Is Education a Risky Investment? The Scarring Effect of University Dropout in Sweden

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Abstract

A number of theoretical models of educational decision-making assume that education is a risky investment, but the empirical evidence of those risks is scant. This article analyses the link between educational failure and future adverse outcomes using Swedish register data. Drawing on the concept of risk inherent in the Breen–Goldthorpe model of educational decision-making—that staying on in school and failing leads to downward mobility—this article estimates the risk of university dropout in terms of future labour market exclusion, where dropouts are compared to never entrants of tertiary education. To rule out unobserved differences between the groups, sibling fixed effects are paired with controls for ability, non-cognitive skills, and life course events. The results show scarring effects of university dropout on labour market marginalization, although the scarring effects are small. This lends some support for the assumption that entering higher levels of education involves a risk of downward mobility.

Introduction

Current theorizing in the sociology of education and especially in efforts aimed to explain educational inequality across social classes tend to draw on rational choice theory. A common model is that individuals weigh costs and benefits of different alternatives when choosing to continue in education or in the choice of educational specialization. These models usually include some measure of risk. A classical concept of risk is the negative mobility outcomes in the labour market that are tied to educational failure. Here, Breen and Goldthorpe (1997) made the argument that the risk of educational failure and in turn downward mobility is what deters individuals of working-class origins from continuing to higher levels of education. Educational failure would thus not only lead back to ones working-class origin but down into labour market marginalization.

It is however not clear from a theoretical point why educational failure should have any negative effects beyond education itself, i.e. that dropping out would produce a scarring effect on labour market outcomes. Moreover, there is little empirical evidence of such negative outcomes of educational failure. This article attempts to fill this void by estimating the long-term scarring effects of educational failure in Swedish tertiary education on labour market outcomes using register data of Swedish males, and in complementary analyses also of females. The empirical strategy is to compare never entrants to dropouts, and to rule out unobserved differences between the groups with sibling fixed effects paired with controls for ability, non-cognitive skills, but also for life course events such as getting children.

The Breen–Goldthorpe Model

The Breen–Goldthorpe (1997), henceforth BG, model of educational decision-making aims to explain why social inequalities in educational attainment arise under equal
formal access to education. It is widely cited and is a good example of more formal theorizing in the sociology of education. What is unique to the BG model is that it produces social inequality under formally egalitarian conditions as an unintended consequence of risk-averse behaviour. The model’s baseline assumption is that individuals want to maintain at least their parents’ level of social class. It focuses explicitly on what Boudon (1974) denotes as secondary effects, that is, class differences in educational choice within the framework of available choices produced by one’s ability and previous achievements, as opposed to primary effects which reflect the impact of class differences in achievement and ability.

Formally, the BG model consists of a decision tree and certain behavioural assumptions, and a cost–benefit multiplier (e.g. tuition, earnings foregone). The tree describes educational pathways for an individual facing the choice of entering university (but as the authors argue, this can be generalized to other choice situations) and involves two branching points: to stay on or leave, and if staying on: to fail or to succeed. This generates three states: graduation, dropout, and non-enrolment, which in turn are linked to three class destinations: marginalization (BG use the term ‘underclass’), the working class, and the most advantaged service class. What is central is that staying on and failing are associated (with some probability) with the marginalization destination. Leaving is also associated with the marginalization destination, but this probability is lower: ‘Remaining in school and failing increases the chances of entering the underclass. This means that there is a risk involved in choosing to continue to the next level of education’ (BG, 1997: p. 282). This is the concept of risk in the BG model.

The central behavioural assumption is that of relative risk aversion (RRA), which has different implications for different origin classes. The RRA claims that individuals primarily want to avoid downward mobility. The service class thus wants to avoid both the working class and marginalization, and the working class only wants to avoid marginalization. This is close to the prediction of the Keller–Zavalloni (1964) model, which argued that educational ambitions level off once one has achieved the level of parents’ social positions. In this model, we would expect utility to decline once the child has reached parents’ level of education, but there is no real choice dilemma involved. Hence, individuals of working-class origin who pursue more education than their parents’ level of education would not fare ill.

The BG model takes this argument one step further and argues for a risk of downward mobility when pursuing further education. Educational failure will not just nullify the ongoing educational investment, but lead down into marginalization. This is a risk for individuals of the service class and the working class alike, but leads to a dilemma only for the latter: to maintain their position according to the RRA mechanism, individuals of service-class background have no other choice than to take the maximum of education. For individuals of working-class origins, taking up further education increases the risk of downward mobility, and this can be managed easily by minimizing educational investments beyond what is necessary for class reproduction. Hence, many working-class individuals facing these circumstances will choose not to invest in education to insure themselves against downward mobility (entering marginalization), since leaving would be safer than staying on. Hence, the working-class children’s investment in education will be depressed. BG are very explicit that it is the behavioural mechanism of RRA that ‘basically drives the model’ (BG, 1997: p. 293) together with the assumption of a risk of marginalization: ‘[w]hat is essential is that there should be some measure of risk, in terms of eventual class of destination, that is attached to continuing in education’ (p. 293). This risk is effective only for the working class: ‘riskiness is a cost imposed on the working class, but not the service class, through the possibility of their dropping into the underclass [i.e., marginalization] […] this outcome should be less likely if they opt for less ambitious but “safer” educational careers’ (p. 293). It is this part that differentiates the BG model from other explanations of educational inequality.

Many aspects of the BG model have been analysed in the literature. However, whether education indeed is risky and dropping out actually is worse than never entering have to date not been addressed within this framework. This is important because in the absence of risk, the working class does not face the choice dilemma that the BG model postulates.

