The Consequences of Delaying Entrance into University:

Program specific differences in the wage penalties associated with less post-schooling experience.

Kelly Foley
Copenhagen Business School*

Fane Groes
Copenhagen Business School

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Abstract

Because the returns to education depend on the finite horizon of individuals' working lives, human capital models predict that if an individual is going to attend university, she should do so as soon as possible. Delaying university can also mean individuals have fewer years in which to accumulate post-schooling experience. In this paper, we use Danish administrative data to estimate the wage losses experienced by individuals who accumulate less post-schooling experience because they postponed entry into university following high school. All else equal, experience-related costs of delaying university will be larger when the returns to experience are higher. Using a panel covering 10 years of post-schooling wages, we estimate the returns to experience separately for graduates in different fields of study. We find important differences in wage profiles across the fields of study. Specifically, we find that compared to other programs, Arts and Humanities graduates have flatter wage profiles. These flatter profiles in turn mean that the experience-related wage losses are smaller. For Arts graduates the wage penalty is never more than six per cent. In contrast, the penalty for Social Science graduates who delayed university can be as large as 8 per cent.

*Correspondence: Department of Economics, Copenhagen Business School, Porelænshaven 16A, 1, DK Frederiksberg 2000. The research is supported by a grant from the Danish Social Science Research Council (FSE). The authors would like to thank Lena Scotte for stellar research assistance, as well as participants at the CBS lunch seminar series and the University of Copenhagen empirical lunch seminar for their comments and suggestions.

1 Introduction

Compared to the amount of attention that is directed toward understanding how wages are affected by the level of education individuals obtain, the issue of *when* education is acquired receives scarcely any attention. The issue of timing garners less attention from economists, at least in part, because most of the workhorse models of human capital predict that investment levels are largest early in the life cycle and decline monotonically throughout. In short, because the returns to human capital depend on the span of one's working life, it is best to have the longest horizon over which to reap those benefits. Yet, a substantial number of individuals have interruptions in their schooling and pursue investment paths that defy these predictions.

In this paper, using data from the Danish population registers, we focus on individuals who attend university but do not progress directly from high school. The decision to delay the first entrance into university is often referred to as taking 'gap years', and we adopt this convention. Taking gap years is a fairly widespread practice in Denmark that increased in prevalence during the 1980's and 1990's. In the 2001 high school graduating cohort, among those who eventually attended university, only 19 percent went directly from high school. Delayed entrance occurs throughout Europe, but with less frequency. In recent cohorts of university entrants, 27 per cent of Danes entered directly, compared to 46 per cent in Norway (Orr and Netz, 2011). Delaying university is also observed in North America. In a sample of Canadians who were 20-years old in 2000, among those who had enrolled in post-secondary education, 24 per cent had delayed by 12 months or more (Tomkowicz and Bushnik, 2003). In 2000, almost half of U.S. undergraduates had delayed their post-secondary schooling by at least six months (Horn and Malizio, 2002).

The prevalence of this specific kind of schooling interruption suggests that the timing of university investments could play a non-trivial role in explaining distributions of wages.[1] There are a number of ways in which delaying university might affect wages. For example, delaying university could potentially increase wages if, as a result, individuals become more productive in

[1]We examine only interruptions that occur between high school and university, in effect holding constant any interruptions that might occur during university.

terms of labour market skills or in producing human capital. We are unable to identify the direct effect of delaying university on wages. Instead, we focus on the costs incurred because individuals who delay university have fewer years in which to accumulate post-schooling experience. These costs are closely linked to the returns to experience. Higher returns to experience imply greater potential wage losses associated with delaying university.

Because wage profiles for different occupations and education levels are not always parallel (Heckman et al., 2006; Lemieux, 2006), the costs of delaying university may depend on the university program individuals pursue. In our data, individuals who pursue Arts and Humanities are far more likely to have taken a gap year relative to students studying in all other fields. For example, Arts students are 27 percentage points more likely to have taken a gap year compared to Engineering students, even after controlling for an array of characteristics.

We explore whether the propensity to delay university is linked to differences in experience-related wage costs. Specifically, we estimate the returns to post-schooling experience for graduates of Arts and Humanities, Social Science and Science and Engineering programs. We use a panel, in which we observe wages for 10 years following graduation, to estimate returns to experience in linear fixed-effects models. We find that Arts graduates have much flatter wage profiles in comparison to those with Social Science or Science and Engineering degrees.

We use our estimated returns to experience to predict the wage penalties that individuals who delay university incur because they have lower levels of experience. For the average Arts graduate, who worked full-time continuously in the ten years following graduation and entered university directly, having an additional year of experience increased hourly wages by 3 to 5 per cent. The wage penalties associated with delaying university are larger for Social Science and Science and Engineering graduates, because their wage profiles are much steeper. For continuously employed full-time workers, with these degrees, delaying university was associated with wage penalties in the order of 6 to 8 percent.

On the whole, our results demonstrate that because wage profiles are much flatter for Arts and Humanities graduates, the wage penalties, which accrue because individuals who delay university accumulate less experience, are lower than those for graduates of Social Science, Science

and Engineering programs. Because the experience-related costs differ by degree program, postponing university is not independent of program selection. On one hand, individuals who want or are required to delay university may choose programs with lower costs associated with delaying. On the other hand, individuals who want to enter low-cost programs are more likely to take gap years precisely because the costs are lower.

Our findings have implications that are relevant to the literature estimating the direct effects of schooling interruptions, as well as the literature on gender-specific occupational segregation. The connection between degree program and the costs of delaying university suggests that those who take gap years are a highly selected group. Estimates of the direct effect of delaying university that fail to take this into account are likely to overestimate the costs. Our analysis also suggests that the link between occupational selection and labour supply, highlighted by Polachek (1981), extends not just to post-schooling labour market absences but also to schooling interruptions.

The rest of the paper proceeds by first describing, in brief, the Danish schooling system. We then review the relevant literature. In the next two sections, we describe the empirical approach and our data. The results section that follows first describes individuals who delay university, in terms of their characteristics, their activities in the first gap year, and their educational outcomes. Then we present our estimates of the experience-related wage penalties associated with delaying university. Finally, we offer some concluding comments.

1.1 Danish School System

During our sample period, Denmark had 9 years of mandatory schooling called Folkeskole, corresponding roughly to ages 7 through 16. Education beyond Folkeskole is not compulsory. Those who did continue beyond grade 9 could choose between an additional year at Folkeskole (grade 10) or a variety of high schools: ordinary, business or technical high school. Students can also enter high school after grade 10. Students can qualify to enter university from any type of high school, conditional on fulfilling the specific university program prerequisites. These

prerequisites often involve passing exams in higher level courses in program specific subjects. Students must also achieve a minimum score of 6 on a 13-point grade scheme to qualify for university.

Eligible students apply to university through a centralized application system. During the sample period, capacity within faculties at each university was established by the Ministry of Education in consultation with Deans from the various institutions. The national government also legislated that a certain fraction of positions were allocated to students applying through three different pathways. Roughly 10 to 20 per cent of the positions were reserved for students over age 25, without a high school diploma. Another 20 per cent were allocated to applicants with work experience. The GPA of applicants applying through this channel was inflated by a factor that increased with the amount of work experience. For example, in 1987 the GPA of applicants with 9-11 months of experience was inflated by 1.09, and by 1.18 for those with 18 months experience. Most of the capacity, 60-70 percent, was allocated on the basis of GPA alone. The application system would generate offers to the applicants with the highest grade point average. The high school GPA used for admissions is a weighted average of the final exams and the course grade, which, for example, might be given for class participation or quality of homework assignments. Final exams are standardized across all high schools and are evaluated by the students' teachers as well as external examiners assigned by the Ministry of Education.

In this paper, we focus on students entering programs that lead to a 5-year Candidature degree (Kandidatur in Danish). The Danish system of post-secondary education is divided into three categories, with 2-year, 3-year, and 5-year degrees. In Denmark, only the 5-year degrees are thought of as university degrees. During our sample period, some programs commenced with 3-year bachelor degrees that led into Candidature programs, particularly in Arts and Humanities and Social Sciences. Teachers and nurses are not classified as university programs in Denmark because these are 3-year degree programs not leading to a Candidature.

2 Previous Research

Many of the early models that use human capital investments to explain variations in earnings treat labour supply exogenously (e.g. Becker and Chiswick, 1966; Mincer, 1974; Ben-Porath, 1967). In these models, investment decisions can be examined separately from consumption decisions, such that optimal human capital investments maximize the present discounted value of lifetime income. Because the value of human capital depends on the finite horizon of one's working life, these models predict that human capital investments are made as early as possible in the life cycle. A prediction seemingly at odds with the patterns observed in the Danish data.

