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A Cost-Benefit Analysis of Adult Vocational Education Spending in Sweden in 2020

by

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Introduction

In the summer of 2020, when the initial economic ramifications of the coronavirus crisis were becoming evident, the Swedish government announced a special crisis package of economic stimulus. The additional spending was meant to stimulate a halting economy and not least alleviate the damages from a very strained labour market. The efficacy of these measures are yet to be determined (Regeringskansliet, 2020a).

In the budget a large amount of spending was directed towards increasing admission into the education sector – notably including a 250 million SEK addition to the adult vocational education sector with the stated aim of quickly creating 2 500 new vocational education places for students (Regeringskansliet, 2020b). This is in-keeping with economic crisis handling in Sweden and in the rest of the Western world. During economic crises, the government tends to attempt to direct more people into the education sector as a means of moving people from the labour market into education (Hayes, 2014). The rationale is partly that it is better for society and the individual if they are studying rather than being unemployed as a result of a recession. It is also partly that when the individuals leave their education, they will be equipped to take better, higher paying jobs, which will be beneficial to both society and the individual. Vocational education is central to this second idea – with the aim of equipping students with relevant, sought-after skills, so that they can get a more favourable position in the labour market.

Despite the fast increase of vocational education places in Sweden in the past two decades, very little research has been conducted on how beneficial this spending is. By using the latest spending addition of 250 million SEK to the vocational education sector and data from the past 10-15 years, this paper will perform a cost-benefit analysis on spending in the adult vocational education sector.

This *ex-ante* cost-benefit analysis (CBA) finds that whilst spending on adult vocational education is not beneficial in the five-year time horizon, it is beneficial in a longer ten-year horizon. It could have been considered an *in-medias res* analysis as well, however then the programme cost would have had to be considered a sunk cost, and that would have missed the point of evaluating the policy efficacy. However, certain changes to some underlying assumptions makes the policy not beneficial in both time periods. Additionally, this paper is

wary of the potential issues with attempting to model a post-corona labour market. We recommend that the policy is implemented due to the original positive outcome in the ten year horizon.

Following this section there will be a section of background on modern Swedish adult vocational education and a review of the scarce existing literature on its effectiveness. Thereafter there will be a section in which the data and methodology used in this CBA will be discussed. This is followed by a results and a discussion section. Lastly, there is a short conclusion, summarising this CBA's main findings.

Background and literature review

The post-secondary school adult vocational education system in Sweden was created as a temporary measure in 1996 in order to combat the then record-high unemployment that characterised the 1990s in Sweden (Prop. 1995/96:145). Its stated aim was to give more “in depth theoretical and practical skills which are necessary to independently and lawfully execute qualified tasks in a modern production of goods and services” (Prop. 1995/96:145). The system became permanent in 2001 and subsequently grew quickly. In 2009 the system was renamed and restructured, however the aim and structure remained the same in large parts (Prop. 2008/09:68). In the years 2009-2019 the number of admissions who started their education increased from around 17 000 to almost 30 000 (Myndigheten för yrkeshögskolan, 2020a).

As opposed to higher education, the vocational education system is characterised by shorter education lengths – many not exceeding two years – as well as a direct labour market demand for the skills acquired from the education. Myndigheten för yrkeshögskolan, the government agency in charge of directing public spending, only grants money to programmes that teach skills for which there is a clear labour market demand (Lind & Westerberg, 2015). This means that there is a ‘here-and-now’ aspect to adult vocational education. In 2019, the most common educations were within administration & business services, health & social work, built environment & building technique and data/it (Myndigheten för yrkeshögskolan, 2020a) – all of which are in-demand skills in the Swedish labour market (Arbetsförmedlingen, 2020).

In the spring of 2020 when the Swedish government decided to direct an additional 250 million SEK in order to generate 2 500 year-places, and in extension 1 250 examined, in the wake of the coronavirus crisis this was in-keeping with previous expansions of the vocational education system. The idea was to “relieve the economic consequences of the virus outbreak and to meet an increased demand of education and reskilling in the labour market” (Regeringskansliet, 2020a). Notably, additional means were directed towards higher education as well as towards the Swedish educational form “*folkhögskola*”. Naturally, these investments can (and perhaps should) be considered alternative investments to spending on the adult vocational education sector. However, due to time- and space constraints this paper has decided to compare the investment to a “status quo” instead, where the money is not invested.