Is Education Risky?
The question is then if education is a risky investment? How can educational failure lead to adverse outcomes in other dimensions than education, such as entering labour market marginalization? Breen and Goldthorpe’s (1997) discussion of consequences of educational failure is scant. They do not cite any studies to directly qualify the claim that failure involves a risk of social demotion. The only explanation mentioned is linked to educational investments being non-reversible, and failure thus means that no further education can be taken up. This notion of risk seems to fit best with strongly stratified
educational systems with many dead ends (cf. Allmendinger, 1989). In such systems, the divide between academic and vocational secondary education is sharp, which means that the academic path precludes the vocational and leads to very slim chances of employment in vocational trades. Following the academic path is a commitment with continuous investments in education, and exposure to risk, before getting qualified for work. While BG model may be better suited to explain the choice between academic and vocational education, BG however maintain that the model has wide applicability arguing that non-segmented educational systems, such as the American, are often ‘more diversified than is often supposed’ (BG, 1997: p. 278). However, the non-reversibility argument is weak in explaining why it is better to leave than to stay on, since both decisions would lead to the same level of attained education.

In fact, a number of perspectives implicitly assume that educational failure carries little negative outcomes. In human capital theory (Becker, 1964/1993), it is years of schooling that generates economic returns via effects on marginal productivity. The theory is silent in how the years of schooling were achieved. An individual with 12 years of schooling who did not enrol in university is no different than an individual with the same schooling who did enrol but dropped out—both have 12 years of education. With this view, dropping out has little to do with risks. Educational failure only means that there is no more accumulation, but nothing more than the ongoing investment should be lost. Similarly, in credentialist theories (Collins, 1971) where labour market returns are the effect of an educational certificate controlled by status groups rather than increased productivity, the credentials of previous education are not lost when one enters a higher level, and so there is no credential cost of dropping out.

Other perspectives are more in line with BG and suggest that dropout may lead to detrimental outcomes. For example, according to signalling theory (e.g. Spence, 1973), educational failure could signal lower productivity, for example through lower perseverance, lower self-control, and the like. Indeed, dropouts tend to lack such non-cognitive skills (Heckman and Rubinstein, 2001). In the literature on statistical discrimination, employers take shortcuts and look for markers among applicants known (to them) to correlate with productivity in the aggregate population (Phelps, 1972), and so signalling failure could give some momentum for statistical discrimination. However, a signal of educational failure must necessarily be vague. Employers would have to be actively informed about the failure to discriminate against dropouts, but this information is not likely to be disclosed by applicants if it is perceived as disadvantageous. Another mechanism behind a detrimental dropout effect is psychological scarring, i.e. motivational effects following the failure. To the same extent that unemployment may create discouraged workers (Ellwood, 1982), dropping out would also create discouraged workers (and students). Here, the bad experience of dropout may translate into low aspirations, negative self-evaluation, and distress, i.e. trigger a process of cumulative disadvantage. To summarize, the theoretical predictions for dropout effect are ambiguous, and this ambiguity motivates an empirical analysis of the matter.

Previous Studies
The determinants of the dropout decision itself have received large attention (e.g. Tinto, 1975), and a prominent explanation is that students are overly optimistic about their capacity, and thus dropout as a response to poor academic achievement (Stinebrickner and Stinebrickner, 2009), i.e. what can be denoted as ‘educational failure’ in Breen and Goldthorpe’s (1997) model. Poor academic achievement may itself be an explanation of future marginalization, but the question here (and in the BG model) is if there are additional effects of dropping out, net of achievement. It is also the case that high parental socio-economic standing generally prevents dropping out, and that stressful family situations such as being a young parent or experiencing parental divorce are important predictors of dropout (Gesthuizen et al., 2005). Oreopoulos (2007) argue that students heavily discount future outcomes when deciding to drop out of high school, and so the dropping out decision itself is likely not based on a rational calculation of the costs and benefits of staying vs. leaving (not least if dropping out at this level is associated with negative future outcomes). A hastened decision to drop out aligns well with scarring effects, which are not necessarily intended by the individual.

There is a literature on the economic consequences of dropout comparing dropouts to graduates (e.g. Gesthuizen, de Graaf and Kraaykamp, 2005; Oreopoulos, 2007), but this literature is rather silent on any risk associated with entering a level of education. The contrast to never entrants has rarely been analysed, but there are some recent exceptions. Matković and Kogan (2012) compared the time to first job and job quality of never entrants and dropouts in Serbia and Croatia, and found that dropouts had higher, not lower, employment rates than never entrants, but only in Serbia, and found no differences in job quality. Matković and Kogan
controlled for family background and previous field of study, and found previous achievement not to influence on the estimates in Croatia, where this measure was available. Schnepf (2014) studied 15 European countries in the PIAAC survey, and were able to also control for numerical and literacy skills (but not ability per se, nor previous educational achievement). She found that dropouts had lower employment rates compared to never entrants only in Denmark and Germany, and that in Ireland and Italy, the rates were actually higher. In the remaining majority of 11 countries, among them Sweden, no difference was found. None of these studies discusses the implications of the findings for the BG model, but their results are nonetheless relevant and provide very mixed support for the BG conception of risk. The strongest evidence in favour of BG is found in Schnepf’s study and the results for Denmark and Germany, i.e. where there is strong divide between academic and vocational upper-secondary education with an vocational apprenticeship system. However, given the large variation of dropout effects, there is scant support for the claim that the theory is universally applicable (BG, 1997: p. 278). In comparison to previous literature, this study has a more distinct focus on marginalization as the outcome (in line with the BG model), and employs a more solid strategy to address unobserved heterogeneity, e.g. with direct controls for previous schooling, cognitive ability and non-cognitive skills, and unobserved family background (see analytical strategy below).

