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Does socioeconomic disadvantage boost the signalling value of education? Evidence from a survey experiment in the apprenticeship market

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Abstract

In this article we explore the question of whether the socioeconomic context in which educational credentials are obtained affects their signalling value. Signalling theory predicts that educational credentials in labour markets have a value beyond providing information on a person's human capital. Educational credentials function as a filter, by selecting individuals who possess important productivity-related qualities. Theoretically, we would expect individuals who grew up in a socially disadvantaged context to need more productivity-related qualities to obtain any given educational credential. More specifically, we test the hypothesis that the signalling value of educational credentials will be larger for candidates with an immigration background and/or working-class parents. Empirically, we use data collected in a survey experiment carried out in the apprenticeship market in Switzerland. We find that socially disadvantaged candidates do receive a higher premium for a given credential, but only from male recruiters.

Keywords: signalling theory; educational credentials; discrimination; hiring behaviour

Introduction

Employers play a crucial role in shaping employment and social stratification. They select candidates according to their perceived ability and productivity and so determine who has access to (which) jobs and who has not. A large corpus of literature spanning across a broad range of disciplines including economics, social psychology and sociology has studied employers' recruitment behaviour, and has shown that this is an extremely complex process, where rational thinking, statistical reasoning, stereotypes and possibly emotions play crucial roles (see e.g., Bills et al 2017; Guryan and Charles 2013; Rivera 2015). Employers select candidates on the basis of the limited information they have access to. In order to understand the way in which employers shape stratification, it is crucial to understand how they interpret this information.

With this article, we want to contribute to the understanding of the complex interpretative patterns that guide employers when they assess candidates. We rely on insights borrowed from the economics tradition of signalling theory and from the literature on statistical discrimination. Both these approaches assume that employers interpret candidate characteristics as meaningful indications regarding their productivity based on probabilistic (or statistical) reasoning i.e., by imputing characteristics to individual candidates based on assumed group averages of the groups they belong to (Phelps 1972; Spence 1973).

More specifically, we focus on how employers interpret a crucial signal: educational credentials. Signalling theory predicts that educational credentials have a value beyond providing information on the specific skills that a person has learned at school. The effect, known as the “signalling value of education”, has been theorised by Arrow (1973) and Spence (1973). Along similar lines, both argued that education is used by employers as a general signal of productivity-related personal qualities. To obtain an educational credential is difficult, and not everyone will manage to attain a given level of qualification. Only those who possess certain qualities will do so. These qualities could be personality traits such as conscientiousness, perseverance, loyalty to hierarchies, or anything that one needs to succeed in education and is at the same time associated to productivity. Thus, in the labour market, education functions as a filter and can be used as a signal of these qualities.

In this article, we test the hypothesis that the signalling value of education depends on the context in which a given credential is obtained. More precisely, we expect given educational credentials to count more for applicants who grew up in a context of socioeconomic disadvantage. We know from sociology of education that school performance does not depend on individual qualities alone and that it is strongly related socioeconomic background (Shavit and Blossfeld 1993; Breen and Jonsson 2005; Pfeffer 2008). If we assume that recruiters are at least in part aware of this, then the same signal (i.e., a given educational credential) should be more valuable for a candidate whose socioeconomic background made it objectively more difficult to obtain that credential. According to the logic of signalling theory, a candidate who grew up in a context of socioeconomic disadvantage and nonetheless managed to obtain a highly valued credential, is likely to possess more productivity-related qualities than a candidate with the same credentials who grew up in a middle- or upper-class family. For simplicity, we call this effect “differential signalling”.

Empirically, we focus on recruitment in the apprenticeship market in Switzerland. Switzerland has a so called “dual vocational training system”, meaning that vocational training takes place in schools and firms (Busemeyer and Trampusch, 2012). Typically, apprentices spend 1-2 days per week at a vocational school and 3-4 days in a firm, where they receive training, but they also perform productive work. During an apprenticeship, an apprentice receives a salary, that is lower than the wage obtained by standard workers (Muehleemann and Wolter, 2014). Crucially, apprentices are selected by firms at the firms’ discretion, exactly as are standard employees in the labour market. As a result, the apprenticeship market in a country like Switzerland is de facto a labour market, albeit with an important training component.