Despite the significant and rapid expansion of the post-secondary vocational education in Sweden and its aim of meeting a new demand for skills in the labour market, very few studies have been conducted on the efficacy of adult vocational education spending.

Myndigheten för yrkeshögskolan does provide certain statistics themselves. However, these mainly concern the progression of the studies and their immediate aftermath. For instance, the graduation to admission rate, the number of people getting relevant employment upon completion and how many return to their previous employer (Myndigheten för yrkeshögskolan, 2020). Whilst these are useful statistics, they say little about the general efficiency of vocational education spending for the individual and for society at large.

To date, the only comprehensive study on the individual long-term effects of adult Swedish vocational education was composed in 2015, by Lind and Westerberg (2015). In it, the authors follow students who finished their education in the years 2008-2010 and “describe their employment rate, median income and unemployment before, during and after the education” (2015: p. 1), from two years prior to education to two years after. Albeit not a cost-benefit analysis, the paper contains much useful information for the study at hand. The authors find that participants in vocational education programmes increase their employability and wages upon completion of their studies compared to before starting - across gender, age and field of studies. It further shows the difference between different fields of studies and how certain programmes are more efficient than others in terms of employment prospects and wage increases. However, since the additional spending announced by the

government did not restrict which fields the extra places were going to go, the CBA at hand has treated it as the average across all studies.

Internationally, there have been some attempts to analyse vocational education from a CBA-perspective. A significant addition to the literature is a 2008 OECD-report, which attempts to categorise and catalogue the impacts of vocational education (Hoeckel, 2008). The author categorises various costs and benefits associated with adult vocational education from the perspective of the individual, the employer and society. The author categorises the benefits into short-term benefits (such as increased incomes and greater employment opportunities for the individual) and long-term benefits (such as increased taxes from higher earners for society). Whilst the short-term benefits are undeniably relevant, the longer term benefits of the policy is in general of a more uncertain character, as it is notoriously difficult to model the future of the labour market in a long term perspective. Hoeckel concludes that it is difficult to create a general OECD-model for performing cost-benefit analysis on vocational education as the systems and approaches are too varied across countries.

An example of an existing CBA of vocational education is that of Costabella (2017) which analyses the benefits of Italian post-diploma education. Post-diploma is a vocational educational form for recent high-school graduates (majority under 25 and very few over 30 years), and therefore not an optimal comparison to the Swedish vocational education system which has a greater age-span. The author finds that the education increases employment by 10% and that the policy's benefits outweigh its costs five years after starting the programme (the programmes are one year). Due to the policy not paying off three years after graduation, Costabella asserts that the education is inefficient.

Data and Methods

This paper's method follows the guidelines outlined in Boardman et.al. (2018) concerning the steps involved in a CBA and using the Kaldor-Hicks criterion, meaning in practice that a policy will be recommended if its benefits outweigh its costs. As the purpose and alternative projects of this CBA have been established we now move on to the issue of standing. These include, firstly, those who participate in the programme, i.e. the people who will enroll as a result of the extra funds. Another actor with clear standing is the public sector. In this CBA this group encompasses all levels of government (national, regional and municipal) and by

extension the taxpayers. Other potential groups have been excluded. For example, employers are not included since the increased value from the program should be reflected in the companies paying a higher salary, giving more working hours and/or more extensive employment opportunities. Thus, the employers' valuation is captured in the salary increase of the participants. Further, double-counting in terms of income effects is avoided by not giving employers standing. This somewhat goes against the strategy outlined by Hoeckler (2008). It should however be noted that, as opposed to other countries, adult vocational education is not attended as part of your existing employment. Therefore, the individual's education is not a direct concern of the employer in the Swedish setting. Non-participants, another potential inclusion, are amply captured as tax-payers. It's possible to make crowding-out arguments, however these are difficult to capture and the directly in-need skills acquired through the education will likely mean that a crowding-out is not too large.