In models with endogenous allocation of time between work, leisure and investment, leisure must be sacrificed to invest in human capital. Consequently, human capital investment should be analyzed in a utility maximization framework. An important difference in this class of models is that the pattern of human capital investments may depend on individual preferences, in particular the rate of time preference. Heckman (1976) develops such a life-cycle model where utility depends on effective leisure. Furthermore, Heckman (1976) assumes that human capital is equally productive when employed in market, investment and home activities. Consequently, investment time declines monotonically with age just as in the models with exogenous labour supply.

Blinder and Weiss (1976) assume, in contrast, that actual leisure enters the utility function. In their model, individuals who are sufficiently impatient have incentives to postpone investments. Specifically, if the rate of time preferences is larger than the interest rate and the rate of human capital depreciation, individuals may "retire" upfront. According to this model, heterogeneity in either interest rates, preferences, or human capital depreciation has the capacity to explain why some individuals postpone university.

Polachek (1981) extends this literature by modeling the link between earnings and occupational specific human-capital. In his model, individuals can invest in types of human capital which vary in the rate of depreciation. Individuals with different optimal paths of labour supply may invest in different occupational specific human capital. Specifically, women who plan

intermittent absences from the labour force may select into occupations where human capital atrophies relatively slowly. Using data from the NLSY women's sample, Polachek (1981) finds that women who spend more time out of the labour force do tend to work in occupations with lower depreciation rates. Our work poses similar questions but rather than examining gender differences in earnings, we examine whether the timing of human capital investments are linked to the type of investments, focusing on differences in wage growth or returns to post-schooling experience.

Human capital models that predict continuous and monotonically declining investments in human capital, also assume perfect credit markets. Without perfect credit markets, individuals who are credit constrained may delay university to save money for their education. Kane (1996) uses state level variation to estimate the relationship between tuition levels and delaying university in the NLSY and CPS data sets. He finds that delayed college entry is more pervasive in high tuition states. He interprets his results as evidence that tuition elasticities are overstated by one third because students respond to tuition increases by delaying entry. Also using the NLSY, Carneiro and Heckman (2002) find that 8% of all students are credit constrained in their decision of when to enter university.

In Danish data, credit constraints are far less likely to play an important role in delaying university. During the period we study, no fees were charged at any Danish university. Generous grants were available for all students over age 19 and for low income students below age 19. In 1987, the grants system was reformed so that all students could receive grants without means-testing. Nielsen et al. (2010) study the effect of that expansion in aid and find very little impact on enrollments suggesting that constraints did not bind prior to the reform.

Beyond credit constraints, a variety of reasons for postponing university are apparent when some of the traditional assumptions do not hold. For example, traditional human capital models assume full information and perfect certainty. Interruptions in education may occur because individuals learn about their abilities or labour market opportunities during the intervening periods. It could also be the case that the capacity to acquire human capital depends on age and maturity, making it productive to delay university. Traditional human capital models also

assume that the supply of human capital investment opportunities are perfectly elastic. In reality, individuals may not be admitted to their program of choice. If taking time off increases productivity sufficiently, delaying university could have a positive effect on earnings. Studies using data from Canada, U.S. and Sweden reach different conclusions about the size and sign of the effect that delaying university has on wages and earnings. The conflicting results in this literature no doubt reflect differences in samples, and the nature of the effect identified.

In U.S. data, Light (1995) finds that individuals who delay by two years receive a wage premium that is 20 percentage points lower than those who complete 16 years of education with no delay. Delays in Light's (1995) data can occur because of interruptions during college or prior to college. Monks (1997) estimates, in a fixed-effects model similar to our set-up, the effect of age at college-completion on earnings. He finds that the initial post-college increase in earnings is 4 per cent smaller for individuals who graduate one year older. In his data Monks (1997), can not distinguish between individuals who graduate later in life because they delayed entry or because they took longer to complete their college education.

In contrast, Ferrer and Menendez (2009) find that delaying university increases wages within a sample from the 1995 cohort of Canadian university graduates. Using provincial and national unemployment rates in the years prior to university enrollment to instrument for the decision to delay, they find that 5 years after graduation, wages were 5 per cent higher among university graduates who delayed relative to those who entered directly from high school.

Using Swedish data that is most similar to ours, Holmlund et al. (2008) report that, at age-40, earnings are 40-50 percent lower among graduates who delayed entry into university by two years, relative to those who enter directly from high school. Holmlund et al. (2008) attempt several strategies to control for unobserved selection, but in the end rely on a rich set of control variables.

Like Holmlund et al. (2008), we can not identify a direct effect on the level of wages, instead we exploit the panel nature of our data to explore how returns to delaying university affect wages through the channel of post-schooling experience. Our main contribution is to examine whether there is a link between the type of university degrees individuals pursue and the propensity to

delay.

3 Empirical Approach

Individuals who decide to delay their studies are, in all likelihood, different in important ways from those who enter university directly from high school. This makes it extremely difficult to estimate the impact that delaying university has on individuals' outcomes later in life. Our attempts to uncover an exogenous source of variation in the timing of individuals' university enrollment were unsuccessful. Neither regional-cohort variation in unemployment rates nor cohort size predicted delay-decisions with sufficient power. We also explored the possibility of using changes across cohorts in the enrollment capacity of the program in which individuals eventually enrolled. Although this potential instrument had strong predictive power, it appeared to influence the behavior of very few individuals.[2]

Rather than identifying the direct effect of postponing university, we focus on how delaying university affects wages through the channel of post-schooling experience and wage growth. We begin by assuming that log wages are quadratic in post-schooling experience, following the familiar Mincer (1974) equation[3]:

$$\ln(w_{isa}) = \beta_S + gap_i\beta_{gs} + X_{ia}\beta_{xs} + exp_{ia}\beta_{es} + exp_{ia}^2\beta_{e2s} + \epsilon_{isa} \tag{1}$$

The index a refers to years after high school graduation, and X_{ia} are observable characteristics. The direct effect of delaying university is β_g and gap_i are the number of years between high school graduation and enrolling in university. For individuals who graduated in June and

[2]Because admissions into capacity-constrained programs is determined by high school GPA, a discontinuity in enrollments occurs around the GPA cut-off. Humlum et al. (2012) use that discontinuity to examine the effect of university timing on fertility decisions. They restrict their analysis to the set of applicants to programs with GPA-offs. We do not observe individual applications for our sample because these records were not registered until 1996. In the cohort of 1996 high school graduates, only 10 per cent of the delayers applied for university in that year. Furthermore, within our sample, over 70 per cent of the individuals who delayed university either entered programs with no capacity constraint or had high school grades that were above the GPA cut-off of the program they eventually entered. In other words, the majority of individuals who postponed university would have been admitted directly to the program they eventually attended.

[3]Although several studies (e.g. Murphy and Welch, 1990) have concluded that a quartic in experience fits data better than a quadratic, the third and fourth degree polynomial terms are not significant in our data for the first ten years of post-schooling wages.

enrolled in university in the September of the same year $gap_i = 0$. Several studies have found that the wage profiles for different schooling levels are not parallel (e.g. Lemieux, 2006; Heckman et al., 2006). Accordingly, we allow the returns to experience to differ by schooling levels completed. Indeed, we fully condition on the level and type of degree attempted and completed. An individual is defined as having completed their schooling if they do not appear as enrolled in any subsequent years within our observation window (22 years following high school graduation). If an individual spent x years in university (whether continuously or not), post-schooling years commence x years after high school. Initially, we restrict the sample to individuals who worked full time continuously in the first ten years after completing their schooling. Completing schooling need not mean completing a degree. For the set of full-time workers, experience accumulates mechanically in each post-schooling year. In this context, individuals who delay by one year, will have one less year of post-schooling experience in comparison to individuals who enter university directly and who spent the same number of years acquiring the same level of schooling. Table 1 illustrates the post-schooling work histories for some hypothetical schooling pathways.

Individuals who delay university may be impatient or they may have strong preferences for leisure relative to consumption and work. For these and other possible reasons, the error term in (1) is probably correlated with exp_i and gap_i. We assume that correlation operates through unobservable characteristics which do not change with age or time, such that ϵ_{isa} can be decomposed into individual-fixed and strictly-exogenous components:

$$\epsilon_{isa} = \phi_i + \upsilon_{ia} \tag{2}$$

Under this assumption log wages are:

$$\ln(w_{isa}) = \alpha_S + X_{ia}\beta_{xs} + exp_{ia}\beta_{es} + exp_{ia}^2\beta_{e2s} + \theta_i + \upsilon_{ia} \tag{3}$$

where $\theta_i = \phi_i + gap_i\beta_{gs}$. While the direct effect of taking a gap year is not identified in (3), we can consistently estimate the returns to experience in a fixed-effects regression and use these to estimate the wage penalty incurred because individuals who delay university have accumulated

less post-schooling experience.