The Swedish Context

Sweden is an interesting test case for the study of inequality for many reasons. Swedish society is characterized by a relatively high level of equality of condition (i.e. a compressed income distribution and generous social transfers) and a relatively low absolute level of educational inequality (Erikson and Jonsson, 1996). Swedish education is free at all levels, and the system is highly standardized with low level of stratification (cf. Allmendinger, 1989), and have few dead ends (Erikson and Jonsson, 1996). Upper-secondary school is stratified, but only in one dimension, namely the academic–vocational divide, but even vocational education is focused on general skills rather than occupation- or firm-specific skills (as in apprenticeship systems).

During the studied period, the vocational track of secondary education did not automatically give eligibility for university (this changed in 1994 to make all eligible, but has recently been partially reversed). However, the ‘25:4 rule’ instated in 1977 gave everyone older than 25 with at least 4 years of work experience general eligibility for tertiary education. Free adult secondary education, which offers additional specific courses, for example in mathematics and natural sciences, is a further alternative route to gain eligibility for tertiary education. One the one hand, the relative open system is likely inviting many to try out the tertiary level, and this may increase dropout rates. On the other hand, Sweden applies the numerous clausus systems where positions are fixed and applicants compete with their previous achievement, which is likely to minimize the incidence of dropout (Schnepf, 2014: p. 13). However, Sweden combines this with generous provision of tertiary positions, and aims at enrolling 50 per cent of a cohort (Ministry of Education, 2001), which should tend to counter the effect of competition. In Schnepf’s European comparison, Sweden lies close to the average in dropout rate (21 per cent), but has among the lowest levels of dropouts from tertiary education that fail more completely in taking tertiary credits, which is the focus in this study.

The Swedish labour market is characterized by high employment barriers. There is an institutional mismatching of a highly skilled and unionized labour market with a standardized educational system oriented towards producing general skills rather than vocational. This has been advanced as one explanation for the relatively high youth unemployment rates in Sweden (Schröder, 2000). Since the education system is not tied to the labour market to any large extent, the school-to-work transition is difficult (Erikson et al., 2007). In conclusion, the organization of the education system would make scarring effects of dropout limited, whereas the difficulties of labour market entry would tend to exacerbate them, and this would then lead one to expect that scarring effects would fall somewhere in the middle in the distribution across countries.

Data

This article uses Swedish population level register data. The target population is defined as males born between 1958 and 1977 with Swedish schooling, but brothers of these persons are also included if their outcomes and control variables can be observed. The exclusion of women is a consequence of using information from military enlistment to measure abilities, but complementary analyses are conducted for females while excluding these measures (see the Web Appendix). The year limits are determined by the need to evaluate outcomes among individuals at an age when they are likely to have completed the process of labour market entry. To be included in the sample, one must also reside in Sweden.
for at least 4 years during ages 30–50 years during 1985–2012, when outcomes are measured.

Measuring Dropout
Two independent data sources are used to gauge educational attainment and dropout from tertiary education. The education register holds records of the highest attained education for the Swedish population. For secondary and tertiary education, its main data sources are graduation registers, and so highest attained education is generally defined as graduation. Educational attainment is coded into detailed levels that distinguish between different kinds of secondary schooling and detailed levels of tertiary education. The registration register contains university registrations per semester (autumn or spring) since 1977. A registration is a confirmation that someone will follow a semester of study. Such registration is mandatory to attend lectures and seminars, etc., and at the time required meeting with university administration on site (distance education was rare). Registration does however not presuppose that the individual completed any course, or took any course credits. One caveat with the Swedish system is that students have to actively apply for graduation. Graduation does not happen automatically and without application; individuals who fulfil the requirement of graduation will not necessarily be registered as holding tertiary-level education (note that professional occupations would require graduation for licensing).

Dropouts are defined as those with upper-secondary education and tertiary education registrations, but without a tertiary degree (or enough credits to meet the requirements for a degree). Individuals with upper-secondary graduation are thus differentiated by the number of registered semesters in tertiary education. A distinction is made between those with 0, 1–4, and 5+ registrations. Individuals with 0 registrations are never entrants, and will be the reference category. The focus is on those with 1–4 registrations, who by no means will be eligible for graduation. The group with 5+ registrations, but no exam, is more likely to not be proper dropouts. One can expect that pull factors are more accentuated in this group, e.g. drafting or head hunting from employers which only focus on merit but not on formal qualification. Since six terms would be the minimum to fulfil a Bachelor’s exam, this may also include individuals who simply did not apply for graduation. Those potential dropouts with 5+ registrations have been assigned to a certain category called ‘ambiguous dropouts’. I caution to interpret this effect.

Those individuals who are not at risk of dropping out, e.g. by having already completed a tertiary level of education, or not being eligible for further education, are maintained in the sample since they contribute to estimating the effects of other parameters in the model. This stabilizes the model and provides statistical power; this is important given the sibling fixed effect setup (discussed below). These cases are defined by dummies for their respective educational level (with the same reference of never entrants): education below upper secondary (low), other post-secondary degrees (mid), and the tertiary level (high). The coefficients for the not-at-risk groups are straightforward to interpret, and show the educational gradient compared to upper-secondary level schooling (never entrants).