In terms of impacts this CBA mainly considers the direct government cost of the programme, the increased median income of the participants as a result of the education and the effect of Quality Adjusted Life Years (QALY) from a lower unemployment rate. These are summarized in Table 1 in the "Costs" and "Benefits" columns. Since the cost of the programme is in 2020, estimates in this study have been adjusted to 2020 prices. In the analysis, other impacts, such as tax revenue from income tax, loss/gain in unemployment benefits and student aid have also been considered. These have however been deemed non-vital by us as they should be considered as transfers between the public sector and the participants, and thus equalling zero for society. They are summarized in Table 1 in the "Transfers" column and are included in the analysis to show their relative magnitude and provide an exhaustive investigation of the costs and benefits.

Table 1 - Impact matrix

Costs	Benefits	Transfers
Program cost (SEK) (GOV)	Increase in gross income (SEK) (GRAD)	Income tax (SEK)
	Increase in Health (QALY) (GRAD)	CSN loan (SEK)
		CSN transfer (SEK)
		Unemployment benefit (SEK)

The first parentheses show the metric of the impact such as (SEK) for Swedish kronor and (QALY) for Quality Adjusted Life Years. The second parentheses, if present, represent those who with standing and are affected by the impact. (GOV) represents the government and (GRAD) the graduates.

Program cost (cost)

In terms of the cost of the programme and its effectiveness, the starting point is the announced government policy which we compare to the alternative of not implementing the policy. Our analysis therefore compares impacts to the status quo. As mentioned, the policy directed 250 000 000 SEK to generate 2 500 new year places. Since most vocational education are two-years programmes, this paper has divided the costs over two years. Thus, a yearly additional cost of 125 000 000 SEK will be expected to generate 1 250 actual places, i.e. a 100 000 SEK per place cost, from these two-year programmes. Based on the Myndigheten för Yrkehögskolan's own figures of cost per place (63 463 SEK), this governmental money-to-place calculation seems reasonable or even somewhat pessimistic. Of these 1 250 places, this CBA assumes a graduation rate of 72%, which was the 2018 graduation rate. Whilst the graduation rate has been steadily increasing in the past decade, this paper has opted for the graduation rate to remain steady in order to capture some uncertainty associated with this estimate. Thus, using a 72% graduation rate, the initial 250 000 000 SEK should be expected to yield an additional 900 adult vocational education graduates ($1\,250 \times 0.72$).

Income (benefit)

In order to estimate the program's effect on median income, we just use the income from graduates as presented by Lind & Westerberg (2015) which starts at 100 000 SEK before the

education and starts at 250 000 SEK after the vocational education is complete. The median income is then assumed to increase by 1.3% each year which has been the average real salary increase between 2010 and 2019 according to Carlgren (2020). This was chosen since it's the average increase in the decade leading up to the policy.

In order to compare those who are affected by the program with that of the status quo, a counterfactual group of graduates is needed. Using dropouts would be a suitable choice given that they are relatively unaffected by the program. The median income of dropouts is however lower than that of graduates, even before starting their education which disables them to be used as a counterfactual. We therefore assume that the counterfactuals would have had the same pre-education salary (100 000 SEK) as those who complete the programmes. During the education years, this group would have gotten the same increase in salary as the dropout group, namely 21 290 SEK. After two years, the counterfactuals' salaries increase with 1.3% - the same as the graduates. We therefore make a parallel trend assumption.

Health (benefit)

The effect of unemployment on health is captured through the use of QALY. This CBA relies on a 2019 study by Siverskog & Henriksson, which finds that unemployment is on average associated with a reduction of QALY by 10%, with a low estimate of 4.1% and a high estimate of 15.8%. In order to quantify the effect of unemployment on QALY, this paper has used the average of Myndigheten för Samhällsskydd och Beredskaps low and high estimate for QALY, resulting in a 1 250 000 SEK value of one QALY (low: 500 000; high: 2 000 000). The QALY effect is calculated by multiplying the value of a QALY with the percentual QALY reduction resulting from unemployment and then in turn multiplying this with the difference in unemployment rates between graduates and dropouts.

