Labour market effects of general and vocational education over the life-cycle and across time: accounting for age, period and cohort effects

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Amsterdam, 2017

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Acknowledgements: Thanks to Bas Hofstra and Nigel Kragten for their contributions.

This publication is part of the project "The Future of Craftmanship" and is made possible by a grant from the Programme Council for Policy-Oriented Education Research (ProBO) from the Netherlands Initiative for Educational Research (NRO) (grant 404-15-400). For more information on the project, see the website of ROA: http://roa.sbe.maastrichtuniversity.nl/" under research.

Samenvatting in het Nederlands

Recent onderzoek laat zien dat de arbeidsmarktkansen van beroeps- en academisch geschoolden verschillen over de levensloop. Beroepsgericht geschoolden zouden door de directe aansluiting van kennis en vaardigheden en eventuele stages eerder een baan vinden. Echter, gedurende de levensloop is de kans groot dat de aangeleerde kennis en vaardigheden achterhaald worden. Met name in een snel veranderende samenleving als gevolg van snelle technologische vooruitgang, globalisering en een fluïde arbeidsmarkt, zou dit tot een achterstand kunnen leiden. Academisch geschoolden daarentegen zouden hier beter voor opgeleid zijn doordat zij met hun algemene kennis en 21st century skills zijn opgeleid om zich sneller aan te passen aan veranderende omstandigheden.

Voorgaand onderzoek heeft een eerste aanwijzing voor deze effecten gevonden, maar empirisch onderzoek hiernaar blijft tot op heden beperkt. Bovendien heeft voorgaand onderzoek zich alleen op leeftijdseffecten geconcentreerd zonder rekening te houden met periode of cohort effecten. Dit is problematisch aangezien leeftijdseffecten ook iets kunnen zeggen over een bepaalde periode of cohort (het Age-Period-Cohort probleem). Ook zijn de veranderingen door de tijd nog niet in kaart gebracht. Daarnaast heeft voorgaand onderzoek alleen naar 'niveaus' gekeken om een onderscheid te maken tussen beroeps- (b.v. MBO/HBO) en academische opleidingen (b.v. universiteit), terwijl er juist veel variatie in beroepsgerichtheid is binnen niveaus. Zo is een universitaire studie medicijnen zeer smal en beroepsgericht, terwijl een MBO opleiding bedrijfseconomie en accountancy veel breder is.

Binnen deze studie zijn de arbeidsmarktkansen van bredere en smallere opleidingen onderzocht, als ook in welke mate deze kansen veranderen door de tijd. Hierbij houden we rekening met periode en cohort effecten. Hiervoor maken we gebruik van de Enquête Beroepsbevolking (EBB 1996-2012) van het CBS, met gegevens van meer dan een miljoen respondenten.

Het blijkt dat smaller opgeleide personen inderdaad een betere aansluiting op de arbeidsmarkt hebben en op jongere leeftijd minder vaak werkloos zijn. Echter, de status van het beroep is ook lager. Verder blijkt dat breed geschoolden zich door de levensloop inderdaad sneller ontwikkelen dan smal geschoolden; de beroepsstatus neemt sneller toen als ook de kans om werkloos te zijn. Echter, in geen enkele periode in zijn/haar leven is de kans van de breed geschoolde om werkloos te zijn kleiner dan die van de smal geschoolde. Er zijn geen aanwijzingen gevonden dat deze effecten groter zijn geworden in meer recentere periodes.

Abstract

Recent studies argue that the labor market returns to a (vocationally) specific educational degree vary over the life cycle. Graduates from vocational education have a smooth school-to-work transition, but have difficulties later in their career when their specific skills become obsolete – especially after periods of rapid technological change. Existing literature does, however, not disentangle age, period, and cohort effects, nor examined to what extent the lower returns to vocational education in the later career varied across periods. Using Labor Force Survey data for the Netherlands (1996-2012), we find that having a vocational degree increases the likelihood of being employed in early life, and lowers the average job status. This initial advantage of a higher employment probability decline with age, and the disadvantage in job status increases as workers grow older. The life cycle penalty that is associated with vocational education has not, or only marginally, changed over time.

Keywords: Vocational Education, Labor Market, Segregation Indices, Age period cohort effects

Introduction

Recent studies argue that the labor market returns to vocational education vary over the life cycle (Krueger and Kumar 2004; Hanushek et al. 2017; Brunello and Rocco 2015; Woessman 2016; Forster and Bol 2016). The main argument is that at the start of the career having a vocational degree facilitates the school-to-work transition by providing ready to use skills and work related experiences. However, over the career the task demands in occupations change, and the occupation-specific skills that are acquired in education become obsolete. Individuals that have a general educational degree have more general skills and will therefore be much more able to adapt to changing skill demands caused by technological innovations. As a result, graduates from vocational education are argued to suffer a penalty in the later career, being less likely to be employed and having less desirable jobs than people with a general degree. This recent finding can be best summarized as a trade-off between short-term advantages and long-term disadvantages for having (occupation-)specific skill s.

Although previous studies find support for the idea that the labor market effects of a vocational degree vary over the life course (e.g., Hanushek et al. 2017; Forster and Bol 2016), they were not able to separate age effects from period or cohorts effects. This is problematic because age, period, and cohort (APC) are perfectly related: age=period-cohort. The implication of this APC problem is that workers with a vocational degree may not suffer more because they age, but because the labor market returns of a vocational degree were lower in older periods or among older cohorts. For example, today's elderly workforce entered the labor market during the economic downturn in the early 1980s. This may have reduced the number of available apprenticeships for students of a vocational education, with high unemployment as a result, and these disadvantages may have accumulated over the life course explaining late life disadvantages (DiPrete and Eirich 2006; Korber and Oesch 2016).

Furthermore, the theoretical argument rests not solely on an age effect, but also on an interaction between age and period effects: over the life cycle the effects of vocational education will decrease, but this is especially the case in a context of rapid technological innovation, as specific skills are much more likely to become obsolete in times of rapid change (Green, Wolf, and Laney 1999, Green 2002; Cedefop 2008; Forster, Bol, and Van de Werfhorst 2017; Woessman 2016). However, whether this is the case remains unexamined.

The main research question of this study is: *what are the consequences of a general versus more vocational specific educational degree for the likelihood of being employed and job status across the life cycle, and do these consequences differ over time?* We investigate this question by analyzing data from the Dutch Labor Force Survey (*Enquete Beroepsbevolking*, EBB), for the years 1996 to 2012. The longitudinal data allow for including age as well as period or cohort effects in our models to disentangle age, period, and cohort effects as good as possible (Bell 2014), and to estimate an interaction between age and period to show how the age effects change across time.

Following a recent study (Forster and Bol 2016; see also DiPrete et al. 2017), we measure the vocationality of educational programs by looking at how strong they link to certain occupations. The main advantage of this method is that a more gradual distinction can be made in the extent to which educational programs provide student with (occupation-) specific skills. Such a distinction is lost when using a binary indicator for vocational versus general. For example, although both being (general) university studies, medical students often are trained very specific vocational skills, while sociology students often acquire much more general skills and eventually scatter out over a wide variety of occupations. Without recognizing the differences between educational programs much information is lost, and the mechanisms that relate vocational specific skills to labor market, returns cannot directly tested (c.f., Horn 2016).