Table A1 displays the coding and frequencies of the combined attainment and registration variable. In total, 280,000 individuals have vocational upper-secondary education and no registration. 2,800 have one tertiary education registration, another 1,800 have two registrations, and 1,800 have 3–4 registrations. For individuals with academic upper-secondary education, there is almost 100,000 in the sample without any tertiary registration, while almost 6,000 have one registration, 4,000 have two registrations, and another 4,000 have 3–4 registrations. These base numbers are in many cases more than one would find in a sample survey alone, and should provide sufficient power to the statistical analyses.

Outcome Variables
In the BG model, downward mobility (for the working class) refers to labour market marginalization/exclusion: ‘those with only a precarious place in the labor market and in only the lowest grades of employment if not unemployed’ (p. 281, see also Goldthorpe, 2000: p. 245, footnote 21). To capture this state, two measures of marginalization are used: low labour earnings and to receive social welfare. The former encompasses all forms of marginalization, since any absence of work will give smaller earnings (these are earnings exclusively from labour), whereas as the latter captures the inability to economically subsist oneself, i.e. a more severe and permanent form of marginalization. The measures reflect the proportion of time spent in the respective marginalization state during labour market entry (bounded between 0 and 1), i.e. in the 8 years following age 30 years or following labour market entry if that comes later. Specific details on the construction of these outcomes are provided in the Web Appendix. The lower part of
Table 1. Descriptive statistics

|                              | Mean   | (SD)   | N in category\(^b\) |
|------------------------------|--------|--------|---------------------|
| **Treatment/at risk\(^b\)**  |        |        |                     |
| Never entrants (reference)   | 0.535  | (0.248)| 376,482             |
| Dropout                      | 0.030  | (0.169)| 20,815              |
| Ambiguous dropout            | 0.017  | (0.130)| 12,022              |
| Not at risk—low education    | 0.015  | (0.122)| 10,638              |
| Not at risk—mid-education    | 0.108  | (0.311)| 76,191              |
| Not at risk—high education   | 0.295  | (0.456)| 207,434             |
| **Controls**                 |        |        |                     |
| Age (in first observation year)| 30.255 | (0.907)|                     |
| First-generation immigrant   | 0.017  | (0.129)| 12,003              |
| Second-generation immigrant  | 0.03   | (0.170)| 20,937              |
| Birth order                  | 1.74   | (0.930)|                     |
| GPA from upper-secondary school, z-scores | −0.14 | (1.009)|                     |
| Exam year, upper-secondary school | 1986.2 | (6.508)|                     |
| **Upper-secondary track**    |        |        |                     |
| 2-year vocational (old system)| 0.395  | (0.489)| 278,008             |
| 2-year academic (old system) | 0.120  | (0.325)| 84,493              |
| 3(4)-year academic (old system)| 0.338  | (0.473)| 237,648             |
| 3-year vocational (new system)| 0.023  | (0.150)| 16,269              |
| National program (new system)| 0.082  | (0.274)| 57,639              |
| Individual program (new system)| 0.000  | (0.020)| 292                 |
| Missing (mainly 1981)\(^c\)  | 0.042  | (0.200)| 29,224              |
| Cognitive ability, z-scores  | 0.208  | (0.943)|                     |
| Non-cognitive skills, z-scores| 0.151  | (0.780)|                     |
| No enlistment position (bad health proxy) | 0.06  | (0.237)| 41,914              |
| Married status               | 0.269  | (0.443)| 189,120             |
| Children 0–3 years in household | 0.348  | (0.476)| 244,740             |
| Children 4–6 years in household | 0.142  | (0.349)| 100,097             |
| Children 7–10 years in household | 0.06   | (0.238)| 42,495              |
| Children 11–15 years in household | 0.014  | (0.117)| 9,763               |
| Number of children           | 1.649  | (1.161)|                     |
| Parent’s education (years)   | 11.581 | (3.147)|                     |
| **Class origin**             |        |        |                     |
| Unskilled manual             | 0.173  | (0.378)| 121,766             |
| Skilled manual               | 0.225  | (0.417)| 158,073             |
| Routine non-manual           | 0.127  | (0.333)| 89,501              |
| Lower service                | 0.249  | (0.432)| 173,052             |
| Upper service                | 0.105  | (0.307)| 74,135              |
| Self-employed professionals  | 0.004  | (0.061)| 2,620               |
| Entrepreneurs                | 0.073  | (0.260)| 51,426              |
| Farmers                      | 0.043  | (0.202)| 30,062              |
| Class origin missing         | 0.001  | (0.036)| 938                 |
| **Outcomes (based on first 8 years in age 30–50 years)\(^d\)** |        |        |                     |
| Proportion of time spent in...|        |       |                     |
| Low labour market earnings   | 0.102  | (0.239)| 71,760              |
| Social welfare               | 0.018  | (0.097)| 12,952              |

Note: N = 703,573. \(^a\)For categorical/dummy variables coded 0/1. \(^b\)Table A1 or text for definitions. \(^c\)Information on track is missing for the year 1981 in the raw data (imputed with dummy). \(^d\)The proportion measures capture how many years household the state was encountered.
Table 1 shows descriptive statistics for each of the outcome variables.

Analytical Strategy and Control Variables

The estimation problem is that there are three main groups of dropouts: (i) those that were pushed out of education because of failure, (ii) individuals who were recruited out of education and into employment due to their superior skills, and (iii) those who revised their initial decision, e.g. based on new information and experiences, without failure or outside offers. This last Group (iii) will likely experience small effects of dropout, and to the extent that this is a large group, the overall effect will tend to be small. The main problem is that when comparing Groups (i) and (ii), the effect of dropping out may thus be confounded with positive selection, and this means that the association between dropout and marginalization destination may be underestimated.

