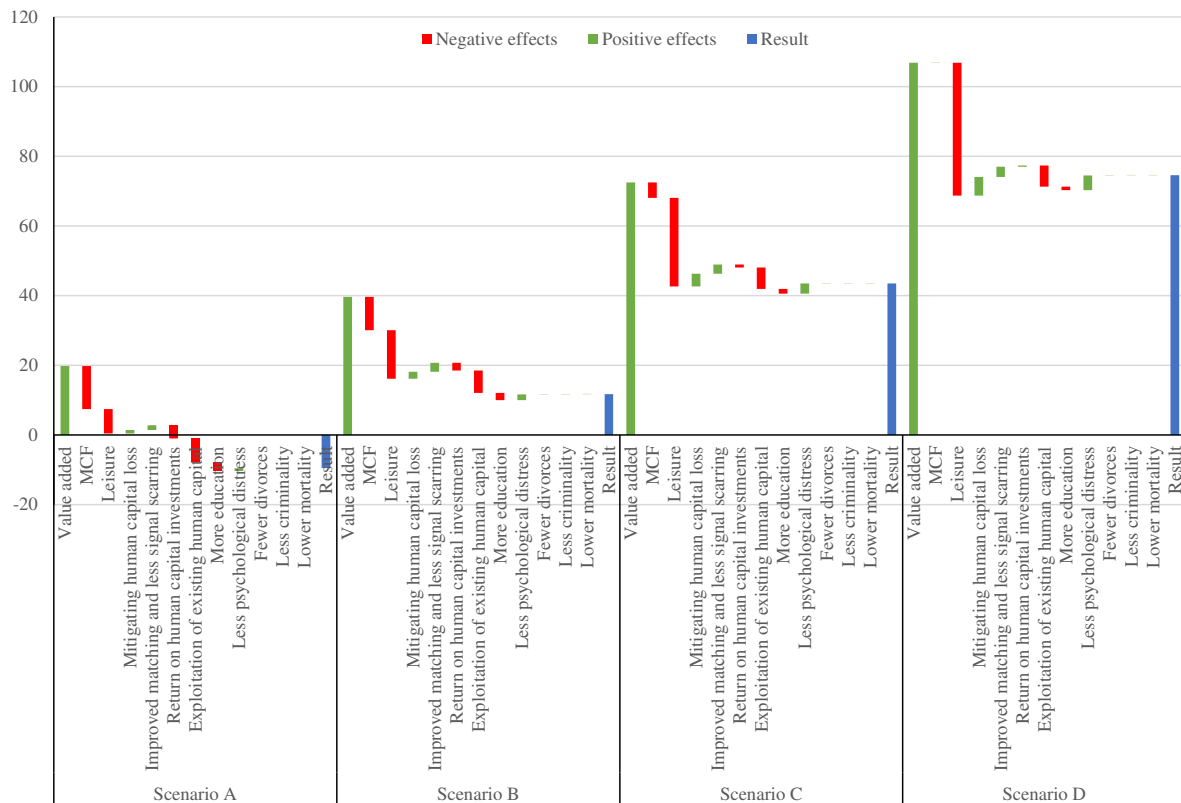
The MCF is particularly high in scenario A and lowest in scenario D. The reason for the difference between the scenarios in the magnitude of MCF is that the number of unemployed (with social benefits from the government) and the number of employees in the private sector (paying taxes) are inversely related in the scenarios. For instance, in scenario D, all non-Armed Forces persons are unemployed until 2024, and the impact on government budgets from hiring to the Armed Forces is only the difference between net wages (and net pension saving) minus net unemployment transfer (and net pension on the transfer).

The value of leisure (and household production etc.) is assumed to be half of net wage level. This is the most substantial cost in scenario B – D. In scenario A the MCF is higher than the cost of loss of leisure.

Mitigating human capital loss and improved matching and less signal scarring are small positive gains for society. Return on human capital investments, exploitation of existing human capital and education costs in the defense sector are larger yet modest negative effects of the expedite recruitment strategy. The psychological effect is also modest, but positive for society. The three social and health-related effects are estimated to be very small.