For continuously employed individuals, post-schooling experience can be written as a function of gap years:

$$exp_{ia} = a - yrs_i - gap_i \tag{4}$$

where yrs_i are the number of years spent in post-secondary schooling and gap_i are the years of delay prior to university. Conditional on the years spent in university, the wage penalty a years after high school, due to less accumulated experience can be constructed using[4]:

$$\frac{\partial \ln(w_{isa})}{\partial exp_{ia}} \frac{\partial exp_{ia}}{\partial gap_i} = -\beta_{es} - 2\beta_{e2s}(a - yrs_i - gap_i) \tag{5}$$

The wage penalty in (5) describes how much those who work continuously would lose in wages if they have one less year of post-schooling experience.

For at least two reasons, the cost of delaying university among continuously employed workers is unlikely to be the same as that for all workers. First, the returns to experience need not be the same. Second, among all workers experience accumulated in the post-schooling years will vary across individuals. For example, those who delay university might work more after they complete their schooling.

Instead of restricting the sample to those who work continuously, we can include individuals who work intermittently and estimate a fixed effects regression similar to (3), using actual experience accumulated. With a linear fixed-effects model, under the assumption described by (2), we can obtain estimates of the returns to experience for all workers from this regression. We can not, however, use these returns in the same way to construct the wage penalty associated with delaying university. Instead of the expression in (5), the effect on wages operating through post-schooling experience for all workers is:

[4]Delaying university might also affect yrs_i or X_{ia}, our estimates will not capture any such effects.

$$\frac{\partial \ln(w_{isa})}{\partial exp_{ia}} \frac{\partial exp_{ia}}{\partial gap_i} = [\beta_{es} + 2\beta_{e2s} exp_{ia}] \frac{\partial exp_{ia}}{\partial gap_i} \quad (6)$$

For continuously employed workers, by definition $\partial exp_{ia}/\partial gap_i = -1$. Unfortunately, because we do not have exogenous variation in gap years, we can not consistently estimate by how much delaying university affects experience for all workers. Nonetheless, we proceed by predicting $\partial exp_{ia}/\partial gap_i$ in OLS regressions, controlling for high school grades and family background. We construct the wage effects in (6) using the estimated returns to experience for all workers along with the predicted differences in experience. These estimates can be thought of as the wage penalties after controlling for the observable differences in experience associated with delaying university.

4 Data

We use the administrative Danish register data covering 100% of the population in the years 1980 to 2008. The data is created by merging several registers containing information reported to Danish authorities for a variety of purposes, some of which are administrative (eg. taxes, pension schemes, student grants) and some of which are for statistical reporting (student enrollment, graduation dates, occupational classification). In this paper, we use data from three different registers. The first is the Danish Student Register, which contains annual records for all individuals who attended any level of schooling in Denmark. Every educational institution that is regulated by the government reports by law to Statistics Denmark, through the Ministry of Education. Both enrollments and credentials obtained are recorded, including specific dates of initial enrollment and completion. The specific institution and program is also recorded. For university programs, we have very detailed information about the type of degree program students enrolled in and whether they obtained the credential. Although we can directly observe how long it takes an individual to complete their education, we do not observe whether individuals enroll full time or part time or whether they pass their yearly examinations. For individuals attending ordinary high schools (almindelig gymnasium) in Denmark, we observe their average

high school grades, which are used to qualify for university.

The second registry included in our data set is the Integrated Database for Labor Market Research (IDA), which contains annual information about socioeconomic variables (e.g., age, gender, children, geographical location etc.) This database links individuals to their parents, thus we can construct very detailed information about family background. This registry also contains labour market information (e.g., labor market status, level of employment, occupations, etc.) for the population working in Denmark.

Finally, we draw information on hourly wages from the Income Registers. The hourly wage is reported for the main job held in the last week in November of each year. Wage information is not available for workers not employed in this week. Statistics Denmark constructs the hourly wage variable from the sum of total labor market income in the job held in the last week in November divided by the total number of hours worked in that week. The labour income used to construct this variable is reported to Statistics Denmark directly from the tax authorities and as such have a high degree of reliability. Additionally, Statistics Denmark provides a measure of the quality of the hourly wage variable. An hourly wage is considered by Statistics Denmark to be 'high quality' if an individual has worked an average of 20 hours per week, in the weeks she worked, throughout November. To be included as a wage earner in our analysis an individual therefore must be a full-time worker, according to this definition. Throughout we use real wages, deflated to 1981 levels using Statistics Denmark's consumer price index.

We restrict our sample to individuals who were born in Denmark and graduated from a Danish ordinary high school (almindelig gymnasium) in 1981 through 1986, which allows us to observe all individuals for 22 years following high school. We report the sample sizes for each high school cohort in Table 2. The only attrition in our panel occurs when individuals' permanent residence is outside of Denmark. We only consider graduates from ordinary high schools because, prior to 1996, high school grades were registered for only this type of high school. Over the sample period, 82 per cent of Danish high school graduates had graduated from ordinary high schools. We further restrict the sample to individuals who attended a university program, which leads to a Candidature, within 6 years of high school graduation. For our estimates of the wage penalties,

we consider only those who took 2 or fewer gap years, and those who spent no more than 10 years in post-secondary schooling. This allows us to observe 10 post-schooling years for all individuals.

5 Results

5.1 Who delays university?

Access to administrative data linking family background characteristics to education and employment histories permits a fairly rich characterization of the university students who delay entry to university. Table 3 reports the mean characteristics of individuals who enter university directly from high school and those who delay by 1 to 6 years. Gender appears to be the most distinguishing characteristic between those who delayed and those who entered directly. Women being far less likely to have entered directly. Individuals who entered directly tended to have higher grades and came from lower income families. Individuals who delayed by 3 or more years seem qualitatively different than the others. These students came from less-educated lower-income families and also had considerably lower grades.

To gauge the relative importance of each characteristic in predicting years of delay, in Table 4, we report estimates from OLS and Probit regressions. The estimates in Columns 1 and 2 are marginal effects estimated in Probit regressions where the dependent variable takes on the value one if the individual delayed by 1 to 6 years. In Columns 3 and 4 the dependent variable compares individuals who took one or two gaps years with those who entered directly. For comparison, the final two columns report OLS estimates in a specification where the dependent variable is linear in years of delay and the sample includes those with 2 or fewer gap years. Even controlling for gender and background characteristics, grades still predict the decision to postpone university (which may have been involuntary). A one point difference, on a 13 point grading scale, increases the probability of delaying by 8 or 9 percentage points. Although the estimated effect of family income is statistically significant, it is very small in economic terms. Parental education and family structure appear to have played a bigger role than family income.

Among the individual characteristics, gender is the strongest predictor of whether individuals delayed their education. Without controlling for the individual's degree program, girls are

roughly 15 percentage points more likely to have postponed their education. After including controls for the first university program entered, the gender differential falls to .10. There is a strong correlation between gender and program selection. This pattern of gender-specific selection into degree programs has been documented elsewhere in the literature and is often cited as a source of wage differentials (Brown and Corcoran, 1996; Turner and Bowen, 1999; Machin and Puhani, 2003).

Within particular fields of study, the probability of having delayed university varies significantly. On average, individuals who studied Arts and Humanities were more likely to have postponed their studies. Compared to Arts students, Engineering students were 27 percentage points more likely to have entered directly, and Science and Social Science students are 15 and 9 percentage points more likely, respectively. Naturally, the decision to delay university is not independent of the choice of university program. We will discuss later how the costs of delaying which are associated with lower accumulated experience differ across programs.

Comparing the estimates in the first two columns to the those in the third and fourth columns suggests whether individual characteristics played a different role in predicting short versus long gaps. The marginal effects in the full sample are fairly similar in size to those estimated in the sample of individuals who delayed by no more than 2 years. This also reflects the fact that a small fraction of the sample took three or more gap years.

5.2 Activities during Gap Years

Although it is not possible for us to estimate the direct impact of delaying university, we can gain some insight into why individuals delay by examining their activities following high school. Table 5 reports the fraction of individuals engaged in particular activities in the November following their high school graduation (which occurs in June). Table 6 reports the same information separately by final degree completed.[5]

[5]During the sample period, military service was compulsory for a fraction of 18 year-old men selected by lottery. In our data, military service is only observed if the individuals' occupation is coded as such. Unfortunately, in these occupational records military service is severely under reported. In 1979, 27 per cent of 18 year-old men were conscripted while in 1989, 24 percent were conscripted (Sorensen, 2000). In our data, we observe rates of service of roughly 7 per cent.

A small fraction of students, roughly 5 per cent who delayed university enrolled in 1-year high school programs in the fall after their high school graduation. Virtually all of those students enrolled in what was called the 'Higher Commercial Examination Programme (Højere Handelsek-samen). The program was an alternate route into apprenticeships and commercial vocational training.[6] The individuals who entered Social Science programs and those who delayed by three or more years were the most likely to have enrolled in supplementary high school programs. In addition to enrolling in high school programs, others enrolled in post-secondary programs that are not considered university. Most of the individuals that enrolled in other post-secondary programs delayed by more than 2 years, particularly among those that eventually enrolled in an Engineering program. Among Engineering students who postponed university by 3 or more years, 17 per cent enrolled in a non-university program after graduating high school.