To control for selectivity of dropouts compared to never entrants, a number of empirical strategies are pursued. First, previous educational achievement is controlled for (upper-secondary graduation GPA), which will capture a great deal of individual heterogeneity relevant to selection into higher education. Information on GPA from upper-secondary school is collected from population-level schooling registers, and transformed to z-scores within each graduation cohort. The register also provides type of upper-secondary school track (i.e. academic vs. vocational), which is included as control also interacted with GPA since grade-setting practices likely differ across tracks.

Second, military enlistment data that contain a formal cognitive ability test and an assessment of non-cognitive skills are used. These data are only available for males, and are typically collected at age 18 and thus before any tertiary enrolment. Cognitive ability and non-cognitive skills are in combination powerful predictors of both educational performance and labour market outcomes (Lindqvist and Vestman, 2011). Controlling for non-cognitive skills is especially important since dropouts can be expected to differ in this regard specifically, for example because of lower levels of commitment, control, and perseverance (Heckman and Rubinstein, 2001). Unfortunately, the enlistment data limit the analyses to men. However, complementary analyses will be conducted without these data allowing females to be analysed as well, while making use of all the other control strategies.

The test of cognitive ability is thorough, and based on an underlying theoretical model with four dimensions: reasoning, verbal understanding, spatial ability, and technical understanding. From the 1950s and onwards, these dimensions were captured by tests called instructions, concept discrimination, paper form board, and a technical comprehension. In 1980, the test of concept discrimination was exchanged for synonyms and paper form board was exchanged for metal folding, but the underlying dimensions remained the same (Carlstedt, 2000: pp. 15–17). The 1980 enlistment battery measures the G-factor of general intelligence (Carlstedt and Mårdberg, 1993), but also the earlier battery from 1954 singles out a dominant G factor in resemblance with results from the 1980 battery (Carlstedt, 2000: p. 37).

Non-cognitive skills were assessed during a 20-minute interview with a skilled psychologist that aimed to evaluate psychological fitness for military service. The assessment is based on behavioural questions, such as what the interviewee does rather than thinks (Mood et al., 2013). One of the key tasks is to secure individual functioning in social groups, and so the evaluation is to a large degree focused on social skills, but also to sort out psychologically dysfunctional individuals. Four factors are assessed: (i) social maturity (sense of responsibility, independence, extraversion, and dominance); (ii) intensity (the capacity to activate oneself without external pressure, the intensity, and frequency of free-time activities); (iii) psychological energy (ability to take the initiative, perseverance, capacity to activate oneself and others, and ability to fulfil and complete plans); (iv) emotional stability: ability to control and channel nervousness, tolerance of stress, and disposition to anxiety (Mood, Jonsson and Bihagen, 2013). Each of these dimensions are rated on a scale of 1–5 where average refers to normal functioning, and are then summarized. Both cognitive ability and non-cognitive skills have been transformed to z-scores. The enlistment data also contain information on the position in the Swedish Armed Forces that the individual was assigned to, and importantly, if no assignment was made. Health problems and psychological dysfunctions are common reasons for not being assigned, and this control thus captures an alternative cause of the dropout decision. This categorical variable is included with a full dummy representation (but in the descriptives in Table 1, only the fraction with no assignment is shown). It should be noted that individuals with very severe forms of health and psychological problems may not be subject to enlistment at all, and thus absent from the analytical sample in this study.

Third, to further increase the robustness to self-selectivity bias, brother (or sister) fixed effects (FE) are included to control for all social circumstances brothers (or sisters) share during their childhood. Differentiating out social background means that parental preferences
and parental knowledge of the education system that are stable across brothers are controlled for, but also hard-to-observe productive capacities shared among siblings. One may object that parents learn from experiences of older siblings and apply this knowledge to younger siblings so that social background is not constant. Hence, birth order is also controlled for. Birth order have strong causal effects on educational attainment (Barclay, 2015). Introducing family fixed effects may come at the price of magnifying measurement error and is known to create downward biases on, for example, the estimated returns on education (Ashenfelter and Zimmerman, 1997). This will also make the test conservative. To define the siblings, information on mother and father in Statistics Sweden’s multigenerational register is used.

It should be noted that using brother fixed effects only makes sense if brother (sister) pairs have both dropouts and never entrants. Focusing on dropouts in the brother sample, the mid-panel of Table A1 shows the number of males with 1–4 tertiary registrations and the education of his brothers. For the relevant cells, the cell sizes range from more than 2,000 for vocational education and 5,000 for academic education. The right panel instead focused on never entrants, and shows the number of males with 0 tertiary registrations and the education of brothers. Here, the cell sizes are between 1,000 and 2,000 for vocational and academic upper secondary, respectively. Even though these cell are limited given the overall sample size of brothers (approximately 245,000), the absolute sizes should be large enough to enable a meaningful estimation. Similar figures appear in the Web Appendix Table S4 for both genders.

Fourth, previous research has found that life course events such as getting children are important predictors of dropout and therefore the presence of children and civil status are important controls. In addition, enrolment and dropout decisions may be marginally dependent on labour market conditions such as the unemployment rate. This may influence both educational choice and returns on education. The models thus include birth year and year fixed effects, and indicators for being married and having children in four different age intervals. Finally, parental socio-economic status (SES) is also controlled for by their years of education (highest observed) and their dominating class position (coded to the Swedish SEI scale, a close approximation of the Erikson-Goldthorpe-Portocarero scale, EGP).