**Figure 3:** Overview of societal positive and negative effects, scenario A–D, discounted 2020 USD.



## 8 Sensitivity Analysis

The estimates of the effects of the expedite recruitment strategy rely on many uncertain variables, and thus the results are uncertain. In this section, we investigate what happens to the overall results when we change the parameter values. We also assess what happens to the results when we apply the alternative reference case where the Armed Forces experience no increase in manpower over the next four years.

### 8.1 Sensitivity for key variables

In **Error! Reference source not found.** we show the sensitivity to retention rates in the expedite recruitment alternative. If the personnel hired fast during the summer of 2020 has less propensity to stay in the Armed Forces, the organization will lose on its investments in defense-specific human capital. Thus, the change in the retention rates by -20 to -100 percent has a clear negative impact in all scenarios. In scenario B, a higher quit rate among the personnel has the potential to make society worse off when applying the expedite recruitment strategy rather than the reference alternative. **Error! Reference source not found., Error! Reference source not found., and Error! Reference source not found.** show the results' sensitivity to changes in the parameters for human capital loss, exploitation of existing human capital, and less return on the defense-specific human capital investments, respectively. The figures show that even under fairly large negative changes to the parameter values, the impact on society's net benefits of the expedite recruitment alternative is positive in scenario C and D. Again, scenario B is vulnerable for large, negative parameter assumptions. In **Error! Reference source not found.,**

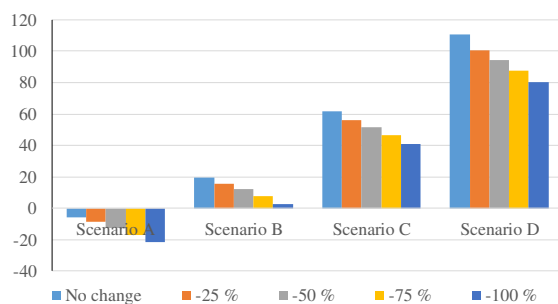
we investigate how the results change when we alter the equality sign between wages and value added. If the value added by the personnel in the expedite recruitment strategy is 20 percent higher than their wages, even scenario A turns positive for society. If, on the other hand, the value added is lower (-20%, -40%, -60% of the wages), the overall results experience a major reduction in societal net benefits. Scenario B is negative both under -40% and -60%. Scenario C is still positive even when value added is reduced by 60%, but is fairly close to the indifference line (0 societal net benefits). To assume that the Armed Forces personnel provide such low value added though means either that the personnel is very inefficient compared to the personnel hired in the reference alternative or that society does not value their production as much as in the reference alternative. While it was interesting to test the sensitivity to lower value added, we find it unreasonable to assume that personnel hired in the Armed Forces in the expedite recruitment strategy is less efficient or less valuable than the batch of personnel hired in the reference alternative.

**Error! Reference source not found.** tests the sensitivity to different assumption about the value of leisure. In the main results, we assumed that leisure had a value equal to half of the net wages for the unemployed. This assumption is based on an overall assessment of the literature on reservation wages. The sensitivity analysis shows that the results are sensitive to this assumption. If leisure has the value of 100 percent of the net wages, scenario B is turns negative for society, while scenario C and D are still positive albeit with much smaller social contributions.

When we adjust the impact on people’s future wages from improved matching and less scar signaling, the results are moderately affected (**Error! Reference source not found.**). Finally, changing the value of mitigating the psychological stress of displacement due to employment in the Armed Forces has a moderate effect on the social net benefits of the expedite recruitment strategy (**Error! Reference source not found.**).

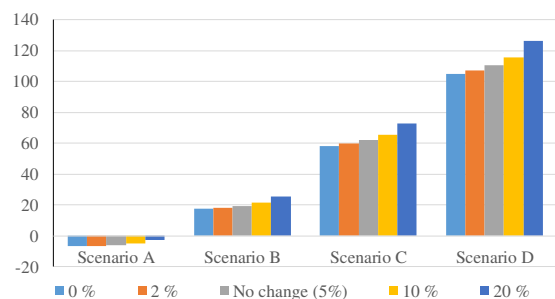
The sensitivity analysis show that the most important variables are the value added of Armed Forces personnel and the value of leisure. As long as the new employees in the Armed Forces are able to perform meaningful tasks in an efficient manner, the project will contribute with positive net benefits as long as the unemployment rate is high until at least June 20, 2021.