2. Vocational education and labor market outcomes over the life-cycle and across time

2.1 School to work transitions

Vocational education is generally regarded to smoothen the transition to the labor market. Studies for example find that individuals with a vocational degree find a job quicker (Shavit and Müller 1998; Müller and Gangl 2003; Breen 2005; Biavaschi et al. 2012). The literature provides several mechanisms that explain this effect. First, in vocational education, students learn very specific skills which directly translate to the tasks that are demanded in specific occupations. As a consequence, vocational graduates are attractive for employers if they want someone who needs less on-the-job training and is immediately productive. Graduates from general educational programs lack these attributes and will therefore – on average – take longer before they get to their first employment (Ryan 2003; Scherer 2005; Wolbers 2007; van de Werfhorst 2011).

Second, irrespective of whether vocational graduates are actually more productive, vocational degrees *signal* high immediate productivity, making them attractive for employers (Arum and Shavit 1995). Third, vocational specific educational programs are often accompanied by strong social networks, for example by means of apprenticeships, making networks a more valuable resource for vocational graduates than general graduates to find employment (Rosenbaum et al. 1990). Fourth, credentialism and occupational closure theory might explain the early benefit associated with a vocational degree by highlighting the ways by which vocational degrees are used to regulate access to (some) occupations (Bills 1988; Weeden 2002; Bol 2014).

Although it is not our aim to differentiate between these mechanisms in this article, it is important to highlight that there are different mechanisms that lead to the same prediction: compared to students with a general degree, vocational graduates will experience a smoother transition from school to work.

There are several studies that show that a vocational degree is also associated with a prestigious job at the start of one's career (e.g., Wolbers 2007; Wolf 2011; Roksa 2010; Brunello and Rocco 2015). Vocational education may result in a more prestigious job because the smooth school to work transition of students with a vocational degree may result in extra job experience (Biavaschi 2012; Silverberg et al. 2004). There are also studies that show that vocational graduates work in comparatively less prestigious jobs (e.g., Shavit and Müller 1998; Iannelli and Raffe 2007). A vocational degree may lower the prestige of one's job because being taught mainly specific skills that relate to a small section of jobs makes workers inflexible and unable to move to more desirable jobs (Ryan 2001). Furthermore, vocational tracks typically train their students for specific manual or craft jobs with a relatively low status, while general tracks are more likely to train their students for management or professional functions that are often considered to have a higher prestige (Iannelli and Raffe 2007; Wolbers 2007; Roksa and Levey 2010; Beicht and Walden 2015). Due to these opposing findings, and the difficulties in comparing these studies because they all define a vocational degree different,[1] it remains uncertain whether a vocational degree also leads to a more desirable occupation at the start of one's career. Therefore, we abstain from specifying further hypotheses.

2.2. Vocational education and the life-cycle

Recent research suggests that individuals with a general degree have better labor market prospects during the life-cycle than individuals with a vocational degree (e.g., Hanushek et al. 2017; Brunello and Rocco 2015; Forster and Bol 2016). Several mechanisms are thought to underlie these long-term advantages of a general degree.

First, vocational and general educational programs prepare their students for different kinds of jobs. Vocational educational programs and informal apprenticeships tend to be confined to manual and crafts jobs where technological innovation and company growth are limited, leading to less potential growth in opportunities for vocational graduates (Biavaschi et al. 2012).

Second, students with a general educational degree require more on-the-job training. When they get hired, they will almost always require a substantial amount of training before they are ready for the job they are hired for. In contrast, students with a vocational degree do need much less training, which also means that over their career they often do not take extra training to update their skills (Brunello 2001; Vogtenhuber 2015). More on-the-job training makes workers more flexible when facing technological and/or organizational changes, leading to more prosperous employment opportunities for general graduates later in their career (Shavit and Müller 1998; Brunello 2001; Rosenbaum 2001; Korpi et al. 2003; Krueger and Kumar 2004). Vocational students are less capable of adapting to technical change, such that they will have difficulties remaining valuable in the long run in a changing world (Weber 2014; Stenberg and Westerlund 2015; Woessman 2016).

A third argument is that the more specific skills of workers with a vocational degree depreciate faster than the skills of workers with a general education, such that in the long run their skills remain valuable (Brunello and Rocco 2015). Vocational specific skills are only valuable for a limit number of jobs, while more general skills are transferable to a wide variety of jobs, with as a consequence that people with a vocational degree are relatively vulnerable to changes in the labor market (CEDEFOP 2013; Weber 2014).

For the aforementioned reasons, we expect that in the long-run workers with a general degree experience a labor market advantage over graduates from vocational education. Our first hypothesis is that while vocational graduates are more likely than general graduates to be employed at the start of their career, this pattern reverses later in their career, as generally schooled workers will be more flexible. The second hypothesis concerns the status of the job that general and vocational graduates work in. While vocational education may effectively protect against unemployment by smoothening the transition to the labor market and giving access to long-term contracts, it also reduces the incentive or possibility to search for higher status jobs (Korber and Oesch 2016). For this reason we expect that individuals with a general degree will see a steeper rise in their job status over their career compared to vocational graduates.

2.3. Changes across time

The declining returns to vocational education over the life cycle may be especially strong in more recent periods. At least three – interrelated and not mutually exclusive – reasons can be given for this.

First, the occupational skill requirements change rapidly due to an increasing rate of technological change (Acemoglu and Autor 2011; Brynjolfsson and McAfee 2014; van de Werfhorst 2014). For example, the last decades the computing power has increased exponentially, resulting in the automatization of many jobs. Decisions made by bank employees are increasingly guided by computers, similar to the work of surgeons, who are more and more assisted by machines that take over parts their work (Autor 2010). With rapid technological change, the types of skills that are required change rapidly as well. Where being able to calculate quickly used to be an important task for a banker, now one of the main requirements is that they are able to work with the software that does these calculations. As we have argued above, general education acquires students with more flexible skills than workers from vocational education. This means that in periods of rapid technological change, we expect that the late-career advantage of general education is stronger (Krueger and Kumar 2004; Hanushek et al. 2017; Woessman 2016).

Second, with technological changes and the offshoring of vocational jobs to developing countries, vocational skills – such as those for handcraft or manual work – are losing their value in the labor market (Autor 2003; Acemoglu and Autor 2011; Liu and Grusky 2013). Vocational education increasingly prepares students for jobs that will be automatized or offshored, and thus are disappearing. For example, the work of dressmakers, computer programmers, and clerks have largely been taken over by robots or have been offshored to low income countries, while jobs such as those of truckers or accountants may follow in the near future (Autor and Dorn 2009). In contrast, general education prepares their students more often for a wide array of jobs, including those that are increasingly in demand, such as those in the service sector. These developments naturally favour people with a more general educational degree. This is one reason why the wages of individuals with a general degree have vastly increased, even though the supply of graduates from general education has grown as well (Liu and Grusky 2013).

Third, labor markets have become increasingly flexible, for example by a decline of union membership and liberal policies such as the easing of dismissal rules (Kalleberg 2000; Autor 2010; Cutuli and Guetto 2012). Due to these changes, employees increasingly have temporary contracts. In the Netherlands, the country under study, the number of employees with a temporary contract has increased from 14 to 22 percent between 2004 and 2014, while the number of freelancers has increased in the same period from 8 to 12 percent (Statistics Netherlands 2015). These employees are relatively often unemployed and more often switch between jobs than employees with a permanent contract. With each new (type) of job employees require different skills. Compared to students with a vocational training, students from general education typically have a broader set of skills which they can more easily update, giving them an advantage when they gain a new (type of) job. For this reason, they may be better prepared for a flexible labor market in which people often switch between jobs and tasks.