Our empirical analysis is based on a survey experiment administered to a sample of recruiters of apprentices in the French speaking Swiss canton of Vaud, in which they were requested to assess hypothetical candidate profiles that vary in terms of social background and school credentials. The Canton of Vaud was chosen because it has a varied economic and social structure, combining highly tertiarised urban areas, industrial regions, and rural areas with small scale production especially around agriculture. Consequently, this ample degree of variation ensures that our findings will not be limited to a specific type of economic activity.

This article contributes to the sociological literature on labour market signalling by considering how the value of a given (educational) signal can be affected by the socioeconomic background of the emitter. More in general, we speak to the literature analysing the complex interpretative patterns that employers apply when examining information on candidates (Auer et al 2019; Jackson 2009; Rivera 2011, 2015). Moreover, it contributes to the literature on the school-work linkage by considering education as a positional good and by specifically exploring the interaction between social position and educational credentials (Thurow 1975; Bills 2003; Di Stasio et al. 2016).

The article starts by briefly discussing signalling theory and outlining our central hypothesis. Second, we present our experiment and then move on to the result section. First, we focus on the results obtained in the full sample and then on heterogenous effects. The conclusion highlights the significance of our findings, suggesting some directions for future research on labour market signalling.

Theory

Job market signalling

In Spence's model, education is a useful signal for employers beyond what it tells them in terms of candidates' human capital, i.e., the general and professional skills they have learned (Spence 1973). Obtaining an educational credential has a cost because it takes time, effort, and motivation. As a result, not everyone will manage to obtain a particular credential or a degree. Thus, possessing a given credential provides much more information than simply the human capital one has acquired. It also informs on the candidate's general ability, which includes several important personality traits, such as perseverance, conscientiousness, ability to get along with others, acceptance of authority, and so forth (Arrow 1973; Spence 1973; Weiss 1995; Bills 2003; Huntington-Klein 2020).

The idea that education combines a human capital with a signalling value is widespread in the literature, however, it is rather difficult to distinguish between the two effects empirically, because they tend to covary (Pischke 2007; Huntington-Klein 2020). Several studies have found results that are compatible with the existence of a signalling effect of education. For example, returns to education measured in terms of impact of degrees on wages, far exceed the aggregate returns to the individual skills that are taught at school (Weiss 1995).

Often, a signalling effect is shown in an indirect way. For example, Bedard (2001) finds that increasing access to universities increases the dropout rates in high schools. He argues that since more able students go on to university, the signalling value of high school diplomas diminishes. This reduces the incentive for low ability students to make the effort to obtain a high school diploma, hence the higher dropout rate (Bedard 2001). In another US study, Tyler et al (2000) exploit variation across US states in the likelihood to obtain a General Education Development (GED)¹ diploma and show that keeping skills constant, having the diploma increases earnings (Tyler et al. 2000). Hämäläinen and Uusitalu (2008) exploit a reform of the Finnish vocational training system that impacted negatively on the earnings of graduates from vocational schools which were not affected by the reform. They argue that the signalling value of these vocational diplomas declined because more talented students attended the reformed schools.

¹ GED (General educational development) is a credential that was introduced in the US after WWII to allow war veterans without formal education to prove their skills. It has since evolved into a second chance diploma for school dropouts (Tyler et al. 2000, 432).

Other studies using similar indirect strategies have instead failed to uncover evidence of a signalling effect. Korch and Sjoblom (1994) compare the returns to absolute and relative levels (relative meaning in comparison to members of the same cohort) of investments into education. Their reasoning is that if a signalling effect is present, it should be stronger in the relative measurement. However, they find the opposite to be true. Clark and Martorell (2014) use a regression discontinuity design, and do not find any significant difference in earnings between workers who barely passed or barely failed to obtain a high school diploma. Overall, even though precise measurements of the relative weight of the human capital and the signalling effect of education have proven elusive, there is a broad agreement on the existence of both effects (Weiss 1995; Bills 2003; Huntington-Klein 2020).

Differential signalling

Most studies on the signalling value of education do not consider the possibility that similar signals may have different values depending on how difficult it was to obtain them. However, since according to signalling theory, the value of a diploma depends on how hard it is to obtain it, or how well it performs a sorting or filtering function, we can assume that the value of a credential will be higher for individuals for whom, because of exogenous factors, it was more difficult to obtain it. More concretely, it is plausible that obtaining a credential may require more individual effort and ability for individuals who have grown up in a context of social disadvantage, for example because they have low skilled parents and/or an immigration background. In other words, we can expect a given credential to count more for individuals whose socio-economic backgrounds make it less likely they will reach that level of education.