In conclusion, the strategy employed is strong but nonetheless leaves a few potential alternative explanations unattended, where the most serious would be individual or time-varying heterogeneity. For example, if an individual was struck by sudden mental illness (unrelated to the previous performance, ability and non-cognitive skills, and the family of origin), this could cause both dropout and future marginalization. It is very hard to scrutinize this issue, but this is a potential weakness.

Methods
Since the outcome measures are continuous proportions, the main method is ordinary least squares/fixed effects models with family cluster-robust (and heteroscedasticity-robust) standard errors. To simplify the presentation, the tables only present the main effects of the dropout and the not-at-risk dummies.

Results
The left panel of Table 2 shows the effect of university dropout on low labour earnings, for the main male sample. The coefficients reflect the dropout effect on proportion of time spent in marginalization during labour market entry. With only basic controls in Model 1, the models suggest that the dropouts spend 2.4 percentage points more of their first 8 years in a state of low earnings compared to never entrants. The relative effect evaluated at the mean of never entrants shows that that marginalization is 20 per cent higher for dropouts (i.e. the coefficient 0.024, divided by the mean of the outcome for never entrants of 0.116, equals 0.20). When controlling for previous schooling achievement in Model 2, the effect increases, and the effect increases also with controls for cognitive ability and non-cognitive skills. The finding that effects tend to increase with controls for ability is in line with the expectation that dropouts on average may be positively selected on, e.g. ambition or ability as discussed above, and controlling for such factors thus cancels the selection. Marital and cohabitation status are important confounders that decrease the effect, as do parents’ SES. Controlling for enlistment position as a proxy for health is also a confounder. With a full set of observed controls in Model 7, the effect is a 2.9 percentage point higher exposure to low earnings marginalization for dropouts; this is a difference of 2.5 per cent.

In Model 8, the sample is delimited to brothers while maintaining the model specification; the dropout effect is somewhat smaller in this group. Finally, Model 9 introduces controls for unobserved family characteristics via brother fixed effects. The standard errors grow and t-values drop. The coefficient is also almost halved, but is still significant at 5 per cent risk level. Unobserved
Table 2. Effect of dropout vs. never entering university on low labour market earnings and social welfare

|                      | Low labour market earnings |                      |                      |                      |                      |                      | Social welfare         |                      |                      |                      |                      |
|----------------------|-----------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|------------------------|----------------------|----------------------|----------------------|----------------------|
|                      | OLS FE                      |                      |                      |                      |                      |                      | OLS FE                 |                      |                      |                      |                      |
| Dropout              |                              |                      |                      |                      |                      |                      |                        |                      |                      |                      |                      |
|                      | (1) (2) (3) (4) (5) (6) (7) |                      |                      |                      |                      |                      | (8) (9) (10) (11) (12) |                      |                      |                      |                      |
| Dropout              | 0.024*** 0.036*** 0.036*** 0.038*** 0.032*** 0.029*** 0.029*** 0.029*** 0.029*** 0.014* 0.007*** 0.006*** |                      |                      |                      |                      |                      |                        |                      |                      |                      |                      |
|                      | (12.054) (17.687) (17.970) (18.597) (14.762) (14.456) (7.538) (2.474) |                      |                      |                      |                      |                      |                        |                      |                      |                      |                      |
| Ambiguous dropout    | 0.051*** 0.067*** 0.068*** 0.068*** 0.057*** 0.053*** 0.052*** 0.052*** 0.052*** 0.013*** 0.010*** 0.006* |                      |                      |                      |                      |                      |                        |                      |                      |                      |                      |
|                      | (18.284) (23.740) (24.058) (24.232) (19.170) (18.731) (11.426) (3.217) |                      |                      |                      |                      |                      |                        |                      |                      |                      |                      |
| Not at risk—low      | 0.043*** 0.035*** 0.036*** 0.035*** 0.030*** 0.029*** 0.028*** 0.026*** 0.019* 0.002 |                      |                      |                      |                      |                      |                        |                      |                      |                      |                      |
|                      | (15.257) (12.764) (12.819) (12.656) (11.095) (10.524) (10.263) (5.724) (2.424) |                      |                      |                      |                      |                      |                        |                      |                      |                      |                      |
|                      | Not at risk—mid-education   | 0.060*** 0.057*** 0.055*** 0.051*** 0.052*** 0.053*** 0.048*** 0.040*** 0.012*** 0.001*** 0.008*** |                      |                      |                      |                      |                      |                        |                      |                      |                      |                      |
|                      | (75.198) (59.705) (57.605) (53.382) (54.626) (54.932) (55.484) (31.119) (13.535) (19.182) (7.180) |                      |                      |                      |                      |                      |                        |                      |                      |                      |                      |
|                      | Not at risk—high education  | 0.047*** 0.027*** 0.026*** 0.024*** 0.023*** 0.033*** 0.034*** 0.005*** 0.003*** 0.004*** 0.005*** |                      |                      |                      |                      |                      |                        |                      |                      |                      |                      |
|                      | (72.632) (30.671) (28.932) (26.682) (31.383) (35.724) (36.461) (20.656) (11.863) (7.510) (3.824) |                      |                      |                      |                      |                      |                        |                      |                      |                      |                      |
| Year, birth year,    | Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes |                      |                      |                      |                      |                      |                        |                      |                      |                      |                      |
| and migration        |                            |                      |                      |                      |                      |                      |                        |                      |                      |                      |                      |
| Birth order          | Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes |                      |                      |                      |                      |                      |                        |                      |                      |                      |                      |
| Schooling            | Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes |                      |                      |                      |                      |                      |                        |                      |                      |                      |                      |
| Cognitive ability    | Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes |                      |                      |                      |                      |                      |                        |                      |                      |                      |                      |
| Non-cognitive skills | Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes |                      |                      |                      |                      |                      |                        |                      |                      |                      |                      |
| Married, child       | Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes |                      |                      |                      |                      |                      |                        |                      |                      |                      |                      |
| Parental SES         | Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes |                      |                      |                      |                      |                      |                        |                      |                      |                      |                      |
| Enlisted position    | Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes |                      |                      |                      |                      |                      |                        |                      |                      |                      |                      |
| N                    | 703,573 703,573 703,573 703,573 703,573 703,573 703,573 245,061 245,061 703,573 245,061 245,061 |                      |                      |                      |                      |                      |                        |                      |                      |                      |                      |
| # Family FE          | 116,220 |                      |                      |                      |                      |                      |                        |                      |                      |                      |                      |
| R-squared            | 0.026 0.039 0.039 0.045 0.069 0.072 0.074 0.069 0.079 0.046 0.04 0.116 |                      |                      |                      |                      |                      |                        |                      |                      |                      |                      |
| Mean Y               | 0.102 0.102 0.102 0.102 0.102 0.102 0.102 0.093 0.093 0.018 0.015 0.015 |                      |                      |                      |                      |                      |                        |                      |                      |                      |                      |
| Mean Y (never        | 0.116 0.116 0.116 0.116 0.116 0.116 0.116 0.107 0.107 0.026 0.021 0.021 |                      |                      |                      |                      |                      |                        |                      |                      |                      |                      |
|                     | entrants)                    |                      |                      |                      |                      |                      |                        |                      |                      |                      |                      |