The three arguments show that there are different reasons to expect that at least part of what is thought of as a life cycle effect (or age effect) is instead a period effect. Existing studies acknowledge that these two factors can be intertwined: Hanushek et al. (2017) clearly argue that the decline in labor market returns to vocational education are partly explained by rapid technological change. Furthermore, these reasons show that period and life cycle effects may work in tandem with each other: In more recent periods rapid technological change, and flexibilization of the labor market, may have increased the negative career effects associated with having a vocational degree.

3. Data

3.1. The Dutch Labor Force Survey

We use the Dutch Labor Force Survey (*Enquete Beroepsbevolking*, EBB) to test our hypotheses. The EBB offers high quality micro-level data that can be used to measure the vocational specificity of educational programs by looking at their link with occupations. Moreover, the data provide sufficient information to investigate labor market outcomes for people of different ages across a wide period of time (1996 to 2012).

The EBB is a household survey in which up to 15 household members can participate. Until 2010 respondents were interviewed at home through Computer Assisted Personal Interviewing (CAPI). From 2010 respondents are interviewed if possible by phone through Computer Assisted Telephone Interviewing (CATI), and from 2012 if possible through Computer Assisted Web Interviewing (CAWI). Until 1999, the EBB was a cross-sectional survey in which every month a random sample of respondents were interviewed. In 1999 a rotating panel design was introduced. Each respondent in the sample is then approached for five consecutive interviews over a period of twelve months. To not further complicate our analyses, we only select respondents at their first interview. Only respondents within the working-age population are selected. In addition, respondents below 20 are excluded because the vast majority of them will be in school. Our analytical sample therefore consists of respondents between 20 and 65 years of age. In total, after listwise deletion of missing values, we obtain an analytical sample of 1,143,575 respondents.

3.2. Employment and job status

We analyze two dependent variables. First, in line with Hanushek et al. (2017) and Foster et al. (2016) we investigate employment. This is a dichotomous variable distinguishing respondents who are not employed (coded as 0) from those who are (coded as 1). Not employed include those who are unemployed and looking for a job, but also people that have left the labor market for reasons like retirement and inability to work.

The second dependent variable is job status. The respondent's job title was presented using the ISCO-08 classification scale. These scores were rescaled with the help of the International Socio-Economic Index '08 (ISEI) of occupational status (Ganzeboom and Treiman 2010). The ISEI scale ranges theoretically from 16 for occupations with the lowest status to 90 for occupations with the highest status. Descriptive statistics of this and other variables are presented in Table 1.

[Table 1 over here]

3.3 The vocational specificity of educational programs: linkage strength

The vocational specificity of educational programs is measured by looking how strongly an educational program links to the labor market. The more students are employed in the same occupations after graduation, the more linked this educational program is. Just like Forster and Bol (2017) we assume that this means that more emphasis was paid to specific occupational skills during one's education. The strong occupational clustering of graduates from the same educational program (defined by both field and level) provides a measure of vocational specificity that is gradual instead of the dichotomous distinction between general and vocational that is often used. Technically, we use a measure of local segregation. The local segregation (M_g) for each educational program can be formally defined as:

$$M_g = \sum_j P_{j|g} \, Log(\frac{P_{j|g}}{P_j}),$$

Where $p_{j|g}$ is the conditional probability of being in a certain occupation j given that one has the educational degree g. Local segregation shows how much workers with a specific education are spread across occupations compared to all workers (DiPrete et al. 2017).

Measuring the local linkage requires information on educational programs and occupations. Educational programs are measured using the Dutch educational classification (*Standaard onderwijsindeling*, SOI). In this classification each educational program is identified by a six-digit code in which the first two digits represent the level of education (as an ISCED scale) and the four remaining digits the field of study, for example social sciences or management. To avoid that our measure is based on small cells, we follow DiPrete et al. (2017) and only use the first two digits of the field code. When fewer than 100 respondents followed this educational program, they were left out of the analyses. This leaves us with 279 level-field combinations.

Occupations are measured uisng the International Standard Classification of Occupations (ISCO 2008). To have enough detailed information but still enough cases per occupation, we follow DiPrete et al. (2017) and only use the first three digits of the ISCO codes. Occupations within the military (major ISCO group 0) are excluded from all analyses as those categories are hard to compare with civil occupations (Weeden 2002; Bol and Weeden 2014). This selection results in 128 occupational categories to use in our calculation of the local segregation of educational programs.

Table 2 describes the linkage strength for the 10 educational programs with the highest and lowest linkage score. Upper and lower secondary educational programs have the lowest linkage scores, in particular when they are not related to a specific field. For example, individuals who dropped out from the higher levels of “high school” (lower secondary education high level, e.g. *HAVO/VWO* year 1/3), start to work in vastly different occupations, most likely as a temporary worker. By contrast, people with a higher educational programs within a specific field are more likely to start to work and stay in that field. Individuals with a doctoral degree in health (higher education third phase) have the highest linkage score and almost all become medical doctors.

[Table 2 over here]

3.4 Control variables

Employment probabilities differ considerably between educational levels which makes it important to single out this effect, which is done by including educational level in our model. We measure educational levels by using the ISCED 2011 classification. This allows us to look at the effect of vocational specificity *net* of educational levels. Second, we control for the nationality of the respondents, since for several reasons natives are expected to find a job sooner and have a higher job status. Nationality was coded as (1) being Dutch when a respondent had the Dutch nationality or was born in The Netherlands, and (0) otherwise. We also control for marital status, distinguishing between respondents who are married, never married, divorced, and widowed. Finally, regional dummies are included to account for differences in the employment context between provinces. Dummy variables for the 12 provinces in the Netherlands are included.

4. Method

Our main empirical challenge is to disentangle age, period, and cohort (APC) effects. However, age period and cohort are exactly co-linear: Period = Age + Cohort. This poses the well-known APC identification problem. Unfortunately, there is no perfect solution to this exact collinearity, because the collinearity is present in the population as a whole, instead of just in the sample (Bell and Jones 2015). Hence, it is impossible to come up with a technique that always disentangles APC effects (Glenn 2005). Techniques that are recently developed to do so, such as the Hierarchical Age-Period-Cohorts model (HAPC-model) (Yang and Lang, 2006), are shown to be far from a magic bullet (see Luo and Hodges 2013; and Bell and Jones 2014).

Nevertheless, when we are prepared to make certain assumptions about APC effects, inference is possible. The crucial assumption to make here is that there is a zero age, period, or cohort effect, which correspondingly does not have to be estimated and hence can be left out of the equation (Bell 2014; Bell and Jones 2015). This assumption is necessary, because only two of the three APC effects can be estimated simultaneously. It is still a strong assumption, because when one term (age, period or cohort) which effect is not zero is excluded, the other terms will (wrongfully) capture this effect.

We assume that there is a zero cohort effect. This implies that there is no linear (or higher polynomial) trend in the unemployment levels or job status for the cohorts in our sample. This assumption might not be completely realistic because there are some cohorts that have a higher chance to be unemployed than others. For example, unemployment was relatively high in The Netherlands in the late 1980s, and the cohort that entered the labor market may have remained more likely to be unemployed during their career. However, this effect of having a higher chance of being unemployed disappeared in the long run after people got their first job (Wolbers 2016). Hence, these differences between cohorts do not sustain and may to a large extend be explained by simple period effects: in some periods there is higher unemployment. After this assumption of zero cohort effect is made, our age and period effect can be estimated. An interaction between the age and period effects is added to test to what extent life-cycle effects differ across cohorts.