Except for the students who applied when they were over age 25, university admissions were determined using grades from the first high school diploma. Thus, attending non-university programs prior to entering university would not help a student gain admission into a preferred program. It could be the case, instead, that these students were trying something else before entering university. This possibility is consistent with the data which shows that attending non-university PSE is most common among those with three or more years between high school graduation and university enrollment.

Over a third of the students who delayed university, worked full time in the November following their high school graduation. Full-time work is defined as 20 hours or more per week. Male gap-year takers were far more likely to be working during their gap year. About half of the men who delayed by one year were working full-time compared to less than a quarter of the women. This gender difference might be driven by military service. Not surprisingly because women were over represented in the Arts and Humanities, individuals who eventually entered these programs were also less likely to be working full-time.

Another 7 to 8 per cent of those who postponed university were registered as unemployed

[6]Individuals who wanted to pursue vocational training would have typically gone directly from primary school to vocational training. The Higher Commercial Examination Programme was a one-year equivalent program for individuals who had already finished a high school diploma.

in the November following high school graduation. Individuals were registered as unemployed, if they were receiving unemployment insurance in the last week of November. The Danish Unemployment Insurance Fund is a publicly administered fund, however membership is voluntary. Consequently, the unemployment we observe will miss individuals who were looking for work but were not members of the UI fund.[7] Youth unemployment ranged from 8.4 in 1983 to 5 per cent in 1986[8].

The primary activity among the majority of individuals who delayed university, is not reported in Tables 5 and 6. These students could have been traveling, studying abroad, working part time or engaged primarily in non-market activities. We do not report any evidence of child rearing because teenage parenthood is very rare in Denmark. Many of the individuals for whom we do not observe activities during gap years could be taking the kind of upfront retirements described by Blinder and Weiss (1976).

5.3 Cross-sectional differences in educational attainment

Although our focus in this paper is on the loss in wages associated with lower post-schooling experience, in this section we present cross-sectional differences in educational attainment to further describe the characteristics of individuals who delayed relative to those who entered directly. We use two measures of educational attainment. The first is the number of years of education completed. For every credential, Statistics Denmark provides the total number of months it should take to obtain that credential. For example, a high school diploma is equivalent to 144 months of education. A Candidature could be equivalent to 204 months. If an individual in the data had completed a particular credential, then we use the relevant equivalent-months to compute the years of education completed. This measure is distinct from the number of years an individual had spent in school. The second measure of educational attainment we use is an indicator function for whether an individual had obtained a Candidature.

We estimate the differences in these educational measures between individuals who delayed

[7]In the adult population, 88 per cent of unemployed individuals are members of the UI fund (Ejrnæs and Hochguertel, 2011).

[8]Eurostat table: Unemployment rate, annual average, by sex and age groups (%)

and those who entered university directly in OLS and Probit models, controlling for high school grades, gender and family background. These estimates are reported in Table 7 Columns 1 and 2 for educational outcomes measured 12 years after high school graduation, and Columns 3 and 4 for outcomes measured 22 years after high school graduation. Most sample members were age 30 twelve years after high school and age 40 ten years later.

When most of the sample was age 30, on average, those who delayed university by two or more years had completed fewer years of education and were less likely to have obtained a Candidature degree. There is very little difference between those who entered directly and those who took one gap year. Indeed, when controlling for the first degree program, on average, individuals who delayed by one year were slightly more likely to have obtained a Candidature. After another decade, the gaps in educational attainment closed. The differences in years of education completed, although statistically significant, is less than one month. Individuals who delayed by one year, were still 1.6 percentage points more likely to have completed a Candidature but there is no difference in this likelihood for individuals who delayed by more than one year.

On the whole, Table 7 suggests, that relative to students who entered university directly, there are differences in the timing of educational completion for those who delayed, but not in the eventual level of schooling obtained. While delaying university is closely linked to the age at which an individual completes their education, it need not perfectly predict the timing of completion. Individuals who delayed may study more intensely to catch up, or the very reasons that they took gap years may have led them to proceed slowly through their education. These are effects that we are not able to capture in our estimation of wage impacts. Because we use fixed effects models, we will in essence control for differences in the length of time spent in school.

5.4 Estimating the Wage Penalty of Delaying University Associated with Lower Post-Schooling Experience

If we restrict our attention to the cost incurred because delaying university creates a deficit in post-schooling experience among those who work full time continuously, the wage penalty of one gap year is equivalent to the returns to that foregone experience. Using a sample of full-time

workers who were employed continuously in the ten years following their last year in school, we estimate log wages using the specification described in (3). We estimate these log-wage equations separately for 8 different final schooling categories: Arts and Humanities without degree, with Bachelors, with Candidature; Social Science without degree, with Bachelors, with Candidature, Science and Engineering without degree, with Candidature.[9] We focus on those who completed the Candidature degree. Our regressions also include controls for the number of children living in the household.[10] To ensure that we can observe 10 years of post-schooling experience for all individuals, we restrict the sample to individuals who took no more than two gap years and no more than 10 years to complete their schooling. We cluster all of the standard errors at the individual level to account for any autocorrelation generated by heterogeneity in the returns to experience. The experience and experience squared coefficients are reported in the Appendix Table A.1. In Figure 1, we plot the estimated penalties for individuals who graduated with a Candidature in the three program types over 10 years of post-schooling experience. These effects are constructed from (5).

Individuals who pursue a degree in Arts and Humanities programs have much lower returns to experience and as such face lower penalties when they take gap years. The wage penalty associated with falling behind by one year of experience is 3.8 percent. Figure 1 also shows the penalty is fairly constant across the years of post-schooling work. This follows because the average wage profile among Arts and Humanities graduates is flat with very little curvature. Science and Engineering graduates have steeper wage profiles and as a result the wage penalty associated with delaying university is larger. For these individuals, the wage effect ranges from 6.6 to 5.1 percent over a 10 year horizon. The difference in wage penalties is most striking for Social Science graduates. On average, these graduates experience rapid wage growth and

[9]We also estimated regressions with Science and Engineering separately but the difference in the effects was small and statistically insignificant.

[10]The number of children includes all the children age 0 to 17 in a single household living at the same address. If three generations live together, the two youngest generations will be classified as one household and the oldest generation as another household. If a child under 18 years has a child, they will form their own household according to this definition by Statistics Denmark, but this does not occur in our sample. Children who do not live with their parents are not counted in this measure. Measures of fertility are recorded on separate registries, to which we do not have access for this project.

consequently may experience large wage penalties. In the first post-schooling year, the wage-effect is 8 per cent for Social Science graduates. Ten years later, average wages are 7 percent lower for Social Science graduates with a one year deficit of experience because they delayed university.

If we consider all workers, differences in post-schooling experience will depend on individual labour supply histories. Figure 2 plots predicted post-schooling experience for individuals who entered directly and those who took one gap year. The predicted values are estimated separately by post-schooling year and education category in OLS regressions controlling for years of delay, years in school, high school cohort, grades, gender and family background. The estimates plotted in Figure 2 are evaluated at the mean of the data. In other words, in each year, for each education category, the difference between the zero-gap year and one-gap year lines can be read as the coefficient on the gap-year indicator.

In the first post-schooling year, on average, individuals who entered university directly did not accumulate one full year more experience than those who delayed by a year. Arts graduates who took a gap year are .68 of a year behind those who entered university directly. The difference in experience for Science, Engineering and Social Science graduates is almost .8 of a year. The deficit of experience is relatively constant over time for the average Arts graduate who postponed university. For Social Science graduates, the gap in experience increases slightly to .88 after ten years. Among Engineering and Science graduates, after 10 years, the average difference in experience is virtually a full year.

Figure 2 also demonstrates that Social Science, and Science and Engineering graduates work almost continuously. Those who entered university directly accumulated, on average, over 9 years of experience in 10 post-schooling years. For Science and Engineering graduates, this helps explain why those who took a gap year are on average one full year behind in experience. In contrast, after 10 years, Arts graduates have on average 8 years of experience if they entered university directly. The experience levels reported in Figure 2 control for observable differences, such as gender, which are correlated with program choice and which one might expect to influence accumulated experience. Instead, the lower levels of experience among Arts graduates reflect

differences in unobserved characteristics which influence both involuntary unemployment as well as voluntary absences from the labour force.