When forecasting unemployment, which we define as the share of graduates or dropouts which are enrolled in the "Swedish Public Enrolment Office", we rely on the study by Lind & Westerberg (2015). They find that graduates' unemployment drops to a few percentage points above zero during the training period after which the unemployment rate shoots up to 20% and steadily declines by 2 percentage points per year for the rest of the study, 4 years after the training started. During the same period, the dropouts have a constant unemployment rate of 20%. Based on these estimates we assume that the unemployment rate for dropouts stays

constant at 20%. We also assume that the rate for graduates drops to 0% between year 0 and year 2. Once the education is finished, the graduates have an unemployment rate of 20% which drops by 2 percentage points each year until 3 years after graduation, after which it remains constant. The reason for assuming that the unemployment rate does not continue to decrease beyond this point is simple. Firstly, assuming a continued decline would be associated with severe uncertainties in the forecasting since there is a lack of data of unemployment rate progression for the affected group. Further, with adult vocational education there is a certain short-sightedness in the investment that could offset any positive effects from more education on employment.

Time

In order to display the dynamics of the program and shed some light on how quickly it becomes beneficial, 2 different horizons are used, namely 5 and 10 years after the program is initiated. That is, 3 years after potential graduation and 8 years after potential graduation. Thus, the shorter time period will assess how effective the policy is fairly immediately after the completion of the programme, in line with the assessment made by Costabella (2017). The latter will allow more years of income and health effects after programme completion. Naturally, the time-span could have been even longer, as education can potentially keep paying off for a long time. However, the ‘here-and now’ aspect of adult vocational education means that one should be wary of longer time horizons as it is not unreasonable to believe that the skills gained from the education might be in need of refreshing or even not directly employment useful in a decade after its start.

Transfer costs and benefits

The impact, “Income tax” is calculated using the difference in gross income multiplied by the average tax rate in 2020 on council and municipality level, 32.38% (Holmström, 2020). Due to the way this impact is constructed, it means that the impact can display a negative sign at a certain period if the graduates have a lower income than their counterfactual.

The study grants and loans are calculated using numbers from the Swedish Board of Student Finance (CSN, 2020) assuming that the individual applies and receives grants and loans equivalent to a study pace of 100% as of 2020. The grant amounts to 828 SEK and 1 904 SEK for loans per week where each year consists of 40 weeks of study. The unemployment benefits are calculated using the estimated unemployment rate, as previously discussed, and

the standard payout of 8 030 SEK per month during 2020. The unemployment benefits were temporarily raised to 11 220 SEK per month due to the coronavirus but we do not take this into account due to the temporary nature of the raise (Regeringskansliet, 2020c).

SDR / Sensitivity analysis

In terms of a social discount rate, this paper has opted for an initial 3.5 percent discount rate. This is the recommended rate according to Moore et.al. (2004). In our partial sensitivity analysis we will examine how the NPB changes when considering pessimistic assumptions related to QALY and the discount rate. The lower pessimistic value of monetized QALY is 500,000 SEK according to the Swedish Civil Contingencies Agency (2012). The lower pessimistic decrease in QALY of 4.10% from Siverskog & Henriksson (2019). These health related variables are changed in the sensitivity analysis since we believe that their inclusion is novel and introduces uncertainty. We will also consider a higher social discount rate of 5% to show the effect when the present is more highly valued. We only consider the pessimistic cases in order to show that this is a policy that should be considered if the present value of the net benefits are greater than zero.

Limitations

Naturally, it would have been more beneficial to use people entirely unassociated with the programme as a comparison group. However, as mentioned in the last paragraph, the first semester-dropout group should act as a decent proxy for those unaffected.

Further, this paper does rely on a wide array of assumptions, many stemming from the same original article by Lind & Westerberg (2015). Whilst it would have been better with a greater variety of studies, it is not possible due to the lack of writing on the subject. Additionally, many of the assumptions used in this paper are up to a decade long. It is of course difficult to ascertain how the labour market will look beyond 2020. However, it is good that the Lind & Westerberg study was written using data from the last major financial crisis in 2008-2010 .

Results section

The results from the analysis can be found in Table 2 in a social accounting ledger. The values are given in thousands of SEK and are the values after 10 years. The five-year time horizon has been included below the ten-year to simplify comparison and the discussion as

this section progresses. Separate columns for both actors with standing have been included, and then combined in a third column called Society.