In line with the work of sociologists on hiring behaviour (Bills 2003; Bills et al. 2017; Di Stasio 2014; Di Stasio and van de Werfhorst 2016; Protsch and Solga 2015; Siebert and Solga 2005), in this article we analyse the interaction between social stratification and the signalling value of education. How employer use information related to education to select candidates is an extremely complex matter. In his review, Bills identifies six (partly interrelated) theories that purport to explain why education matters for success in the labour market: human capital, screening, signalling, control, cultural capital, institutional and credentialism. This suggests that human capital and signalling effects are only a small part of the possible ways in which education matters in the labour market (Bills 2003). It has also been shown that the context in which education is acquired matters. For instance, Di Stasio and van de Werfhorst (2016) show that the same information on

candidates' human capital (e. g., field of study, grades) is used differently by English and Dutch employers. Our study follows this line of reasoning, namely that employers can use information provided by educational credentials differently, by challenging the view, implicit in much of the literature on signalling, that signals produce a stable and uniform effect.

More specifically, we focus on educational inequalities and on the fact that success in education is highly dependent on socioeconomic background, particularly social class (Shavit and Blossfeld 1993; Breen and Jonsson 2005; Pfeffer 2008) and immigration background (Heath et al. 2008). Such effects are found at all levels of the skill distribution, including among holders of advanced degrees whose social origin impacts school selectivity, field of study, etc. (Torche 2011).

Whether directly or indirectly (i.e., by influencing school or field of study choices) social origin matters for success in school and the probability of succeeding in education is considerably higher for middle- or upper-class children of native families than it is for those born to working- or lower-class parents or to parents with an immigration background. These differences are so pervasive and well documented, that it is plausible to assume that employers are aware of them and that they will use this information when interpreting the value of an educational credential.

This differential signalling hypothesis has been explored in a small number of studies. However, results do not always go in the expected direction. In the US, Tyler et al (2000) found that GED has a positive impact on earnings for whites but not for minority candidates. One explanation the authors offer is that minority youth are more likely to be in close contact with the welfare state. In such case, taking a GED exam is often de facto compulsory, whereas for other candidates taking the GED exam is the result of a choice. Assuming that employers are aware of this, the value of the signal in terms of motivation is likely to be stronger for youths who are not obliged to take the test. In addition, the ethnic minority groups included in the study were much more likely to have had prison sentences, a factor that might overwhelm all other effects (Tyler et al. 2000, 460-1). Another US study has analysed the impact of possessing a degree from an elite University for African American and White candidates. It found that while having graduated in one of these Universities increases the call back rate for both African American and White applicants, the premium is similar across races (Gaddis 2015). Differential signalling has also been hypothesised by Siebert and Solga (2005) in their study on the value of vocational training diplomas for immigrants in Germany. However, they find that a vocational

diploma has the same positive impact on the likelihood of being in employment and of being in a qualified job for Germans and for immigrants. In other words, the differential signalling hypothesis was not corroborated in this case.

In this paper we hypothesise a positive signalling effect for educational credentials. However, differential signalling has also been hypothesised in relation to negative signals such as the interaction between ethnicity and negative signals, such as the fact of being unemployed. In the US, Nunley et al (2015) found that African American candidates were penalised to the same extent than Whites for being unemployed, while Padulla (2018) found the opposite. According to the latter, the most likely explanation for this result is that the negative signal provided by the fact that an applicant is unemployed does not add much information to the negative stereotype associated with an African American candidate. Like in our hypothesis, the same signal (unemployment) is interpreted differently for different subgroups, depending on how likely it is perceived that members of the subgroup display the signal or not².

In conclusion, existing studies on differential signalling provide mixed evidence, suggesting that whether a signal is interpreted conditionally, for instance on socioeconomic background, may vary according to other contextual variables. It could also be the case that employers interpret “bundles” of signals as being particularly meaningful, rather than each piece of information in isolation (Jackson 2009).

Heterogeneity among employers

Most studies on signalling and employer recruitment behaviour ignore potential variation among employers in the way in which they interpret information on candidates in recruitment. This is largely because the most widely used method, correspondence testing, makes it difficult to obtain reliable information about the characteristics of the recruiter. This is not the case with our study since the survey experiment technique allowed us to collect information on recruiters.