Because individuals who work continuously are not a randomly selected group, there is no reason to expect that the returns to experience among this group of workers are the same for all workers. To describe how a predicted wage profile for intermittent full-time workers compares to that of continuously employed full-time workers, we regressed log wages in each of the post-schooling years on a dummy variable equalling 1 if the worker is employed full-time in all 10 years and zero otherwise, as well as controls for years of delay, gender, high school grades and background characteristics. We ran these regressions separately by final schooling categories and plotted the predicted wages in Figure 3. Within each education category, the difference in the plotted lines is the coefficient on the continuously employed dummy. For Arts graduates, average wages are lower initially and persistently for intermittently employed workers. Ten years after completing a Candidature in Arts and Humanities, continuously employed workers earn wages that are, on average, 11.6 per cent higher than those with gaps in their employment history. Among Social Science, and Science and Engineering graduates, on average, continually and intermittently employed workers had similar wages when they first completed their schooling. Over time, a gap in wages develops and widens. Ten years after completing their schooling continuously employed Social Science graduates have wages 9.9 percent higher than similar but intermittently employed workers. The gap after ten years for Science and Engineering graduates is 13.4 per cent.

For comparison, we run the same regressions that are reported in Figure 3 adding controls for experience and experience squared. We plot the results from those regressions in Figure 4. The differences in wages among intermittently and continuously employed workers virtually disappear for Social Science, Science and Technology graduates. In contrast, controlling for experience does little to change the estimated wage profiles among Arts and Humanities graduates.

Because the wage profiles of continuously-employed workers are not the same as those for intermittently-employed workers, the wage penalties we estimated in Figure 1 do not apply to all workers. Unfortunately, because we do not have exogenous variation in delaying university,

our estimates are not consistent for the true differences in accumulated experience. In spite of this, as a descriptive exercise, we use these predicted differences in experience to evaluate wage penalties associated with delaying university for all workers. To do this, first we regress post-schooling log wages on a quadratic experience as well as the number of children in the household in a linear fixed-effects model. Under the assumptions that the unobserved characteristics which jointly determine experience and wages are time-invariant and a strictly exogenous time varying error, we can obtain consistent estimates of the returns to experience from these regressions. Using the derivative shown in (6, we evaluate the wage penalty using the estimated returns to experience and the predicted differences in accumulated experience. These estimated returns to experience are reported in Appendix Table A.2 and the wage penalties are shown in Figure **??**.

In the sample of all full-time workers, the estimated returns to experience are much higher for Arts and Humanities graduates relative to the returns among continuously employed Arts graduates. This implies, as Figure **??** demonstrates, larger wage penalties for all full-time workers with Arts and Humanities degrees. These estimates range from 5.4 in the first year to 3.9 per cent after ten years. Similarly, the effect of delaying university estimated for all workers with Science and Engineering degrees is larger than the estimates in the sample of continuously employed workers. For Science and Engineering graduates, delaying university by one year is associated with wage penalties ranging from 8.2 to 5.9 over a ten year horizon. The returns to experience for all full-time workers with Social Science degrees are slightly convex during the first ten years. Social science degree holders include lawyers and economists who frequently hold jobs with low initial salaries which rise rapidly. As a consequence, the loss in wages associated with delaying university grows over time. In the first post-schooling year, the wage penalty for Social Science graduates who delayed university is not significantly different than that of Arts graduates. However, in the succeeding years, the wage penalty increases. After ten years the average loss in wages, for Social Science graduates, attributable to lower levels of experience among those who postpone university is 8.6 per cent.

Our results are not directly comparable to other estimates in the literature because we restrict our attention to costs of delaying university that are associated with less post-schooling

experience. If delaying university has a positive impact on wages then that premium would off set the costs we estimate. In our estimates of the returns to experience any such differences should be absorbed by the individual fixed effects. For Sweden, Holmlund et al. (2008) find that one gap year reduces discounted lifetime income by 21 per cent for men and 31 per cent for women. For continuously employed full-time workers, assuming a 35-hour-work week and 46 annual weeks of work, using the same discount rate (4%) as Holmlund et al. (2008), we identify much smaller effects. We find that the present value of 10 years of earnings is roughly 3.4 per cent lower for the average Arts graduates with one less year of experience due to delaying university. For Social Science and Science and Engineering graduates, those penalties are 7.7 and 5.4 per cent respectively.

One interpretation of the differences between Holmlund et al.'s (2008) and our estimates would conclude that the direct effect of taking gap years, which we do not capture, are strongly negative. Another interpretation would suggest that unobserved selection plays an important role in explaining the connection between delaying university and post-schooling wages. Our results imply that at least one of the costs, i.e. lost wages due to a deficit of experience, is correlated with individuals' university program. Any of the unobserved factors that influence selection into a field of study, and ultimately occupation, will have confounding effects on estimates of the direct effects of delaying university.

6 Conclusion

In this paper, we have concentrated on the wage penalties that accrue because, holding all else equal, individuals who postpone university have fewer post-schooling years in which to accumulate experience. When the returns to experience are higher, these experience-related costs are in turn larger. We examine the extent to which these costs vary across different fields of study. We find that compared to other programs, Arts and Humanities graduates have flatter wage profiles. These flatter profiles in turn mean that the experience-related wages losses are smaller. For Arts graduates the wage penalty is never more than six per cent. In contrast, the penalty for Social Science graduates who delayed university can be as large as 8 per cent.

It is not surprising that Arts graduates, for whom the experience-related costs of delaying are lowest, are in fact the most likely to delay entrance into university. These program specific differences in costs suggest that some part of the reason individuals select into particular programs could be related to a desire or need to postpone university. Conversely, it is possible that the higher propensity to delay university, given a particular degree program, is partly driven by the lower experience-related costs. Disentangling these connections is subject for future research. Understanding these connections can potentially uncover important links between the timing of university and occupational selection.

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Table 1: Hypothetical Schooling And Post Schooling Employment Histories

	Years After High School Graduation										
	0	1	2	3	4	5	6	7	8	9	10
Student enrolled in university continuously for five years with no gap years											
Activity	S	S	S	S	S	W	W	W	W	W	W
Years post schooling						1	2	3	4	5	6
Post-schooling experience						1	2	3	4	5	6
Student enrolled in university continuously for five years with 1 gap year											
Activity	L	S	S	S	S	S	W	W	W	W	W
Years post schooling						1	2	3	4	5	6
Post-schooling experience						0	1	2	3	4	5
Student enrolled in university intermittently for five years with no gap years											
Activity	S	S	S	L	S	S	W	W	W	W	W
Years post schooling							1	2	3	4	5
Post-schooling experience							1	2	3	4	5
Student enrolled in university intermittently for five years with 1 gap year											
Activity	L	S	S	L	S	S	S	W	W	W	W
Years post schooling							1	2	3	4	5
Post-schooling experience							0	1	2	3	4

[a] L – indicates an interruption in schooling, W – indicates post-schooling work, and S indicates enrollment in schooling.

Table 2: Sample Sizes and Proportions by High School Cohort and Years of Delay

	Years of delay between high school and university						
	0 Years	1 Year	2 Years	3 Years	4 Years	5 Years	6 Years
				Number of students			
1981	3,004	1,836	1,056	671	342	243	200
1982	3,268	2,039	1,497	682	387	305	204
1983	3,245	2,657	1,322	700	368	262	195
1984	3,682	2,583	1,525	809	424	286	184
1985	3,148	2,975	1,774	911	447	293	191
1986	2,866	3,055	1,897	849	436	321	176
				Proportion			
1981	40.86	24.97	14.36	9.13	4.65	3.31	2.72
1982	38.99	24.33	17.86	8.14	4.62	3.64	2.43
1983	37.09	30.37	15.11	8.00	4.21	2.99	2.23
1984	38.79	27.21	16.06	8.52	4.47	3.01	1.94
1985	32.32	30.55	18.22	9.35	4.59	3.01	1.96
1986	29.85	31.82	19.76	8.84	4.54	3.34	1.83
Total Sample	19,213	15,145	9,071	4,622	2,404	1,710	1,150

Source: Statistics Denmark Danish Population Register Data.
Sample includes native born Danes who graduated from an ordinary high school (almindelig gymnasium) between 1981 and 1994 and attended a university program within 6 years of high school graduation.

Table 3: Demographic Characteristics by Delayed Entrance into University

		Years of delay			
All cohorts	Full Sample	0 Years	1 Year	2 Years	3 or more
High school exam grades	8.532	8.726	8.562	8.389	8.239
	(0.004)	(0.007)	(0.008)	(0.009)	(0.009)
Female	0.472	0.368	0.508	0.542	0.553
	(0.002)	(0.003)	(0.004)	(0.005)	(0.005)
Age at high school graduation	18.316	18.356	18.301	18.269	18.303
	(0.004)	(0.008)	(0.007)	(0.008)	(0.008)
Family income	345,908	338,393	361,049	348,284	334,995
	(1,323)	(1,716)	(2,891)	(2,629)	(3,789)
At least one parent has a university degree	0.195	0.203	0.203	0.187	0.175
	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)
Two parent family	0.715	0.727	0.728	0.713	0.673
	(0.002)	(0.003)	(0.004)	(0.005)	(0.005)
Sample size	53,315	19,213	15,145	9,017	9,886

Source: Statistics Denmark Danish Population Register Data
Sample includes native born Danes who graduated ordinary high school (Almindelig Gymnasium) between 1981 and 1986 and attended a university program within 6 years of high school graduation.
Family back ground characteristics defined in the year the sample member graduated from high school.