**Figure 4: Sensitivity to retention rates\***

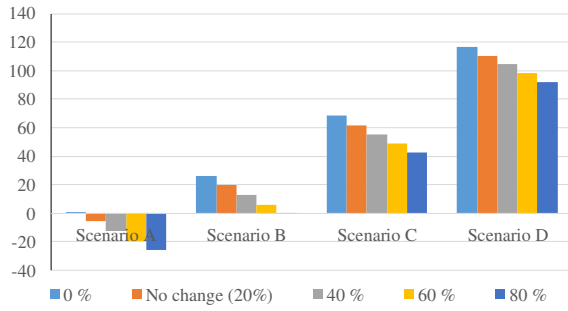


**Figure 6: Sensitivity to exploitation of existing human capital\***

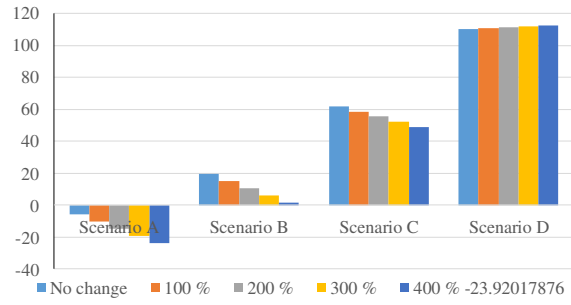
**Figure 5: Sensitivity to human capital loss\***



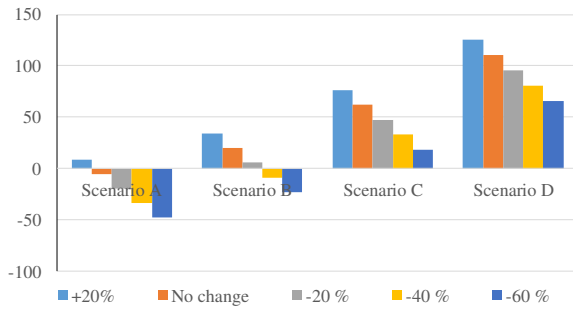
**Figure 7: Sensitivity to less return on the defense-specific human capital investment\***



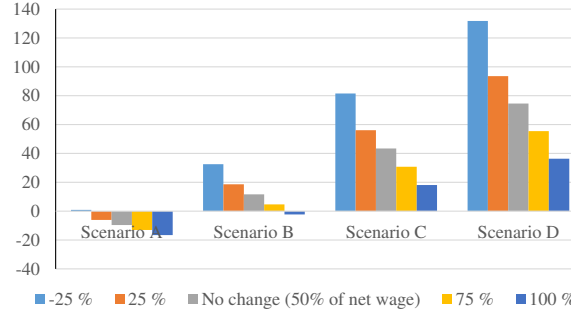
**Figure 8: Sensitivity to value added\***



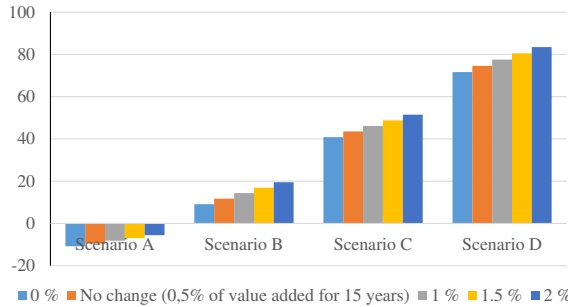
**Figure 9: Sensitivity to leisure\***



**Figure 10: Sensitivity to matching and scarring\***



**Figure 11: Sensitivity to psychological costs\***



\*All numbers in million USD (2020).