Theoretically, including information about recruiters is an important addition to our analysis, because our hypothesis implies a strong inclination to apply probabilistic or statistical reasoning in selecting candidates, i.e., in assigning (assumed) group averages to all group members in the same way. For our hypothesis to be confirmed, employers

² Note instead that another study in Norway found that unemployment penalises immigrants and natives in a similar way (Birkelund et al 2017).

must first assume that the norm for potentially socially disadvantaged youth is to lack important educational credentials, in order to subsequently reward those who “defy” that norm having obtained a given credential. This process requires the application of statistical reasoning twice: first to the group experiencing disadvantage and then to the candidate who was successful in obtaining a given credential.

From the few studies on hiring that report heterogeneous effects by recruiters we know that the inclination to rely on statistical reasoning can vary across recruiters. For instance, male recruiters have been found to be more inclined to consider ethnicity (Carlsson and Rooth 2007) and a criminal record (Baert and Verhofstadt 2015) when assessing candidates. Second, recruiters in smaller firms are more likely to discriminate against ethnic minority applicants (Kaas and Manger 2012; Carlsson and Rooth 2007). Third, in some cases, employers with an ethnic minority background have been shown to be more likely to hire members of the same minority (Booth et al. 2012). Finally, public sector employers are less likely to discriminate against ethnic minority candidates than private ones (Midtbøen 2016)³.

Both theoretical considerations as well as the findings of empirical studies on discrimination in hiring suggest that the effect we hypothesised (differential signalling) may be more pervasive among specific subgroups of recruiters. For this reason, we test our general hypothesis in interaction with recruiter characteristics that can be expected to be associated with a stronger inclination to apply statistical reasoning, i.e., male gender, small firm size, and private ownership of the firm.

Data and methods

In this study we rely on a survey administered to all approved in-firm vocational trainers of apprentices in commercial training (*employé.e de commerce/Kaufmann-frau*) the French-speaking Canton of Vaud in Switzerland between March and May 2017 (see Table S1 in Supplementary material for the experimental protocol). Their contact details were obtained from the official registry, and we included only recruiters who had at least some

³ Obviously, these results could also be due to differences among recruiter in taste discrimination. However, we assume that at least part of these effects is due to statistical discrimination. This assumption seems reasonable, and in line with research that has tried to distinguish between the two types of discrimination (Guryan and Charles 2013).

experience hiring apprentices for the commercial employee profession, which is the most widespread in Switzerland (OFS 2018).

The survey consisted in an online experiment in which participants were presented with fictitious descriptions of applicants (so-called vignettes) at random. These fictitious descriptions approximate a brief CV that an apprentice candidate would send to apply for a position in a firm.

In order to understand well how recruitment works in the apprenticeship segment of the labour market, before designing the experiment, we conducted qualitative interviews with HR managers and public officials involved with the apprenticeship system (see list in the supplementary material, Table S1). These interviews were helpful in determining the attributes of the fictitious candidates, to make them plausible and adequately informative.

Recruiters were asked to state how likely they would be to hire each candidate (0=very unlikely, 10=very likely). We presented them with five profiles for each of two different apprenticeship types (i.e., ten profiles in total) in commercial training, namely, a *Certificat fédéral de capacité* (CFC) and an *Attestation de formation professionnelle* (AFP) position. These two programmes differ in how demanding they are for candidates. The AFP certificate consists of a two-year programme that provides basic training, whereas the three-year programme (CFC) is somewhat more ambitious. We differentiate between these two options to ensure that our results are not driven by the specific skill level of the apprenticeship considered. These programmes train apprentices in areas such as administration, ICT, accounting, languages and general knowledge on society and the economy.

We were interested in analysing the impact of nine variables (dimensions) that provide key information on candidates' educational and socio-economic backgrounds and whose values (levels) are varied at random (Table 1).