Table 4: Characteristics Associated With Delaying University (Standard Errors in Parenthesis)

	(1)	(2)	(3)	(4)	(5)	(6)
	Probit Any Gapyears	Probit Any Gapyears	Probit 0-2 Years	Probit 0-2 Years	Linear 0-2 Years	Linear 0-2 Years
Female	0.149	0.098	0.152	0.100	0.231	0.144
	(0.004)***	(0.004)***	(0.005)***	(0.005)***	(0.008)***	(0.008)***
Average high school exams	-0.090	-0.088	-0.079	-0.080	-0.139	-0.140
	(0.002)***	(0.002)***	(0.003)***	(0.003)***	(0.004)***	(0.004)***
Age at high school graduation	-0.017	-0.022	-0.014	-0.020	-0.029	-0.037
	(0.002)***	(0.002)***	(0.003)***	(0.003)***	(0.004)***	(0.004)***
Ln family income	0.016	0.016	0.025	0.023	0.028	0.025
	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.008)***	(0.008)***
Did not live in a two parent family	0.024	0.017	0.008	0.002	0.027	0.019
	(0.006)***	(0.006)***	(0.007)	(0.007)	(0.010)**	(0.010)*
Mother's Education –Reference Long-cycle Education						
Less than high school	-0.011	-0.013	-0.017	-0.018	-0.037	-0.035
	(0.011)	(0.011)	(0.013)	(0.013)	(0.020)*	(0.020)*
High school	-0.010	-0.009	-0.009	-0.009	-0.022	-0.019
	(0.011)	(0.011)	(0.013)	(0.013)	(0.020)	(0.020)
Short-cycle education	0.031	0.032	0.034	0.037	0.036	0.038
	(0.013)**	(0.013)**	(0.015)**	(0.015)**	(0.023)	(0.023)
Medium-cycle education	0.056	0.054	0.058	0.056	0.085	0.084
	(0.011)***	(0.011)***	(0.012)***	(0.012)***	(0.019)***	(0.019)***
Mother's education data missing	0.000	0.000	0.017	0.014	0.030	0.032
	(0.019)	(0.019)	(0.022)	(0.022)	(0.034)	(0.034)
Father's Education –Reference Long-cycle Education						
Less than high school	0.015	0.007	0.015	0.006	0.027	0.012
	(0.007)**	(0.008)	(0.009)*	(0.009)	(0.013)**	(0.013)
High school	0.002	-0.003	0.000	-0.006	-0.003	-0.013
	(0.007)	(0.007)	(0.008)	(0.008)	(0.013)	(0.012)
Short-cycle education	0.020	0.019	0.021	0.018	0.042	0.041
	(0.012)	(0.012)	(0.014)	(0.014)	(0.022)*	(0.022)*
Medium-cycle education	0.012	0.016	0.012	0.015	0.024	0.029
	(0.007)*	(0.007)**	(0.008)	(0.008)*	(0.013)*	(0.013)**
Father's education data missing	0.007	0.004	0.023	0.017	0.025	0.013
	(0.011)	(0.011)	(0.013)*	(0.013)	(0.020)	(0.020)
First Program –Reference Arts and Humanities						
Science		-0.150		-0.142		-0.232
		(0.007)***		(0.009)***		(0.013)***
Social Science		-0.093		-0.081		-0.139
		(0.006)***		(0.007)***		(0.011)***
Engineering (Technical)		-0.274		-0.270		-0.436
		(0.007)***		(0.008)***		(0.013)***
Other		-0.082		-0.052		-0.093
		(0.008)***		(0.010)***		(0.015)***
Sample size	49,458	47,803	40,313	39,050	40,315	39,052

Source: Statistics Denmark Danish Population Register Data
Sample includes native born Danes who graduated ordinary high school (Almindelig Gymnasium) between 1981 and 1986 and attended a university program within 6 years of high school graduation.
Family back ground characteristics defined in the year the sample member graduated from high school.
Columns (1) - (4) are average marginal effects.
All specifications include controls for high school cohort and municipality in the high school graduation year. Columns (2), (4) and (6) include controls for the university in which the student first enrolled.
Long-cycle includes 5-year degrees, medium cycle is 2-3 year degrees, while short cycle is trade and vocational training.

Table 5: Activities in the November Following High School Graduation

	Years of delay		
	1 Year	2 Years	3 or more
High school	0.036	0.047	0.064
	(0.002)	(0.002)	(0.002)
Non-university PSE	0.017	0.028	0.081
	(0.001)	(0.002)	(0.003)
Full-time employment	0.356	0.338	0.289
	(0.004)	(0.005)	(0.005)
Unemployed	0.067	0.078	0.076
	(0.002)	(0.003)	(0.003)
Sample size	15,145	9,071	9,886
Female			
High school	0.029	0.042	0.053
	(0.002)	(0.003)	(0.003)
Non-university PSE	0.020	0.027	0.072
	(0.000)	(0.000)	(0.000)
Full-time employment	0.221	0.209	0.216
	(0.005)	(0.006)	(0.006)
Unemployed	0.066	0.083	0.076
	(0.003)	(0.004)	(0.004)
Sample size	7,691	4,912	5,471
Male			
High school	0.043	0.052	0.078
	(0.002)	(0.003)	(0.004)
Non-university PSE	0.015	0.029	0.091
	(0.001)	(0.003)	(0.004)
Full-time employment	0.495	0.489	0.378
	(0.006)	(0.008)	(0.007)
Unemployed	0.067	0.073	0.077
	(0.003)	(0.004)	(0.004)
Sample size	7,454	4,159	4,415

Source: Statistics Denmark Danish Population Register Data
Sample includes native born Danes who graduated ordinary high school (Almindelig Gymnasium) between 1981 and 1986 and attended a university program within 6 years of high school graduation.

Table 6: Activities in the November Following High School Graduation, by Finale Degree Completed

	Years of delay		
	1 Year	2 Years	3 or more
No Degree			
High school	0.037	0.044	0.057
	(0.003)	(0.004)	(0.004)
Non-University PSE	0.021	0.034	0.083
	(0.002)	(0.004)	(0.005)
Full-time employment	0.342	0.325	0.279
	(0.007)	(0.009)	(0.007)
Unemployed	0.076	0.078	0.080
	(0.004)	(0.005)	(0.005)
Sample size	4,393	2,857	3,597
Arts and Humanities			
High school	0.011	0.028	0.027
	(0.003)	(0.005)	(0.005)
Non-University PSE	0.027	0.015	0.090
	(0.005)	(0.004)	(0.008)
Full-time employment	0.236	0.238	0.210
	(0.012)	(0.014)	(0.012)
Unemployed	0.100	0.108	0.085
	(0.009)	(0.010)	(0.008)
Sample size	1,234	0,904	1,229
Science			
High school	0.026	0.028	0.020
	(0.006)	(0.008)	(0.007)
Non-University PSE	0.009	0.062	0.053
	(0.004)	(0.012)	(0.011)
Full-time employment	0.360	0.372	0.286
	(0.019)	(0.025)	(0.023)
Unemployed	0.101	0.103	0.073
	(0.012)	(0.015)	(0.013)
Sample size	0,653	0,387	0,398
Social Science			
High school	0.055	0.065	0.141
	(0.004)	(0.006)	(0.008)
Non-University PSE	0.012	0.018	0.042
	(0.002)	(0.003)	(0.005)
Full-time employment	0.399	0.381	0.333
	(0.008)	(0.011)	(0.012)
Unemployed	0.060	0.081	0.073
	(0.004)	(0.006)	(0.006)
Sample size	3,356	1,896	1,680
Technical			
High school	0.016	0.038	0.022
	(0.004)	(0.009)	(0.006)
Non-University PSE	0.014	0.031	0.171
	(0.003)	(0.008)	(0.015)
Full-time employment	0.482	0.410	0.292
	(0.014)	(0.023)	(0.018)
Unemployed	0.093	0.116	0.125
	(0.008)	(0.015)	(0.013)
Sample size	7,454	4,159	4,415

Table 7: Differences in Educational Attainment Associated with Delaying University

	(1)	(2)	(3)	(4)
	12 Years Age 30	12 Years Age 30	22 Years Age 40	22 Years Age 40
	Years of Schooling X Years after High School			
	OLS Estimates			
Years of delay– Reference Direct Entry				
One year delay	-0.096 (0.024)***	0.016 (0.023)	-0.002 (0.023)	0.070 (0.023)***
Two years delay	-0.216 (0.028)***	-0.055 (0.028)**	-0.014 (0.027)	0.082 (0.027)***
Three or more years delay	-0.549 (0.027)***	-0.375 (0.027)***	-0.063 (0.026)**	0.049 (0.027)*
First University Program Reference – Arts and Humanities				
Science		0.676 (0.033)***		0.652 (0.033)***
Social Science		0.962 (0.026)***		0.679 (0.025)***
Technical/Engineering		1.276 (0.066)***		1.050 (0.064)***
	Completed Kand. X Years after High School			
	Probit Marginal Effects			
Years of delay– Reference Direct Entry				
One year delay	-0.003 (0.005)	0.011 (0.005)**	0.010 (0.005)*	0.016 (0.005)***
Two years delay	-0.030 (0.006)***	-0.012 (0.006)*	0.000 (0.006)	0.006 (0.006)
Three or more years delay	-0.106 (0.006)***	-0.080 (0.007)***	-0.005 (0.006)	0.009 (0.006)
First University Program Reference – Arts and Humanities				
Science		0.101 (0.014)***		0.075 (0.009)***
Social Science		0.204 (0.016)***		0.167 (0.006)***
Technical/Engineering		0.316 (0.017)***		0.274 (0.018)***

Source: Statistics Denmark Danish Population Register Data

Sample includes native born Danes who graduated ordinary high school (Almindelig Gymnasium) between 1981 and 1986 and attended a university program within 6 years of high school graduation.