Note: See Table A1 or text for definitions of dropout and not at risk dummies. Outcomes are proportion of time spent in the specific state during 8 years following age 30 years/labour market entry. t-values in parentheses (standard errors are clustered on the family level). *P < 0.05, **P < 0.01, ***P < 0.001.
family factors are strong confounders of the dropout effect. In the final model, dropouts experience some 1.4 percentage point longer time spent in marginalization than never entrants. This corresponds to a relative effect of 13 per cent. While this analysis suggests that scarring effects of dropout exist (compared to never entrants), the scarring effect is small.

The dummies for those not being at risk show a large gradient in marginalization risk by education. All these have the same reference group as the dropout dummy (never entrants). In essence, the higher the educational level, the lower is the marginalization risk. For example, tertiary graduates have 3 percentage points lower marginalization exposure than never entrants, which is substantial compared to the more modest dropout effect.

The right panel of Table 2 analyses scarring effects on social welfare. While the model (Column 10) with observed covariates suggests a scarring effect, the final model with family fixed effects fail to establish a significant effect. The incidence of marginalization in social welfare is lower than for low earnings, which limits statistical power. However, the number of available cases within families is rather large (see Table A1), and this thus suggest that the scarring effects should be detectable but are very small. Hence, dropping out only increases the risk of the milder form of scar.

In the Web Appendix, the analyses are conducted on the whole population without controlling for the enlistment variables (cognitive ability, non-cognitive skills, and enlisted positions). With sibling fixed effect, the dropout coefficient for low earnings becomes 0.013 for males (see Supplementary Table S2), and is very close to the effect discussed above, which was 0.014. Hence, using only a sibling comparison strategy might be a good alternative to controlling for cognitive ability and non-cognitive skills, not least since these often are hard to measure. Importantly, these analyses also include females, and for them there is no scarring effect of dropout on low earnings, but well on social welfare. The latter coefficient is 0.004, suggesting that the risk increases by half percentage point, or in relative terms 20 per cent (see Supplementary Table S3).

Discussion

This article has analysed scarring effects of university dropout vs. never entering on mid-life marginalization in Swedish males, and found evidence of scarring effects of dropout that tend to be small. The effect is in substantive terms at some 13 per cent higher risk of marginalization or 1.5 percentage points higher. The increased risk is found only for the more encompassing measure of marginalization (low earnings). For the more severe marginalization (social welfare), no risk difference was found. For females, a supplemental analysis with a weaker control strategy found scarring effects too, but only for the more severe marginalization of receiving social welfare. In the context of Sweden’s open and large tertiary sector but largely closed labour market, dropping out thus has marginal negative consequences.

This finding talks to models of educational decision-making that aim to explain social inequality. In Breen and Goldthorpe’s (1997) model of educational decision-making, the most critical assumption is that individuals fear downward mobility, where dropping out of higher levels of education is assumed to increase this risk of downward mobility compared to never entering. The article thus lends some support to this claim: never-entering tertiary education reduces the likelihood of experiencing future marginalization, i.e. a risk of downward mobility for the working class. Hence, the risk averse agent of working-class origins does decrease risk when opting out of further schooling, but only marginally so. The question is if the risk difference is large enough to deter students from entering education? Individuals may perceive the risk subjectively to be larger than it objectively is, and if this is the case, there is certainly scope for the assumption. However, if such subjective over-estimation exists, then the explanation must be sought in either differences in the quality of information of the educational system and how to navigate it across working and service classes, or in innate differences in risk averse preferences (even though Breen et al., 2014: p. 265, found that such preferences do not mediate socioeconomic differences in educational choices). It should simultaneously be noted that educational attainment per se has a strong negative association with marginalization, and so the slightly increased risk of marginalization of dropouts should be weighed against the substantially decreased risk that comes with educational success. Some previous research indicates that these scarring effects may be much stronger in systems with a clearer distinction between academic and vocational secondary education that also have apprenticeship systems (i.e. Denmark and Germany, see Schnepf, 2014), and it may be that the BG model works best to explain educational inequality in such a context, despite their claim that their model has general applicability (1997: p. 278). Hence, further tests of the scarring effects of dropout in different contexts are warranted.