## 8.2 Status quo – the number of personnel

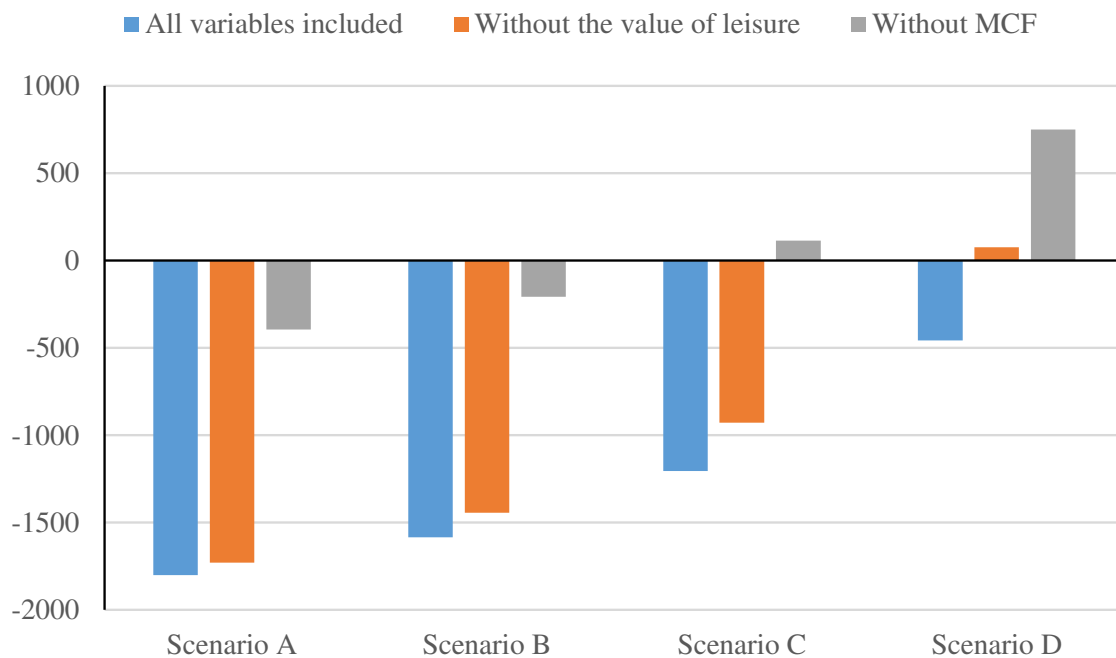
Our base case is that the government’s plan of increasing the budgets of the Armed Forces the next four years is realized. We discuss in section 2 that these plans may be changed due to the corona crisis in the economy and the changes in oil price. We based this intuition not on the current political debate in Norway (which seems to be in line with increasing the spending on the Armed Forces), but rather standard consumer theory in economics. When a consumer’s income is reduced, we expect less consumption of normal goods. Likewise, when the price of a good (security) is increased, we expect less consumption of this good. At the same time, from producer theory, we know that when one input price increases (investments in foreign currency) we expect substitution to other inputs (human personnel).

As a sensitivity of the main results, we assess here the social net benefits of the expedite recruitment strategy when the government and society do not prioritize the Armed Forces the next years in the reference alternative. This means that we compare a situation of expedite

recruitment of 550 persons (unemployed at the time of employment) with a situation without any recruitment.

In figure 12, we present the net social benefits of this comparison. When all the variables in the model are included, the project is unprofitable to the Norwegian society in all scenarios (A–D). If we omit the value of leisure – which is equal to setting the value to zero – the project is profitable to society in scenario D. If we instead omit the variable MCF, as recommended by among others Bos, van der Pol, and Romijn (2019), the project is also profitable in scenario C. The MCF plays a more substantial part of the overall results in the sensitivity analysis than in the main results. Now, the expedite recruitment strategy is compared to an alternative reference case, where all the personnel is hired in the private sector, bringing in tax revenue rather than being financed by it. The difference in the MCF is large, especially in scenarios where the economy recovers quickly.

**Figure 12:** Net social benefits of expedite recruitment strategy, alternative reference case, scenario A–D, discounted 2020 USD.