All specifications include controls for gender, high school grades, age at high school graduation, parents' education, family status and family income in the year of high school graduation, high school cohort and municipality in the high school graduation year. Columns (2), (4) include controls for the university in which the student first enrolled.

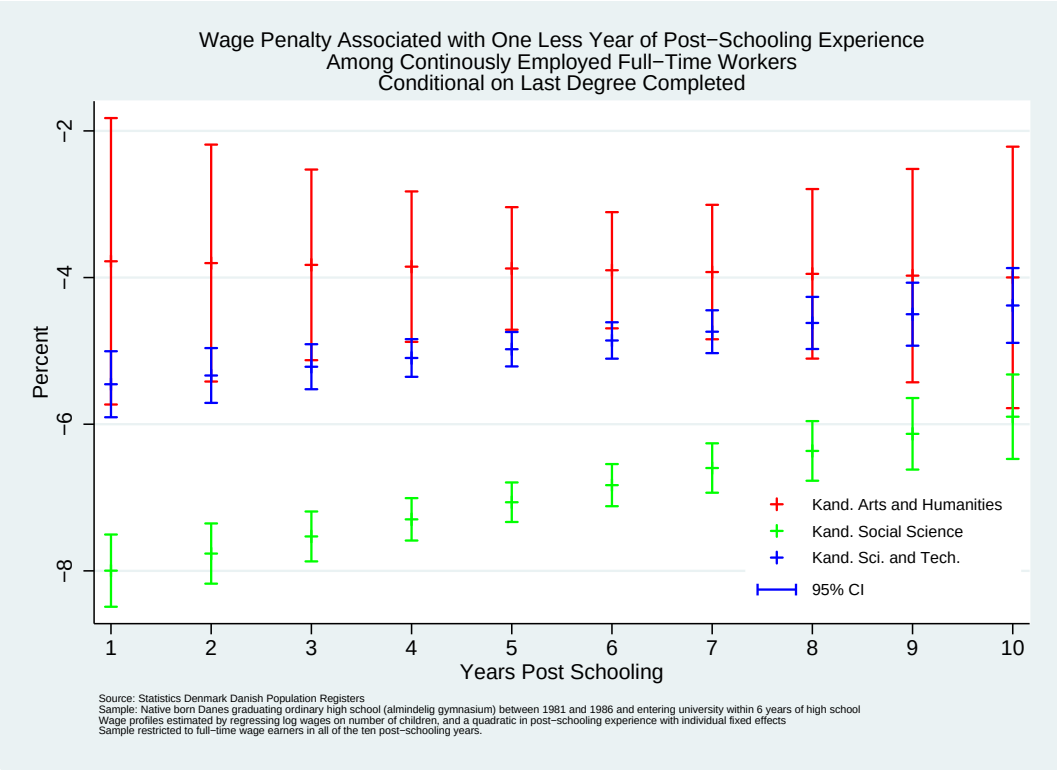

Figure 1: Wage Penalties for Continuously Employed Full-time Workers

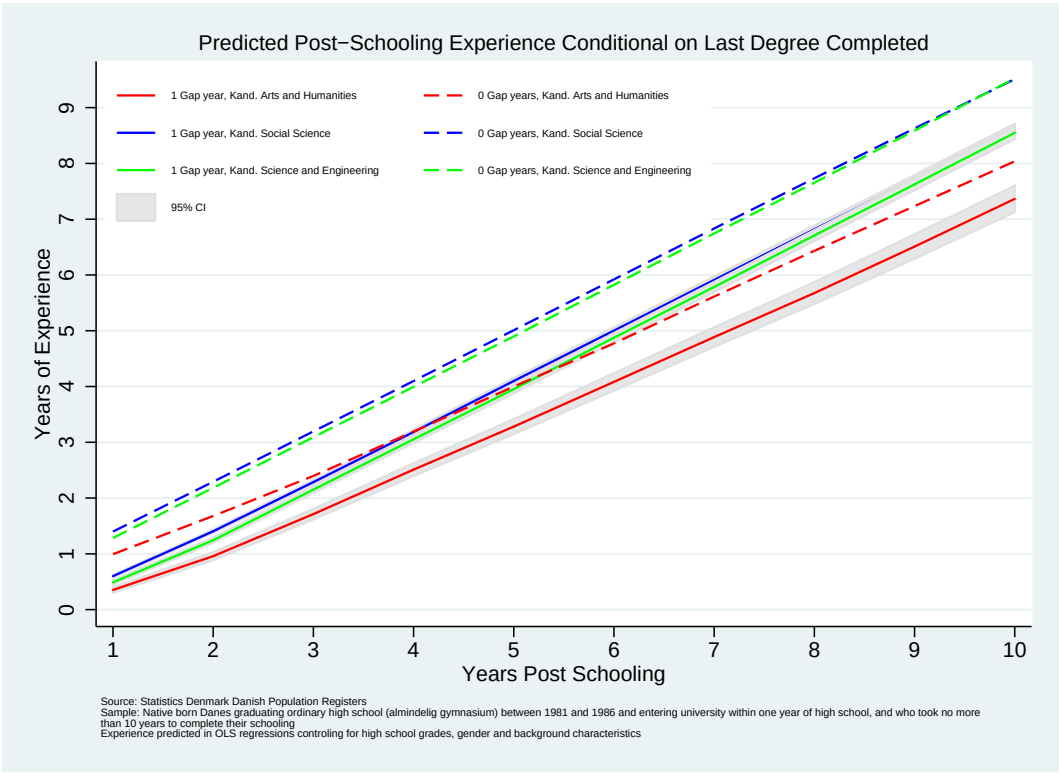

Figure 2: Post-Schooling Predicted Experience

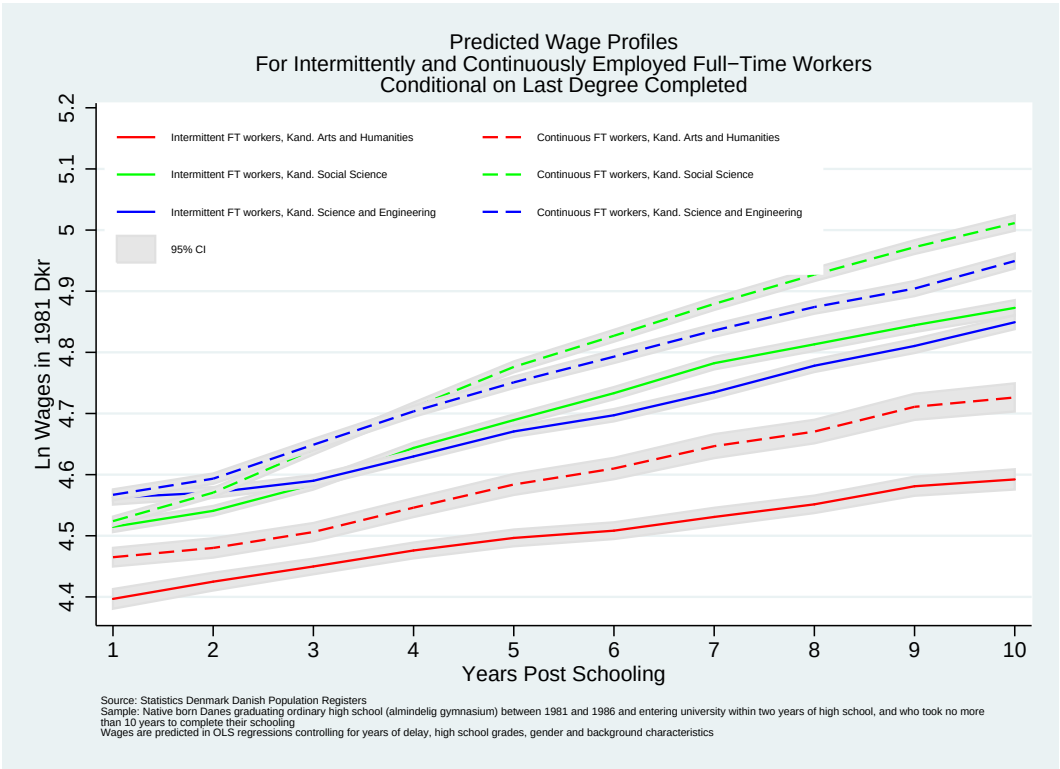

Figure 3: Post-Schooling Predicted Wages

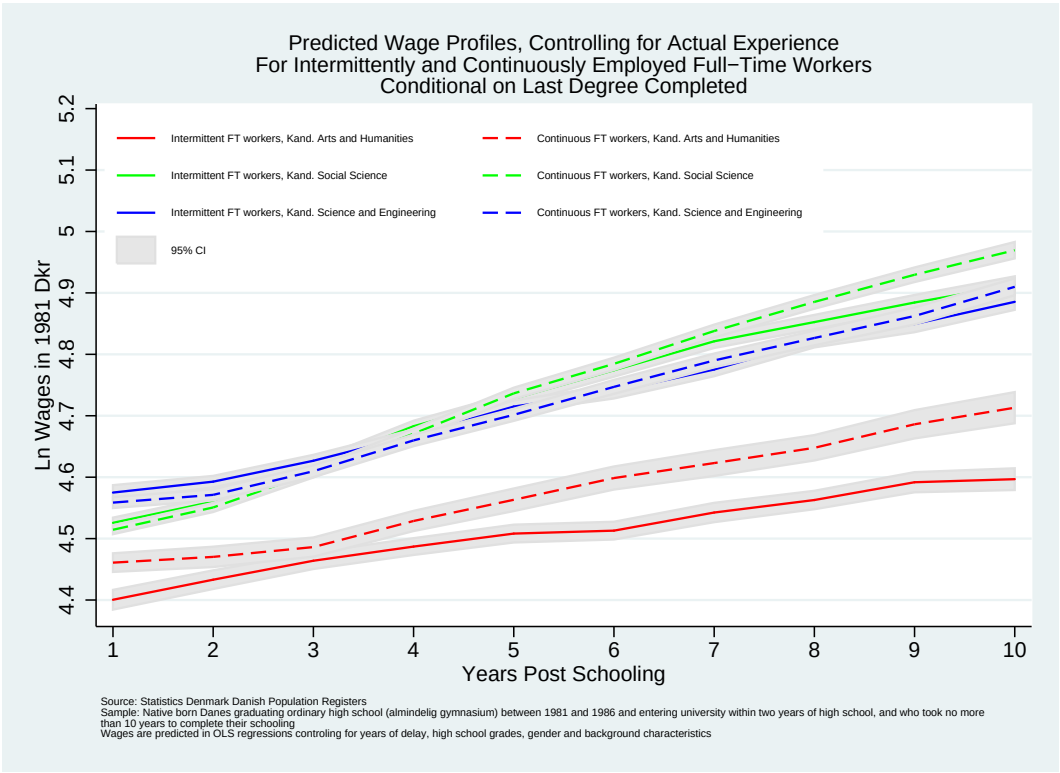

Figure 4: Post-Schooling Predicted Wages, Controlling for Experience

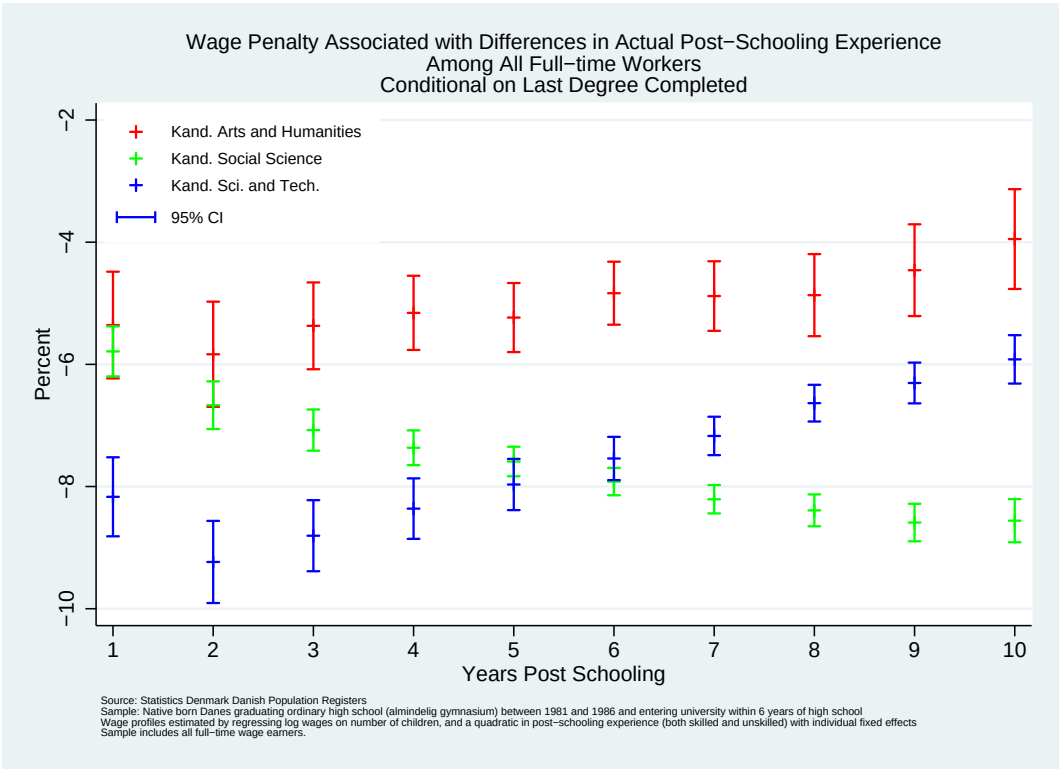

Figure 5: Wage Penalties for All Full-time Workers

Appendix A Additional Tables

Table A.1: Returns to Experience by Final Degree Completed Among Continuously Employed Full-time Workers

	Coefficient exp	Coefficient exp^2
	(1)	(2)
Arts and Humanities, No Degree	0.0729	-0.0005
	(0.0083)***	(0.0006)
Arts and Humanities, Bachelor	0.0554	-0.0025
	(0.0093)***	(0.0008)***
Arts and Humanities, Kand.	0.0375	-0.0018
	(0.0115)***	(0.0009)
Social Science, No Degree	0.1040	0.0008
	(0.0003)***	(0.0003)
Social Science, Bachelor	0.1060	-0.0003
	(0.0070)***	(0.0006)
Social Science, Kand.	0.0823	0.0015
	(0.0030)***	(0.0003)***
Science and Technical/Engineering No Degree	0.0833	0.0003
	(0.0053)***	(0.0004)
Science and Technical/Engineering Kand.	0.0557	-0.0026
	(0.0027)***	(0.0002)***

[a] Source: Statistics Denmark Danish Population Register Data.