Table 2 - Social Accounting ledger with base assumptions and detailed information for 10 year horizon. Thousands SEK			
	Society	Public Sector	Participants
Income tax	-	- 60,850	60,850
Gross income	252,110	-	252,110
Unemployment Benefit	-	32,110	- 32,110
Cost of program	- 245,770	- 245,770	-
CSN transfer	-	- 65,120	65,120
CSN loan	-	- 103,540	103,540
Health (QALY)	24,680	-	24,680
SUM - 10 Years	31,020	- 443,170	474,190
SUM - 5 years	- 151,440	- 427,630	276,190

As is evident, the policy shifts from ineffective to effective sometime between the two periods in the analysis. That the policy fails to be effective within the first time period is hardly surprising. In the five year period there are only three years where the effects of the education is evident, since the first two years are occupied by education. In the ten-year time span, eight years of education effects are included in the study.

In terms of costs, the bulk of costs come from the actual cost of the programme, totalling roughly 246 million SEK (125 million over two years, with a social discount rate the second year). The government-run student loans and benefits (CSN loan and -transfer) also constitute a significant portion of the costs, however, these are just transfers from the government to the participants. The same goes for the unemployment benefits, however these move in the opposite direction. An effect of the programme cost constituting the majority of the cost is that these costs diminish quickly as time progresses and with no additional costs emerging the difference between the five year costs and ten year costs is evident.

Moving on to the benefits, there are two impacts beyond the government to participants transfers that affect the analysis positively. Firstly, there is the health benefit stemming from the increased employment rate, totalling a benefit of 25 million SEK in the ten year-period. As a comparison, the health benefits included herein is roughly one tenth of the programme costs calculated in this study.

The dominant benefit however is the additional gross income generated by the participants, which by itself overtakes the total costs of the programme in the ten year time horizon. This helps explain the significant benefit difference between the five year analysis and the ten year analysis. The gross income is positively affected upon the completion of the programme, and thus having 8 years of increased income effects – as opposed to 3 years – will make a major difference to the bottom line.

Notably however, the estimated ten year income tax increase is just under 61 million SEK, meaning that an analysis in which only the direct programme costs and the direct additional income generated from the programme is included is far from economically sensible from a ten year-perspective. However, it ought to be mentioned here that all feeds of taxation has not been included – for example taxes on employment and VAT from consumer purchases are not included in this calculation.

Sensitivity Analysis

In order to display the robustness of our results and the advantage of using 2 time periods, we now review societal net benefit when adjusting the previously mentioned variables.

Table 3 - Sensitivity Analysis. Thousands of SEK		
Years	10	5
Base	31,020	- 151,440
SDR = 5% HIGH	- 23,440	- 154,490
QALY reduction = 4.10% LOW	16,500	- 157,940
QALY = 500 000 SEK LOW	18,680	- 156,970

Starting with the QALY estimate, it can be concluded that adjusting these to a lower level does not yield significantly different results. This is unsurprising, since the health benefits stood for a very small part of the total benefits from the programme. The main finding, that the policy is not effective in a five year period but is effective in the ten year period remains consistent with the baseline assumptions. In addition to that net benefits have different signs depending on the time periods, the difference in size between the net benefits are also of interest. For the health related variables, the difference to the base assumptions are greater, suggesting that QALY is an impact which accumulates over time. Based on the sensitivity analysis, including the QALY in the CBA serves to encompass as many relevant impacts as

possible even though it doesn't change our final recommendation. Not including QALY at all would have still resulted in a positive net benefit.

More interestingly is the adjustment of the social discount rate. As was discussed in the last section of this paper, this study opted for a lower 3.5 percent social discount rate, meaning that costs and benefits are discounted 3.5 percent each year from the initial spending. If this rate is adjusted upwards to the higher alternative of 5 percent, the results are considerably different. Now, the ten year analysis yields a negative result of over 23 million SEK. Thus, when applying the higher discount rate, the policy is not economically efficient from neither a five year-perspective nor a ten year-perspective. The higher social discount rate makes our results less robust, especially given the unending discussion of what counts as a proper discount rate. The lower robustness is not necessarily cause for concern but should instead be interpreted as weakness of the program given a worst case scenario of the assumption.