The study design relies on a D-efficient (90.03^4) sample of 325 vignettes drawn from all 19,683 possible combinations that aims at maximising the orthogonality of the dimensions to increase statistical power (Auspurg and Hinz 2015). Importantly, in the experimental design we orthogonalized all two-way interactions allowing us to obtain unbiased

⁴ Auspurg and Hinz (2015, 27) define D-efficiency as "(...) a measure of the goodness of an experimental design (...) [that allows] to select one that provides the maximum statistical information, given sensible numbers of respondents and vignettes per respondent". D-efficiency captures orthogonality and balance of the design. The higher the D-efficiency value, the higher the statistical power of the estimates (D-efficiency >90 corresponds to vignette dimension correlations of <0.05, Auspurg and Hinz, 2015, 48).

estimates of all main and two-way interaction effects for all values of the nine variables. The advantage of choosing a D-efficient design is its efficiency with low respondent numbers, for instance when studying hard-to-reach populations such as employers.

Table 1 presents the nine dimensions and the levels that we varied in the experiment. They include grades in the most important subjects (maths and French, i.e., the local language), the school track⁵ (high, middle, and low), an aptitude test (AT) provided by a well-known private firm, the father's profession (to indicate social class), up to two different extracurriculars, the parent's nationality and the applicant's gender.

Table 1: Vignette levels and dimensions

| | Dimensions | Levels |
|---|--------------------------|---|
| 1 | Grade in French language | <ul style="list-style-type: none"> - 5.0 (good) - 4.5 (satisfactory) - 4.0 (pass/sufficient) |
| 2 | Grade in mathematics | <ul style="list-style-type: none"> - 5.0 (good) - 4.5 (satisfactory) - 4.0 (pass/sufficient) |
| 3 | School track | <ul style="list-style-type: none"> - High track - Mid track - Low track |
| 4 | Aptitude test score | <ul style="list-style-type: none"> - 60 (very good) - 50 (satisfactory) - 40 (sufficient) |
| 5 | Profession of the father | <ul style="list-style-type: none"> - Doctor - Insurance consultant - Construction worker |
| 6 | Extracurricular 1 | <ul style="list-style-type: none"> - Violin - Handball - Skateboarding (male candidates) / hip-hop dance (female candidates) |
| 7 | Extracurricular 2 | <ul style="list-style-type: none"> - Nothing (reference) - Scout leader |

⁵The Canton of Vaud has a school tracking system that divides pupils in three tracks according to ability.

| | | |
|---|------------------------|---------------------------------------|
| | | - Member of a theatre company |
| 8 | Nationality of parents | - Swiss - Portuguese - Albanian |
| 9 | Gender | - Male - Female - Female * |

3⁹-full factorial 19683 combinations, D-efficient sample of 90.03

* We have two females for each male vignette category. This allows us to have three values in each dimension (which reinforces D-efficiency) and to present a sample that is closer to the experience of the recruiters, the profession of commercial employee being female dominated.

Before introducing the five vignettes for each of the two apprenticeship positions,⁶ we explained the evaluation setting and mentioned that candidates should be rated independently from one another. We also specified that all candidates had the typical age to start an apprenticeship (i.e., were 16-year-old), were motivated to begin their training and had graduated from compulsory school in Switzerland. This information is important to avoid differing assumptions regarding the quality of the human capital acquired by the students with an attributed immigration background. We did not specify the tasks for which the apprentice would be responsible. On the one hand, these depend on the firm and its needs, on the other, the content of an apprenticeship as a commercial employee is relatively standardised, so we expect variation in terms of tasks to be limited.

We obtained experimental data for ~63 per cent of the total recruiter sample. In more detail, 840 individual recruiters evaluated 7877 vignettes (ratings are missing for 523 vignettes due to non-responses). We ensure that each vignette has been rated by a minimum of four recruiters and that correlations among the vignette dimensions and the recruiter characteristics are negligible.⁷

Our estimation strategy relies on multilevel linear models that account for correlation in the error terms. This strategy is necessary given that our data has a nested structure because each respondent evaluated five fictitious CVs for each apprenticeship type (Skrondal and Rabe-Hesketh 2008; Auspurg and Hinz 2015).

⁶ The order in which the two apprenticeships were presented, as well as the order of the five vignettes for each job was varied at random.

⁷ See experimental robustness tests in Supplementary material Table S2, S3 and Figure S5.

Operationalisation

In the operationalisation of socio-economic background, we were guided by theoretical and by pragmatic considerations. Theoretically, we would expect immigrant status and parental social class to matter most for the putative effect of differential signalling. The impact of these two factors on school performance has been widely documented, and it is safe to assume that it will be known to employers (see below for evidence). As seen in table 1, our vignettes provide information on both social class and migrant status.