OLS regression models are used to predict job status. In contrast to previous research, logistic regression is used to predict the probabilities of being employed and being unemployed while searching for a job. Although logistic regression models have increasingly be criticized (Mood 2010), in our case logistic regression is more suitable than linear probability models because linear probability models gave predicted values above 1 for the youngest group, which is logically impossible, and hence should be avoided. We used robust and clustered standard errors to account for the dependency in observations of respondents from a same cohort. The proportion variance on the period level was very low (less than 1 percent through the models), and does not significantly differ from 0 according to a likelihood ratio test, and hence in our models we did not account for clustering.

Our estimation procedure is as follows. In Model 1 we include the interaction between age and vocational specificity (local linkage, M_g). In line with previous research (e.g., Hanushek et al. 2017; Forster and Bol 2016) age is measured with a quadratic term, and only the interaction between vocational specificity and age is included to keep the model as simple as possible. This should be sufficient because age (including age squared) partly regulates the strength and form of the age effect. Vocational specificity is mean-centred. This means that the effect of vocational specificity is those for respondents with an average vocational specificity, which is therefore an estimate that will be comparable across models. Age is subtracted with 20 in models. As a result, the effect of vocational specificity is the predicted effect for individuals aged 20 – those at the start of their career.

In Model 2 we include the interaction between time and vocational specificity*age. Including this three way interaction makes it also hard to include higher order polynomials in our interaction because this would imply that these have to be modelled both in the two way interactions as in the three way interaction, soon resulting in a manifold of interactions which makes our model less table and even harder to interpreted. Nonetheless, this approach resulted in similar results. Because we model relatively complex three-way interactions these are graphically presented with the use of marginal effects plots (the two way interactions are presented in Appendix A, B, and C). In these figures we compare respondents from a non-specific educational program (1 standard deviation below the average) to respondents from a vocationally specific program (1 standard deviation above the average).

5. Results

5.1 Employment

Logistic regression on the probability of having a job are presented in Table 3. Model 1 immediately includes the interaction between our measure of vocational specify and age. Because age is subtracted with 20, the main effect of linkage refers to people who are 20 years old. At age 20, a one standard deviation increase in our measure of vocational specificity increases the odds of being employed versus the odds of not being employed by 1.493 ($e^{.384+.017}$) for men, and 1.353 ($e^{.243+.059}$) for women. Both for men and women there is a significant quadratic effect, implying that this effect becomes (slightly) strongly when the vocational specificity increases. Age has a quadratic effect as well: for both men and women the chances of having a job are relatively high at the start of one's career, increase till around the age of 35, but decline strongly when people become older. On top of this, there is a significant interaction between age and vocational specificity. Similar to other studies we find that the effect of vocational specificity on employment decreases with age. Estimates for the control variables are in the direction that we expected; natives and singles are more likely to have a job than non-natives and people that are married or divorced. Not surprisingly, the higher educated are more likely to have a job.

Model 2 includes the three-way interaction between age, linkage and period to test whether the life cycle effects of a vocational and general education change across time. Both for men (b=.006, P>.05) and women (b=-.014, P>.05) this three way interaction is not significant. Thus, contrary what we would expect, the life cycle effects seem to be relatively stable across time.

This also becomes visible in Figure 1, where we plot the predicted probability of being employed for people with a vocationally specific degree (one standard deviation above the average) or a non-specific degree (one standard deviation below the average). Although there is a difference in the probability to be employed for workers in 1996 compared to 2012, the overall pattern of the difference in employment probabilities between workers that have varying level of vocational specificity remains the same. For both periods, those with a more vocationally specific degree do better at the start of their career, and this benefit disappears later in the career. However, contrast to earlier studies (Hanushek et al. 2017), we do not find that having a vocationally specific training becomes a penalty in later life. Rather, there is a convergence, where later in the life cycle it does not matter that much anymore what type of education on has attained (cf., Forster, and Bol 2017).

[Table 3 over here]

[Figure 1 over here]

5.1 Occupational status

Table 4 presents the same models, now using a status scale for the job one has as the dependent variable. Model 1 indicates that both for men and for women there is a quadratic age effect: job status increases with age, but this age effect is curvilinear and decreases slightly in later life. Furthermore, there is a quadratic effect of a vocational specificity, while vocational specificity and age interact. Figure 2 depicts these effects graphically. For both men and women, at age 20 specialization in either general or vocational skills is associated with a relatively high job status. In particular specializing in general skills results in a high job status, while having some specific skills (linkage around .8) is associated with the lowest job status.[2] As expected, for both men and women, the positive effects of having (very) specific skills decline as people grow older. Note that this is net of the educational level.[3]

[Figure 2 over here]

Model 2 then investigates the extent to which this interaction varies across period, and includes the three way interaction between age, linkage, and period. For men, there is no significant interaction between period, age, and linkage (b=-.020, P>.05), meaning that the pattern of more job status growth over the career for more generally schooled workers remained stable over time. For women, however, there are significant differences (b=-.168, P<.01); the differences in job status between women with a general and vocational education (in favour of women with a general education) increases over the life course, but more so in later periods.

This also becomes visible in Figure 3, where the average predicted job status for those with a more general and vocational degree is plotted for two periods: 1996 and 2012. We see that our models predict much higher job status scores for workers with a general degree, both men and women. Moreover, the gap in job status grows over the career: later in the career the difference in job status between workers with a more general and more vocationally specific educational degree is much larger, approximately 6 (for men) to 8 (for women) points, or a difference of .37 (for men) and .52 (for women) standard deviations.

The crucial question for our study is of course if this life-cycle effect can partly be attributed to period effects – as we would predict by different periodic changes that might have affected the labor market opportunities of vocationally and generally schooled workers differently. For men, the answer is no. Having a vocationally specific degree is a penalty, and this penalty becomes larger when we look at job status. However, the pattern by which it does so is the same for 1996 and 2012. For women, we do find a (small) period effect. Figure 3 makes clear that the life-course penalty associated with a more vocationally specific degree – in particular while having only some vocational skills – is larger for more recent periods.

[Table 4 over here]

[Figure 3 over here]

5.3. Robustness checks

A couple of robustness checks are performed. Interestingly, using a linear probability model instead of logistic regression to predict the probability of having a job resulted in slightly different results. While using a linear probability model, people with a more vocationally specific degree were more likely to be surpassed by individuals with a general degree during their career in terms of levels of employment, as was found in previous research as well (e.g., Hanushek et al. 2017; Forster and Bol 2016). Other effects, for job status and whether the life cycle effects change over time, remained highly similar when using a linear probability and logistic regression.

Other robustness checks resulted in similar conclusions. Not controlling for period effects, controlling for cohort instead of period effects, and replacing our measure of vocational specificity with a dummy indicating whether one has followed vocational (MBO and HBO) or general education (MAVO, HAVO, VWO, University) resulted in slightly stronger but further similar effects (see also Appendix A). Including quadratic and cubic age, linkage and time effects (in a three way interaction with each other) strongly complicated our models, but resulted in similar effects. A Heckman selection model to estimate the effects on job status, for whether one has a job or not, resulted in one crucial aspect from the one's presented: where in models without a Heckman selection job status decreased after age 50, it did not decrease in the Heckman model. Our main conclusions, however, remained similar. Because the outcomes of a selection model are fragile to a wrong specification of the exclusion restriction the more robust results are presented.