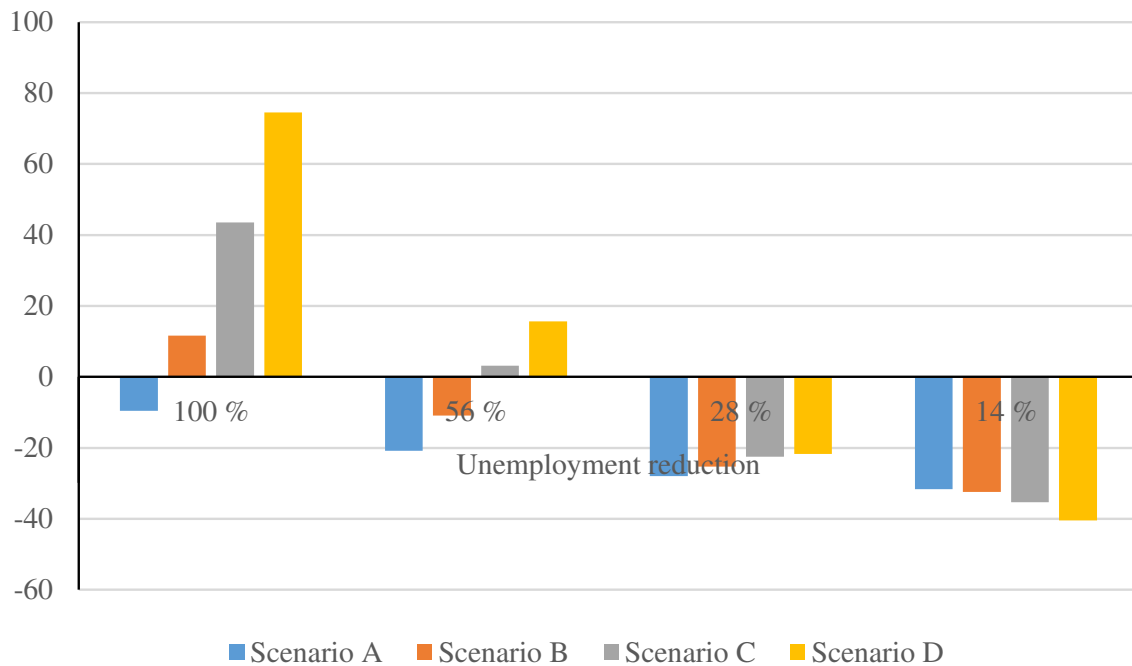


### 8.3 The unemployment-reducing effect of the recruitment strategies

In the main results, we assumed that one position in the Armed Forces reduced the number of unemployed by one. This assumption requires that the Armed Forces employ mostly young people facing a tough labor market and more senior personnel that have skills that are low demanded in the civil labor market. Here, we test the results by reducing the 100 percent likelihood of unemployed to get employed when the Armed Forces recruit one person down to 56, 28 and 14 percent likelihood (see section 6.3).

Figure 13 shows that scenario B is not positive anymore when the unemployment reduction effect is 56 percent. With 28 and 14 percent reduction effect, scenario C and D also turn negative. The analysis show that it matters that the Armed Forces recruit workers with skills that are prevalent among unemployed or strive to employ workers displaced during the corona pandemic. That said, the assumption about a relatively high value of leisure (50 percent of net wage) drives the results down. If we instead assume a zero value of leisure for unemployed workers, scenario B is positive when the unemployment reduction effect is 56 percent reduction, and scenario C and D are positive when this effect is 28 percent.

**Figure 13:** Net social benefits of expedite recruitment strategy, various assumptions about unemployment reduction effect of recruitment strategies, scenario A–D, million USD.



## 9 Conclusion

In this article, we investigate whether it makes sense to expand the Armed Forces with new recruits in light of the current economic recession. Specifically, we study the effects for the Norwegian society of an expedite recruitment strategy to the Norwegian Armed Forces, exploiting the extreme hike in the number of unemployed during the corona pandemics. We include standard BCA effects in the analysis – value added, MCF and the value of leisure – and add nine economic, psychological, social and health-related effects identified through a thorough literature review of the labor and health economics literatures on displacement and recessions.

The starting point of the analysis was the first draft of the MOD’s long-term plan for the Armed Forces that stated that the government planned a gradual increase in the number of personnel by 550 employees in the next four years. We compare this base recruitment strategy with an expedite recruitment strategy where all 550 man-years are hired July 1, 2020.

The results show that the expedite recruitment strategy creates positive net benefits to the Norwegian society if the highly worsened conditions in the labor market continue longer than

half a year from the implementation of the expedite recruitment strategy. The results are robust to moderate negative changes to the assumptions about parameters and variables in the benefit-cost model. We have applied a fairly high value on the reservation wage of unemployed, although several studies suggest no or sometimes negative value of leisure for involuntarily unemployed. This means that the main results may be considered conservative. On the other hand, we have applied a high unemployment reducing effect (100 percent). The sensitivity analysis shows that the expedite recruitment strategy needs a fairly high unemployment reducing effect to be positive in scenario B–D. Only scenario C and D are positive with a 56 percent reduction effect, and all scenarios are negative with a 28 percent effect. The impact of a lower unemployment reducing effect of the expedite recruitment is smaller if the unemployed workers' value of leisure is smaller than what is assumed in this article.