Social class is operationalised by providing information on the profession of the candidate's father. This may appear as an unusual piece of information to be considered in a recruitment process. However, in our exploratory interviews we learned, that given that apprenticeship candidates are typically quite young, recruiters like to collect information on the family background⁸. Middle-class background is operationalised by indicating that the candidate's father works as a medical doctor or as an insurance employee, whereas working class status is signalled by indicating that the father is a construction worker. The idea is to contrast two professions that require postsecondary education with a low skilled, manual occupation. We could have also supplied information regarding the profession of the mother; however, this would have further complicated an already complex experiment and analysis. On the other hand, because of the high prevalence of homogamy, we reasoned that providing information on the father's profession gave respondents enough information to gauge the applicant's social class. Moreover, Switzerland, is still a typical male-breadwinner system where a large share of women works part-time and will experience suboptimal career evolution. Thus, information on the fathers' profession is still a more direct way of conveying socioeconomic status.

To capture immigration background, we use the applicant parents' nationality. Switzerland has a relatively restrictive legislation with regard to access to citizenship, so that foreign nationality can be considered as a good proxy for migration background, especially for recent waves of immigrants (Piguat 2005). We focus on two nationalities, which concern rather recent waves of immigration, i.e., Albanian, and Portuguese nationals (see Figure S1 in Supplemental material).

⁸ We considered as an alternative to use the neighbourhood as a signal of social class. However, we decided against this option because in our exploratory interviews we were told that sometimes preference is given to candidates who live close to the firm, so as to minimise commuting time, and reduce the potential problems that may arise in case of a long commute.

In order to test the differential signalling hypothesis, we need to interact social class, migration background and educational credentials. To keep the number of interactions manageable, we simplify the coding of socio-economic background with a four-value variable: Swiss middle-class, Swiss working-class, foreign middle-class and foreign working-class. This simplification allows us to separate the impact of class and migration background and to assess the joint impact of the two factors.

Regarding the educational credential, we chose school track, because tracks perform a filtering function that is clearly visible to employers. In fact, the Canton of Vaud has a tracking system in compulsory schooling that divides pupils into three groups according to performance. In terms of formal access, anyone of the three tracks can lead to an apprenticeship position, but it is widely known that employers prefer candidates from the high or at least the middle track. As will be shown below, this preference is also clearly visible in our data.

Importantly, for differential signalling to take place, employers must have some assumptions regarding the distribution of a credential in the population. In other words, they must know that the credential is less likely to be obtained by youths experiencing social disadvantage. It is safe to assume that this is the case for school track, for several reasons. First, the proportion of youths with an immigration background is considerably lower in the high track (16%) and in the middle track (24 %) in comparison to the low track (42%) (data for 2015, Statistique Vaud 2016). While employers may ignore the data, they are likely to have some first-hand experience with the education system, for example as parents. Given that these differences are rather large, it is plausible to assume that they are known to employers. Second, the issue of tracking was widely discussed in public debates during several years before the survey. A highly controversial reform adopted in 2013 merged the two lower tracks, changed their denomination, but then re-introduced a distinction based on performance within the merged lower and middle tracks. The result is that the system is still widely regarded as a three-track system (Di Matteo 2015). Proof of this is the fact that many of the recruiters we surveyed in 2017 were still using the denomination of the tracks that was in use with the older system. Given the prominence of the debate on tracking at the time of the survey, it is safe to assume that employers (as most other citizens) were aware of the socioeconomic background bias on access to the higher track.

We can now formulate our key hypothesis: we expect that the premium candidates will receive for being in the upper track relative to the lower one to be smallest for Swiss middle-class candidates, and greatest for foreign working-class candidates (impact of class and nationality is expected to be cumulative). We further expect foreign middle-class and Swiss working-class candidates to be located somewhere in-between.

Main results

We first present the main effects of the variables included in our survey experiment. The results in Table 2 show that educational credentials are the most important factor that determines a candidate’s assessment by recruiters. All the educational credentials have a statistically significant impact in the expected direction. The aptitude test (AT) has the strongest impact, followed by French and mathematics grades. As expected, school track significantly and positively impacts on the assessment of the candidates. The assumption we made above, that recruiters rank candidates according to the track in which they completed compulsory education, is clearly confirmed by the data.