5. Conclusion

Our results confirm that a more vocationally specific educational degree smoothens the transition to the labor market. This gap is relatively large. The odds of having a job is are approximately 1.5 (for men) and 1.4 (for women) higher for people with a vocational than with a general degree. Vocational graduates, however, do have a lower job status than a general graduates, in particular when one has learned only some specific skills.

Furthermore, there is a trade of between the short term advantages and late term disadvantages of a vocational education, as recent literature proclaimed (e.g., Hanushek et al. 2017; Brunello and Rocco 2015; Forster and Bol 2016). The initial advantage associated to vocational education for employment decline when one becomes older. This catch up appears around the age of 45, which is in line with previous studies (e.g., Hanushek et al. 2017; Forster and Bol 2016; Korber and Oesch 2016). However, at later ages people with a general education do not surpass people with a vocational education, as suggested previously (e.g., Hanushek et al. 2017). Hence, over their life course individuals with a vocational degree remain at least as likely to have a job as individuals with a general degree. Moreover, the initial disadvantages to vocational education in terms of job status widen at later ages, resulting in a gap of around 7 points for men and women. This supports the idea that general education becomes more advantageous over the career.

Less support is found for the idea that the disadvantages associated with a vocational education over one's life course change across time. Although the average (un)employment rates and job status have changed over time, life cycle effects of a vocational and general education were in almost all models comparable over time. That vocational education remained more or less similarly (dis)attractive over time contradicts the idea that a general education is increasingly favourable in current times of technological change, outsourcing and flexibilization. These factors may develop slower than suggested in the literature (e.g., Hanushek et al. 2017; Autor 2010; Brynjolfsson and McAfee 2014), or having specific (vocationally) skills might also have positive effects in these periods that cancel out the negative effects. For example, the demand for high quality manufacturing products has increased in recent years, while very specific skills are needed to make these products.

Because our life cycle effects are largely in line with the results from studies on other countries, such as the US (e.g., Hanushek et al. 2017), UK (e.g., Brunello and Rocco 2015) and Switzerland (Korber and Oesch 2016), we do not expect that the country under study is the reason why we found so little effects for the changes across time. In addition, technological change is widespread in The Netherlands (e.g., 94 percent of the household has internet access according to Statistics Netherlands), and flexibilization of the labor market relatively large in international perspective, such that the Netherlands can even be regarded as an excellent test case for the idea that general educational has become more favourable over time.

A number of limitations of our study have to be addressed. First, different people might select into different educational programs (Hall 2016). For example, individuals that want to work in manual professions select themselves more often in vocational education programs. As a result, the effect of vocational education on job status might not reflect educational but selection effects. Related to this, vocational education results in lower drop-out rates (Tessaring and Wannan 2010). The students that might have dropped out in more general programs are likely to get relatively low status jobs after graduation, which might explain the lower job status of vocational graduates. Forcing them to follow a general education, however, might not improve their labor market outcomes in the short or long run. Furthermore, alternative explanations are possible. For example, the jobs of individuals with a vocational degree might be physically more demanding and this might explain why later in life they become equally likely to be employed (after an initial advantage) than people with a general educational degree. In order to make sense of the empirical results, further research should focus on unraveling these mechanisms.

Our results show that the initial advantage associated to vocational education for employment declines when one becomes older, while for job status the initial disadvantages become larger. General educational programs have long term advantages. These life cycle effects, however, hardly change over time.

NOTES

1. For example, Silverberg et al. (2004) base their findings on the influence of taking extra vocational course, Wolbers (2007) and Iannelli and Raffe (2007) compare general and academic education within a comparable level of education, and Roksa and Levey (2010) examines the influence of the extend that a master program is linked to the labor market.

2. When we include an interaction between age and linkage, in which both age and linkage are a cubic effect, the positive effects of a general education (e.g. linkage=-3) become weaker and similar to those of a vocational education (e.g., linkage=3). Furthermore, as this model is far more complicated to estimate, the standard errors increase. At a later age the results converge to those presented in Figure 2.

3. As a robustness check we also left respondents with a university degree out, as for instance doctors and advocates may drive this effect. When leaving respondents with a university degree out, the average job status is lower, but the overall patterns very similar. Hence, the effects are not driven by this group.

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Table 1

Descriptive statistics

	Min	Max	Men Perc.	Mean	SD	Women Perc.	Mean	SD
Having a job			82.8			64.6		
Job status	3.0	89.0		45.8	16.1		41.4	15.1
Linkage	-0.3	5.1		0.2	1.0		-0.2	1.0
Age	20.0	65.0		43.0	12.1		4.3	1.2
Education								
Pre primary			1.3			1.5		
Primary			7.3			8.8		
Lower secondary, low			1.6			2.3		
Lower secondary, intermediate			0.3			0.4		
Lower secondary, high			19.5			23.0		
Upper secondary, low			6.2			4.8		
Upper secondary, intermediate			15.4			17.1		
Upper secondary, high			20.7			19.2		
Higher education, first phase, low			1.1			0.7		
Higher education, first phase, intermediate			15.9			15.3		
Higher education, first phase, high			0.3			0.3		
Higher education, second phase			8.6			5.9		
Higher education, third phase			1.7			0.8		
Marital status								
Married			65.4			66.7		
Divorced			5.6			8.5		
Widowed			0.9			2.8		
Never been married			28.1			22.0		
Ethnicity (native)			97.0			96.7		

Note: n=566,053 (men), n=577,522(women)

Table 2

Linkage strength of the top, middle and bottom 10 educational programs

Rank	SOI	Level	Field	Link
1	4299	Upper secondary, intermediate level	Unknown	-1.323
2	4201	Upper secondary, intermediate level	General	-1.282
3	3301	Upper secondary, high level	General	-1.249
4	4301	Upper secondary, high level	General	-1.162
5	4133	Upper secondary, low level	Management	-1.087
6	5299	Higher education, first phase, intermediate	Unknown	-1.072
7	3335	Lower secondary, high level	Administration	-0.983
8	4323	Lower secondary, high level	Social sciences	-0.972
9	3332	Lower secondary, high level	Commercial	-0.946
10	4233	Upper secondary, middle level	Management	-0.914

269	6067	Higher, second phase	Technicians, with differentiation	2.955
270	7020	Higher, third phase	Humanities, social sciences and arts	3.011
271	5140	Higher, first phase	Mathematics, natural sciences and computer science	3.027
272	5192	Higher, third phase	Hospitality, tourism and leisure	3.051
273	7087	Higher, third phase	Health	3.220
274	7022	Higher, third phase	Humanities, other	3.302
275	7035	Higher, third phase	Administration	3.481
276	7042	Higher, third phase	Public order, safety	3.620
277	4342	Upper secondary, high level	Public order, safety	3.649
278	7041	Higher, third phase	Administration	4.749
279	7081	Higher, third phase	Health	5.079