After the analysis and calculations were conducted, a majority in the Norwegian parliament agreed to proceed with a faster recruitment of the 550 man-years. The December 1<sup>st</sup> 2020 agreement is thus aligned with the analysis provided here. Our sensitivity analysis of how the project fares when society does not prefer an expansion of the personnel in the public sector under scrutiny is therefore superfluous after the December agreement. We chose, however, to include this sensitivity analysis here, because the results could interest policymakers and other stakeholders: the spike in unemployment needs to be long-term (over 4 years) for such a policy to make sense economically to society.

We have not attempted to compare the expedite recruitment strategy with a similar strategy in other public sectors in which the Norwegian society and policymakers plan for future growth. It may be better, for instance, to invest in improved health and educational services. To prioritize the Armed Forces instead of other sectors is a political decision and outside our field of expertise. The fundament for this evaluation has been that the government is currently planning to expand the Armed Forces gradually the next four years. An additional point is that the net benefits are linear in the number of personnel, meaning that a reduced scope will be positive as long as the results for the whole project is positive. The larger the scope of this project, the more likely the project is to induce general equilibrium effects in the labor market and other markets. We have not included such effects in this analysis as a project of 550 man-years are not particularly large. However, we advise policymakers to assess equilibrium effects if the scope is to include *both* this project and other employment policies in for instance the health sector.

The main take-away for policymakers is that in order to reap the benefits to society from the expedite recruitment strategy it is important that the Armed Forces avoid targeting skills and competencies that are in high demand in the civil labor market. The Armed Forces should instead attempt to recruit displaced workers or skills that are prevalent among unemployed. In general, the Armed Forces are well suited for such an employment policy because the organization aims for young, low-to-medium educated recruits, and offers education, courses, and training to its personnel within the organization. As long as most of the new positions can be filled by unemployed or unemployed are competitive for positions left vacant by new recruits to the Armed Forces, we conclude that the project is well worth considering implemented.

## Appendix A: Data description

The data on recruited personnel in this study stem from the planned recruitment in the next 4-year long-term plan for the Armed Forces (Forsvarsdepartementet, 2020). We assume that 20 percent of the hired personnel are short-term contracts and 80 percent on long-term contracts. We apply wage data for the two groups from Hove & Røtvold (2019). For the long-term contracts, we assume that 70 percent are hired as support personnel and 30 percent are hired as maintenance personnel. Furthermore, we assume that the alternative for personnel in the Armed Forces is either unemployment or employment in the private sector<sup>13</sup> (see section 3 for various scenarios of length of high unemployment in the Norwegian economy). We derive data on the population, estimated life expectancies per age cohort, share of divorces and mortality rates from Statistics Norway. The public budget on the police, prison and court system for 2020 is derived from the Ministry of Justice and Public Security (Justis- og Beredskapsdepartementet, 2019). The share of males among those incarcerated are from the Norwegian Correctional Service.<sup>14</sup> An estimate of the Quality-Adjusted Life Years (QALY) is derived from Wisløff (2017). The NOK/USD price of 10.2 is derived from Norges Bank – the Central Bank in Norway, May 11, 2020.<sup>15</sup>

The estimates on the economic costs of displacement and the psychological, social and health-related costs of displacement rely on many uncertain variables. Some of them are derived directly from the literature on displacement and recession, but many are hard to estimate or at least yet to be estimated. Still, in order to quantify the value loss or gain for society of the recruitment strategies, we have set number values on uncertain parameters. The sensitivity of the main results on the values of the uncertain parameters is investigated in section 8.

---

<sup>13</sup> The size of the public sector is held constant in all alternatives. Thus, persons in the model are either unemployed or hired in the Armed Forces or private sector. It is irrelevant whether the personnel otherwise recruited in the Armed Forces are employed in the private or public sector (by pushing others into the private sector), as long as the net increase in labor supply is demanded by the private sector and the relative prices and wages are unaffected.

<sup>14</sup> <https://www.kriminalomsorgen.no/kvinner-i-fengsel.475245.no.html>

<sup>15</sup> <https://www.norges-bank.no/tema/Statistikk/Valutakurser/>