Socioeconomic background and gender, in contrast, do not significantly influence the assessment of candidates⁹. However, analyses on a subsample of candidates with inconsistent credentials show an effect of social class (Fossati et al. 2020). Finally, we find that some extracurricular activities (being a scout leader and playing theatre) have a positive impact on recruiters’ evaluations, while others have no effect (playing violin, skateboarding or handball).

Table 2: Multilevel model of recruiters’ assessment of fictitious candidates applying to apprenticeship positions (0-10 scale)

| | Coefficient | Std. error |
|---------------------------------|-------------|------------|
| Socioeconomic background | | |
| - Swiss middle-class (ref.) | | |
| - Swiss working-class | 0.021 | (0.061) |
| - Foreign middle-class | 0.013 | (0.042) |

⁹ As a robustness test, we ran an alternative model with the non-recoded variables, i.e., immigration background and fathers’ profession and the results remain the same showing that there is no significant social background effect.

| | | |
|-------------------------------------|----------|---------|
| - Foreign working-class | 0.060 | (0.049) |
| Educational track | | |
| - Low track (ref.) | | |
| - Mid track | 0.322*** | (0.040) |
| - High track | 0.626*** | (0.039) |
| Grade in Maths | | |
| - 4.0 (pass) (ref.) | | |
| - 4.5 (satisfactory) | 0.268*** | (0.039) |
| - 5.0 (good) | 0.545*** | (0.040) |
| Grade in French | | |
| - 4.0 (pass) (ref.) | | |
| - 4.5 (satisfactory) | 0.473*** | (0.040) |
| - 5.0 (good) | 0.782*** | (0.039) |
| Aptitude test score | | |
| - Low (40p) (ref.) | | |
| - Medium (50p) | 1.372*** | (0.039) |
| - High (60p) | 1.576*** | (0.040) |
| Gender | | |
| - Female (ref.) | | |
| - Male | -0.056 | (0.034) |
| Extracurricular 1 | | |
| - Handball (ref.) | | |
| - Skateboard/hip hop | 0.004 | (0.039) |
| - Violin | 0.021 | (0.039) |
| Extracurricular 2 | | |
| - None (ref.) | | |
| - Theater | 0.156*** | (0.040) |
| - Scout leader | 0.207*** | (0.039) |
| Apprenticeship Type | | |
| - Three-year apprenticeship (ref.) | | |
| - Two-year apprenticeship | 0.115*** | (0.032) |
| Constant | 4.523*** | (0.093) |
| Variance of respondents' intercepts | 1.646 | (0.092) |
| Variance of vignettes (residual) | 2.000 | (0.033) |

| | | |
|-----|------------|--|
| N | 7877 | |
| aic | 29644.258 | |
| bic | 29783.692 | |
| ll | -14802.129 | |

Standard errors in parentheses. Significance: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Let us now focus on our main hypothesis, i.e., that the premium a candidate obtains from graduating in the high track relative to the low one, is bigger for the those with a socioeconomically disadvantaged background (e.g., applicants with a foreign and/or working-class background). To test this, we estimate an interaction between school track and socioeconomic background. Table 3 shows the predicted values for the various variable combinations of interest as well as the change in the rating relative to the low track, or in other words the premium a candidate gets for being in the mid or upper track relative to the low one.

Table 3: Interaction of socioeconomic background and school track, predictive margins and change relative to low track (full model in supplementary material, table S4).

| | | Predicted margin | Std.error | Change relative to Low track | Std.error |
|-----------------------|------------|------------------|-----------|------------------------------|-----------|
| Swiss middle class | Low track | 6.527 | 0.075 | - | |
| | Mid track | 6.821 | 0.077 | 0.294*** | 0.088 |
| | High track | 7.073 | 0.075 | 0.546*** | 0.085 |
| Swiss working class | Low track | 6.437 | 0.096 | - | |
| | Mid track | 6.793 | 0.101 | 0.356*** | 0.124 |
| | High track | 7.171 | 0.092 | 0.734*** | 0.117 |
| Foreign middle class | Low track | 6.478 | 0.061 | - | |
| | Mid track | 6.852 | 0.062 | 0.374*** | 0.060 |
| | High track | 7.111 | 0.062 | 0.634*** | 0.060 |
| Foreign working class | Low track | 6.541 | 0.078 | - | |

| | | | | | |
|--|------------|-------|-------|----------|-------|
| | Mid track | 6.765 | 0.077 | 0.225** | 0.090 |
| | High track | 7.175 | 0.076 | 0.634*** | 0.089 |