Table 3

Logistic regression of having a job across the life-cycle and across time

	Men				Women			
	M1		M2		M1		M2	
Constant	-1.368 (.104)	**	-1.006 (.124)	**	-2.916 (.102)	**	-2.731 (.12)	**
Control variables								
Educational level (ref=pre primary)								
Primary	.885 (.042)	**	.869 (.042)	**	.813 (.044)	**	.808 (.045)	**
Lower, low level	.789 (.049)	**	.809 (.049)	**	.753 (.056)	**	.772 (.054)	**
Lower, intermediate level	.841 (.087)	**	.986 (.098)	**	1.076 (.062)	**	1.140 (.059)	**
Lower, high level	1.51 (.045)	**	1.494 (.040)	**	1.347 (.043)	**	1.340 (.043)	**
Upper, low level	1.558 (.055)	**	1.552 (.055)	**	1.739 (.043)	**	1.735 (.043)	**
Upper, intermediate level	1.626 (.049)	**	1.627 (.051)	**	1.853 (.042)	**	1.852 (.042)	**
Upper, high level	1.893 (.062)	**	1.880 (.062)	**	2.113 (.041)	**	2.106 (.040)	**
Higher, first phase, low level	1.775 (.078)	**	1.755 (.076)	**	2.345 (.060)	**	2.328 (.059)	**
Higher, first phase, intermediate level	1.972 (.060)	**	1.964 (.061)	**	2.370 (.041)	**	2.370 (.041)	**
Higher, first phase, high level	1.866 (.087)	**	1.840 (.085)	**	1.919 (.081)	**	1.926 (.090)	**
Higher, second phase	2.018 (.054)	**	2.001 (.055)	**	2.336 (.042)	**	2.325 (.043)	**
Higher, third phase	2.273 (.084)	**	2.261 (.084)	**	2.023 (.077)	**	2.031 (.080)	**
Marital status (ref=married)								
Divorced	-.804 (.049)	**	-.813 (.050)	**	.054 (.031)		.052 (.031)	
Widow	-.532 (.040)	**	-.530 (.041)	**	-.289 (.025)	**	-.280 (.045)	**
Never been married	-.864 (.034)	**	-.859 (.034)	**	.510 (.026)	**	.528 (.026)	**
Native	1.159 (.036)	**	1.172 (.035)	**	.951 (.032)	**	.939 (.031)	**
Vocational specificity								
Linkage	.384 (.024)	**	.417 (.036)	**	.243 (.013)	**	.189 (.022)	**
Linkage squared	.017 (.006)	**	.017 (.005)	**	.059 (.005)	**	.057 (.005)	**
Age								
Age	1.468 (.106)	**	1.332 (.109)	**	.903 (.086)	**	.832 (.096)	**
Age squared	-.496 (.023)	**	-.502 (.020)	**	-.309 (.020)	**	-.319 (.018)	**
Period								
Period	.911 (.283)	**	.593 (.336)		.712 (.171)	**	.561 (.192)	**
Period squared	-.225 (.367)		-.365 (.375)		.028 (.187)		-.067 (.183)	
Period cubic	-.018 (.127)		.018 (.127)		-.068 (.062)		-.051 (.061)	
Interactions								
Linkage * age	-.093 (.009)	**	-.100 (.0111)	**	-.070 (.005)	**	-.069 (.009)	**
Linkage * period			-.031 (.043)				.091 (.027)	**
Age * period			.173 (.033)	**			.126 (.038)	**
Linkage * age * period			.006 (.013)				-.014 (.010)	

*P<.05, ** P<.01(two-tailed). Standard errors in brackets. Regions are included as controls but not presented.
Source: EBB 1996-2012.

Table 4

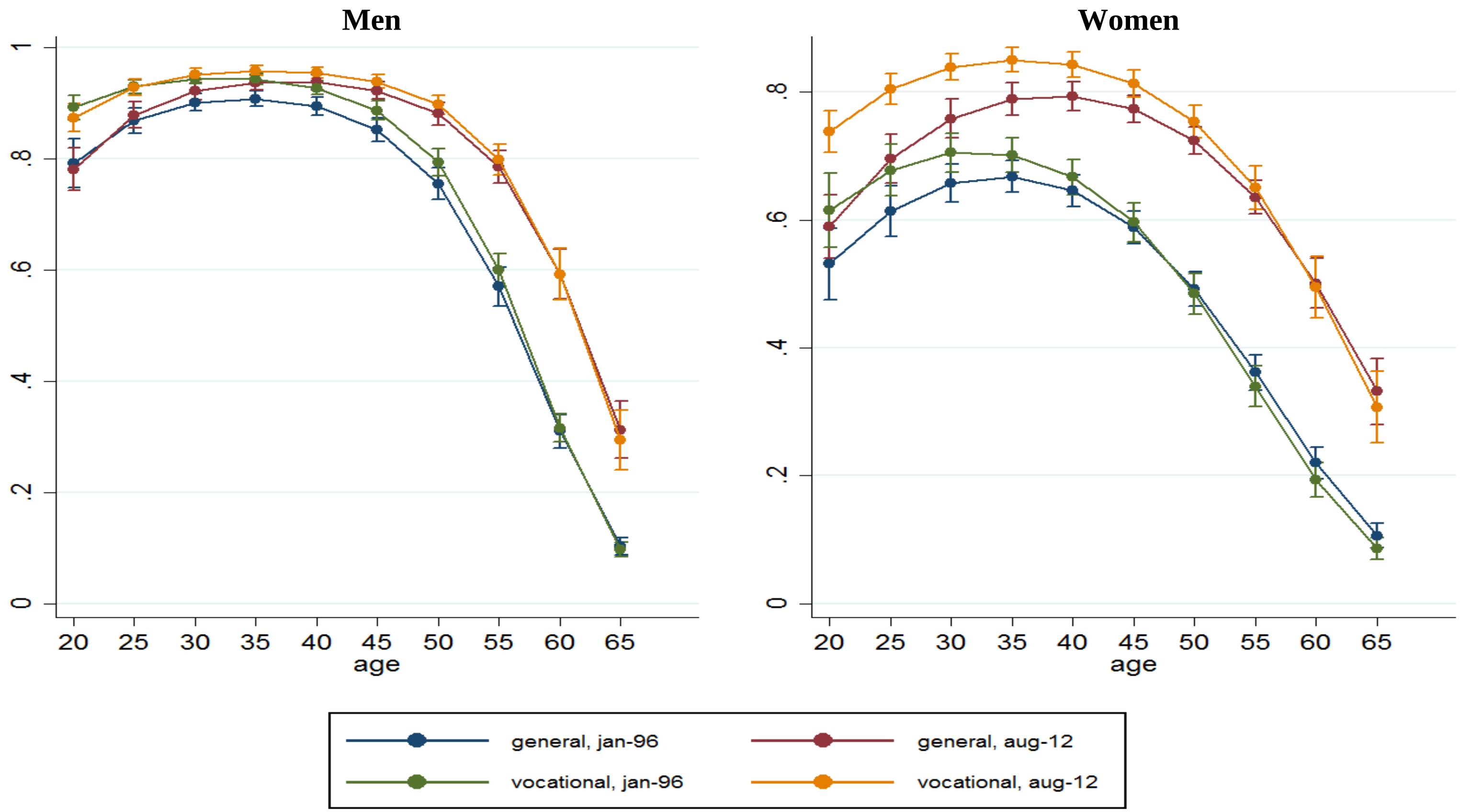
OLS regression of job status across the life-cycle and across time