Dependent variable is log hourly wages. Returns to experience are estimated, separately for each final degree completed, in linear fixed-effects models controlling for the number of children in the household. The panel includes 10 years of post-schooling wages. The sample is restricted to individuals who took no more than two gap years and no more than ten years to complete their schooling, and who worked full-time in all ten years.

Table A.2: Returns to Experience by Final Degree Completed All Full-Time Workers

	Coefficient exp	Coefficient exp^2
	(1)	(2)
Arts and Humanities, No Degree	0.0748	-0.0005
	(0.0058)***	(0.0221)
Arts and Humanities, Bachelor	0.0825	-0.0025
	(0.0086)***	(0.0249)***
Arts and Humanities, Kand.	0.0870	-0.0018
	(0.0082)***	(0.0275)
Social Science, No Degree	0.0801	0.0008
	(0.0003)***	(0.0003)
Social Science, Bachelor	0.0881	-0.0003
	(0.0065)***	(0.0219)
Social Science, Kand.	0.0681	0.0015
	(0.0032)***	(0.0156)***
Science and Technical/Engineering No Degree	0.0762	0.0003
	(0.0053)***	(0.0204)
Science and Technical/Engineering Kand.	0.1095	-0.0026
	(0.0049)***	(0.0176)***

[a] Source: Statistics Denmark Danish Population Register Data.
Dependent variable is log hourly wages. Returns to experience are estimated, separately for each final degree completed, in linear fixed-effects models controlling for the number of children in the household. The panel includes 10 years of post-schooling wages. The sample is restricted to individuals who took no more than two gap years and no more than ten years to complete their schooling, and who worked full-time in at least two years.