Discussion

All together, this paper shows that the policy is beneficial when using a long term horizon. This is because of the benefits accrued over time, starting in the future but is hindered by the large upfront costs of the program. Income gain stands for much of the societal benefit which dwarfs the health benefits. The health benefits as previously mentioned take into account the negative effects of unemployment but says nothing about other potential positive or negative effects that education can have on employment as it relates to health. For example, an additional positive effect from education can come from having more 'meaningful' work. On the other hand, if your education does not generate more qualified employment opportunities in line with your education, i.e. underemployment, this can potentially be associated with negative health effects. However, these estimations are beyond the data limitations in this analysis.

Two factors that we find to be the most important for the recommendation is that of the time horizon and of the social discount rate. As shown in the sensitivity analysis, adjusting the social discount rate from 3.5% to a 5% turned the previously positive ten-year-benefits into negative territory. These findings are undoubtedly noteworthy, as it highlights that this CBA's finding would be different under a separate set of assumptions. However, this paper will still recommend the policy. Primarily because the 3.5% rate opted for in this paper's

original analysis is more in line with SDR recommendations made by public Swedish agencies and previous literature. Secondly, the ten-year time horizon displayed in this paper could arguably be considered on the lower end of the payoff of education. Education remains with the person for the rest of their lives and should, at least theoretically, be directly beneficial to a person's career until their retirement. This point is however secondary, due to the difficulties in assessing education benefits with a too long horizon.

On the point of time horizons, this paper could instead have opted for a 20 year, or even 30 year, time horizons. As just mentioned, it is not unreasonable to suggest that educational effects are that long-lasting. This paper opted against these longer time horizons for reasons discussed previously in this paper (partly estimation difficulties as well as the 'short-term' aspect of Swedish adult vocational education). However, this should still be borne in mind as it pertains to the magnitude of this paper's findings and its recommendation.

Regarding the existing literature, the findings from this paper is in line with the findings of Costabella (2016), in that the policy does not pay off three years after completion. However, whilst the author decides to be sceptical about the education form after this finding, the paper at hand finds that the policy does pay off ten years after starting. Since this paper believes a three year after graduation time frame is very short, it places greater weight on the ten year horizon figure. However, due to both methodological issues and potential problems regarding predictions about the future of the labour market, this paper has opted against an even longer time frame as laid out by Hoeckel (2008).

As it comes to future relevance of this paper's recommendation, a few limitations should first be noted. Firstly, this CBA has been conducted on a policy during a recession (2020) using data from the last significant recession (2008-2010). Whilst this does add some degree of robustness and similarity to the study, it is also noteworthy that both the policy and the effects occurred during times of relative labour market upheaval. Secondly, making predictions relating to the future of the employment market and the future of employment itself is a notoriously difficult task, not least in the current times. No one knows what a post-corona crisis labour market will look like, and there will likely be some significant changes in some areas of work. Lastly, this analysis has only included a relatively little part of the entire labour force, and there are potential issues regarding scalability.

However, still assessing this paper's findings' relevance for future policies relating to adult vocational education this paper paints a positive picture for the future of this form of education. Rapid changes in the labour market and an age of 'life-long learning' will potentially make the effects of adult vocational education *more efficient* but *not as long-lasting*. In such a society adult vocational education could play a larger role, and the fact that it is beneficial today suggests that further funds could be directed to it in the future.

Recommendation

The recommendation of this paper is that it makes sense to continue the expansion of the adult vocational education sector, given the policy analysed herein. This recommendation stems from our analysis showing that benefits overtake costs in the ten year time horizon. Therefore, according to the Kaldor-Hicks criterion, our recommendation should be that the investment is warranted and that additional spending on adult vocational education pays off.

Conclusion

To conclude, this paper has performed a cost-benefit analysis of the proposed 250 000 000 SEK budget addition to the vocational education sector in Sweden. Relying on existing literature of how Swedish vocational education affects wages and employment levels as well as how unemployment affects general health, this paper finds that the benefits of the policy exceeds its costs in the ten year time horizon from its implementation. Therefore, in accordance with the Kaldor-Hicks criterion, this paper recommends continued expansion of the adult vocational education sector in Sweden, as per the proposed budget addition.

Whilst this paper feels comfortable with this recommendation, some caveats should be added. The policy is potentially non-efficient as long as the labour market does not demand that the person who gets the education needs to get educated again within a ten year-period. Additionally, in case of significant structural changes to the labour market, the analysis herein might have to be redone.

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