	Men		Women	
	M1	M2	M1	M2
Constant	2.550 (.289) **	2.184 (.278) **	15.306 (.294) **	15.447 (.323) **
Control variables				
Educational level (ref=pre primary)				
Primary	.463 (.191) *	.446 (.190) *	.856 (.218) **	.864 (.219) **
Lower, low level	.461 (.260)	.407 (.260)	2.745 (.328) **	2.778 (.330) **
Lower, intermediate level	6.080 (.256) **	5.936 (.584) **	6.266 (.382) **	6.341 (.416) **
Lower, high level	5.454 (.238) **	5.473 (.238) **	5.472 (.221) **	5.469 (.222) **
Upper, low level	7.870 (.250) **	7.788 (.249) **	11.450 (.302) **	11.450 (.304) **
Upper, intermediate level	1.400 (.313) **	1.418 (.314) **	11.614 (.263) **	11.617 (.263) **
Upper, high level	14.985 (.325) **	15.001 (.325) **	17.118 (.278) **	17.113 (.279) **
Higher, first phase, low level	26.410 (.325) **	26.442 (.325) **	26.591 (.354) **	26.592 (.354) **
Higher, first phase, intermediate level	26.874 (.277) **	26.880 (.278) **	28.028 (.304) **	28.029 (.305) **
Higher, first phase, high level	27.994 (.443) **	28.006 (.442) **	29.698 (.659) **	29.713 (.651) **
Higher, second phase	32.300 (.277) **	32.313 (.278) **	36.338 (.318) **	36.332 (.32) **
Higher, third phase	3.904 (.348) **	29.932 (.347) **	33.280 (.341) **	33.294 (.336) **
Marital status (ref=married)				
Divorced	.908 (.096) **	-.900 (.097) **	.313 (.064)	.312 (.064)
Widow	-1.320 (.220) **	-1.328 (.220) **	-1.197 (.172) **	-1.187 (.173) **
Never been married	-1.303 (.622) **	-1.310 (.166) **	1.212 (.069) **	1.221 (.070) **
Native	3.628 (.211) **	3.615 (.210) **	3.227 (.187) **	3.223 (.184) **
Vocational specificity				
Linkage	-1.442 (.095) **	-1.664 (.114) **	-2.198 (.084) **	-2.581 (.121) **
Linkage squared	1.260 (.021) **	1.258 (.022) **	1.493 (.026) **	1.488 (.027) **
Age				
Age	4.258 (.237) **	4.435 (.205) **	2.989 (.263) **	2.020 (.195) **
Age squared	-.748 (.049) **	-.736 (.057) **	-.568 (.058) **	-.580 (.061) **
Period				
Period	3.590 (.532) **	3.959 (.598) **	2.853 (.566) **	2.733 (.631) **
Period squared	-4.808 (.626) **	-4.767 (.623) **	-3.490 (.664) **	-3.563 (.649) **
Period cubic	1.587 (.209) **	1.583 (.218) **	1.115 (.232) **	1.124 (.222) **
Interactions				
Linkage * age	-.454 (.026) **	-.440 (.046) **	-.230 (.018) **	-.056 (.045)
Linkage * period		.240 (.109) *		.391 (.080) **
Age * period		-.224 (.111) *		.114 (.135)
Linkage * age * period		-.020 (.043)		-.168 (.036) **

*P<.05, ** P<.01(two-tailed). Standard errors in brackets. Regions are included as controls but not presented.
Source: EBB 1996-2012.

Figure 1

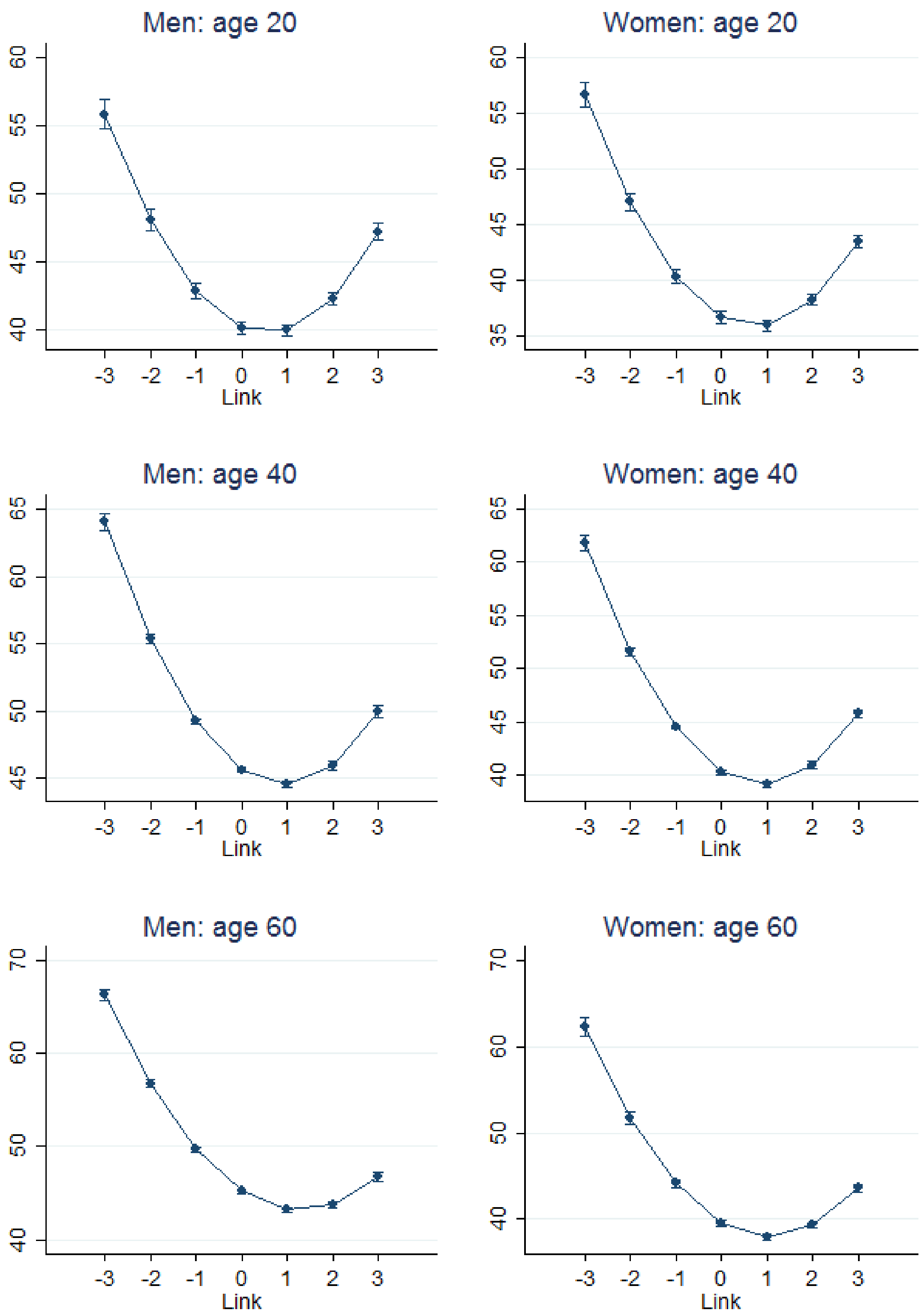
Marginal effects on job the likelihood of having a job across the life-cycle and across time.



Note. Bars present 95 percent confidence intervals.