The approach in this article also talks to a burgeoning literature of scarring effects in various parts of the educational system. While much literature is focused on
the scarring effects of not completing education, the present study adds to a smaller line of research on entering education. One important lesson to learn is that not controlling for schooling, cognitive ability, and non-cognitive skills will suppress the effect of dropout, and that unobserved family factors as well as family circumstances such as getting children are important confounders. An important limitation in the study is that, in line with much previous literature focusing on dropouts vs. never entrants, the motive for dropout is unobserved. Further research that takes this factor into account is warranted.

The identification strategy relied on controlling for factors that are strong determinants of the dropout decision (previous achievement, cognitive ability, and non-cognitive skills, and parenthood), as well as netting out unobserved heterogeneity with brother fixed effects. Even though this article provides evidence of scarring effects of dropping out, the parameters are ‘reduced form’ and provide no information about the mechanisms that in fact generate the outcome pattern. There are several arguments for why we would expect scarring effects of educational failure, and so it remains for future research to identify those mechanisms more precisely.

**Notes**

1 The cost–benefit part of the model is not unique to the BG model, see for example Erikson and Jonsson (1996, Chapter 1), and will only tend to reinforce the class differences discussed below, i.e. act as a multiplier of choice differentials generated through risk aversion. BG argue that differential costs are not the main explanation of the remaining class differences in education (p. 294).

2 For example, the prediction that the service class always aim for maximum education is not unique to the BG model; many behavioural mechanisms other than the RRA can explain such a pattern, most notably strong cultural indoctrination within the service class—a kind of explanation that BG totally reject.

3 This research is reviewed in the Web Appendix, but omitted here due to space limitations.

4 The degree of heterogeneity in the dropout group will be dependent on the institutional context, i.e. how educational failures are treated, exam rules and regulations, etc. Hence, the empirical strategy used to identify the effect must be adapted to the specific context. In addition, the business cycle will also influence the heterogeneity. In a boom, with labour shortage, one can expect more improper dropouts since employers will be more inclined to hire high-skilled individuals without formal qualifications. In a bust, the reverse holds. Hence, it is essential to control for time.

**Supplementary Data**

Supplementary data are available at ESR online.

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### Table A1. Individuals in relevant education × registration cells and their brother’s education

| Educational category                        | Whole sample |            |            |            | Brother sample |            |            |            |
|---------------------------------------------|--------------|------------|------------|------------|----------------|------------|------------|------------|
|                                             | Proportion   | Number of individuals | Dropout | Number of index individuals | Number of brothers | Never entrants | Number of index individuals | Number of brothers |
| Basic education                             | 0.000        | 195        | 0          | 1          | 0              | 51         | 0          | 1          |
| Unfinished upper-secondary                   | 0.011        | 7,933      | 0          | 81         | 0              | 1,584      | 0          | 1,584      |
| Other upper-secondary                        | 0.004        | 2,510      | 0          | 29         | 0              | 557        | 0          | 557        |
| Vocational upper-secondary, 0 tertiary registrations | 0.396       | 278,550    | 0          | 2,234      | 0              | 91,836     | 0          | 91,836     |
| Vocational upper-secondary, 1 tertiary registration | 0.004       | 2,826      | 928        | 0          | 0              | 522        | 0          | 522        |
| Vocational upper-secondary, 2 tertiary registrations | 0.003       | 1,809      | 567        | 0          | 0              | 302        | 0          | 302        |
| Vocational upper-secondary, 3–4 tertiary registrations | 0.003       | 1,873      | 636        | 0          | 0              | 324        | 0          | 324        |
| Vocational upper-secondary, 5–6 tertiary registrations | 0.001       | 636        | 0          | 8          | 0              | 96         | 0          | 96         |
| Vocational upper-secondary, 7+ tertiary registrations | 0.001       | 1,029      | 0          | 14         | 0              | 169        | 0          | 169        |
| Academic upper-secondary, 0 tertiary registrations | 0.139       | 97,923     | 1,244      | 33,104     | 0              | 0          | 0          | 0          |
| Academic upper-secondary, 1 tertiary registration | 0.008       | 5,810      | 1,939      | 0          | 0              | 833        | 0          | 833        |
| Academic upper-secondary, 2 tertiary registrations | 0.006       | 4,330      | 1,522      | 0          | 0              | 645        | 0          | 645        |
| Academic upper-secondary, 3–4 tertiary registrations | 0.006       | 4,167      | 1,504      | 0          | 0              | 601        | 0          | 601        |
| Academic upper-secondary, 5–6 tertiary registrations | 0.004       | 2,559      | 0          | 43         | 0              | 322        | 0          | 322        |
| Academic upper-secondary, 7+ tertiary registrations | 0.011       | 7,798      | 0          | 159        | 0              | 968        | 0          | 968        |
| Post-secondary                               | 0.108        | 76,191     | 0          | 994        | 0              | 12,731     | 0          | 12,731     |
| Partial tertiary                             | 0.110        | 77,731     | 0          | 1,167      | 0              | 9,573      | 0          | 9,573      |
| Tertiary                                    | 0.094        | 66,232     | 0          | 945        | 0              | 7,193      | 0          | 7,193      |
| Long tertiary                                | 0.090        | 63,471     | 0          | 767        | 0              | 5,173      | 0          | 5,173      |
| Total                                       | 703,573      | 7,096      | 7,686      | 124,940    | 41,644         |