Figure 2

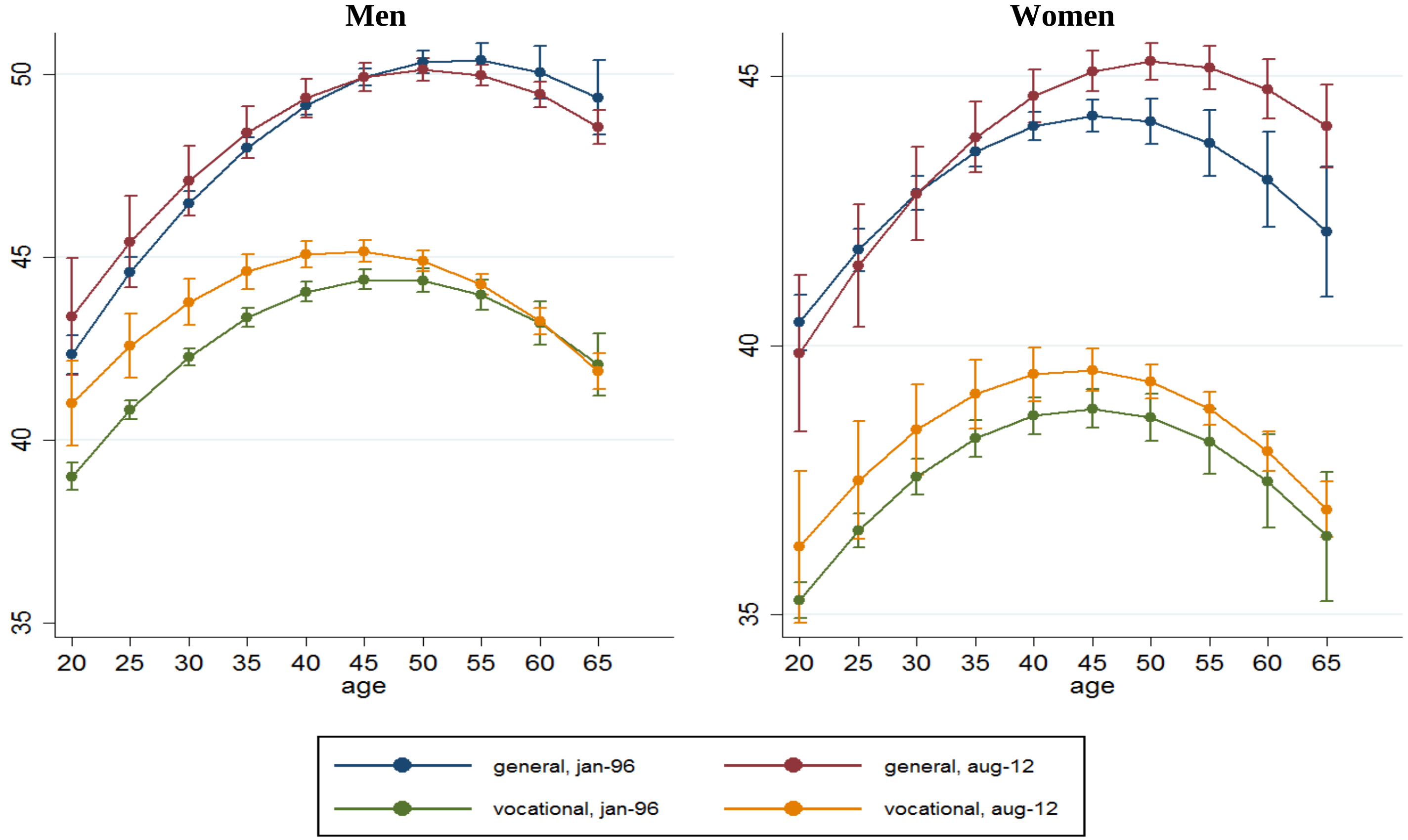
Marginal effects on job status of Linkage strength for men and women of age 20, 40 and 60



Note. Bars present 95 percent confidence intervals.

Figure 3

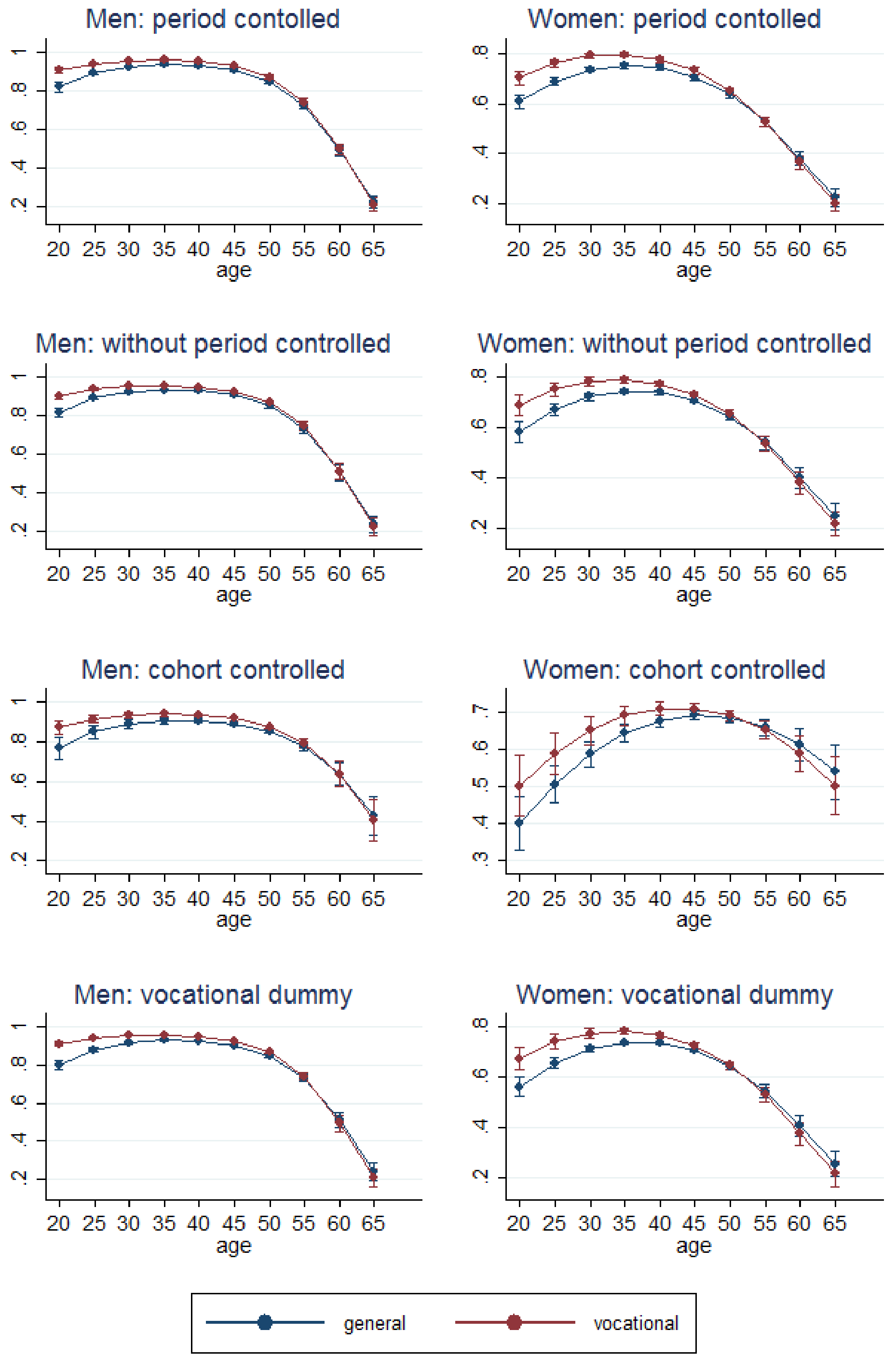
Marginal effects on job status across the life-cycle and across ime (bars present 95 percent confidence intervals).



Note. Bars present 95 percent confidence intervals.

Appendix A.

Marginal effects of the likelihood of having a job across the life-cycle



Appendix B.

Marginal effects of job status across the life-cycle