Significance: ** p<0.01, *** p<0.001

Table 3 shows that candidates with a disadvantaged socioeconomic background obtain a slightly higher premium relative to Swiss middle-class applicants for being the in the high track as opposed to the low track. Regarding the high track, Swiss working-class, foreign middle-class and foreign working-class candidates all receive a premium that is higher than the one obtained by a Swiss middle-class candidate. This is in line with our expectations, but the differences are small and the interaction coefficients between socioeconomic background and school track are not statistically significant (see table S4 in the supplementary material). Therefore, from this analysis we cannot conclude that we found evidence of differential signalling.

Respondent-level heterogeneous effects

As argued in the theory section, differential signalling implies a strong inclination to apply statistical reasoning in the process of candidate selection. Accordingly, we would expect differential signalling to be stronger among male recruiters, small employers and in privately own firms, all of whom have been shown to be more inclined to rely on statistical discrimination. The existence of differential signalling within one of these sub-groups would show up as a significant cross-level interaction term, between the relevant recruiters' attribute and the premium received for graduating in the high track by potentially socially disadvantaged candidates.

Of the three heterogenous effects we hypothesized, we found a statistically significant interaction effect only for the respondent's gender, with differential signalling being visible among male recruiters. This is in line with the literature on labour market discrimination reviewed above, which suggests that male recruiters are more likely to apply statistical reasoning when evaluating candidates than their female counterparts (Carlsson and Rooth 2007; Baert and Verhofstadt 2015). These results are presented in table 4 (for the full model, see table S5 in the supplementary material). To facilitate

interpretation, we present predicted values and the change associated with being in a higher track separately for female and male recruiters. However, these were computed based on one single cross-level interaction model (table S5). Note that since the model now contains a respondent level variable (gender) we also include respondent level controls (nationality, age, experience in recruitment, employer size and employer type).

Table 4: Interaction of socioeconomic background and school track for female and male respondents, predictive margins and change relative to low track (full model in Table S5 in supplementary material).

Panel A: Female respondents

| | | Predicted margin | Std.error | Change relative to Low track | Std.error |
|-----------------------|------------|------------------|-----------|------------------------------|-----------|
| Swiss middle class | Low track | 6.454 | 0.093 | - | |
| | Mid track | 6.854 | 0.096 | 0.400*** | 0.110 |
| | High track | 7.175 | 0.091 | 0.721*** | 0.105 |
| Swiss working class | Low track | 6.498 | 0.119 | - | |
| | Mid track | 6.738 | 0.124 | 0.240*** | 0.153 |
| | High track | 7.227 | 0.112 | 0.729*** | 0.145 |
| Foreign middle class | Low track | 6.548 | 0.075 | - | |
| | Mid track | 6.867 | 0.076 | 0.319*** | 0.074 |
| | High track | 7.174 | 0.076 | 0.626*** | 0.074 |
| Foreign working class | Low track | 6.681 | 0.097 | - | |
| | Mid track | 6.867 | 0.095 | 0.185+ | 0.113 |
| | High track | 7.206 | 0.094 | 0.524*** | 0.111 |

Panel B: Male respondents

| | | Predicted margin | Std.errors | Change relative to Low track | Std.errors |
|---------------------|------------|------------------|------------|------------------------------|------------|
| Swiss middle class | Low track | 6.559 | 0.136 | - | |
| | Mid track | 6.713 | 0.140 | 0.154 n.s. | 0.159 |
| | High track | 6.872 | 0.141 | 0.313 + | 0.160 |
| Swiss working class | Low track | 6.269 | 0.172 | - | |
| | Mid track | 6.932 | 0.186 | 0.663** | 0.226 |
| | High track | 7.054 | 0.172 | 0.785*** | 0.216 |

| | | | | | |
|-----------------------|------------|-------|-------|----------|-------|
| Foreign middle class | Low track | 6.313 | 0.113 | - | |
| | Mid track | 6.841 | 0.113 | 0.528*** | 0.112 |
| | High track | 7.020 | 0.114 | 0.707*** | 0.112 |
| Foreign working class | Low track | 6.199 | 0.144 | - | |
| | Mid track | 6.535 | 0.140 | 0.336* | 0.167 |
| | High track | 7.085 | 0.137 | 0.886*** | 0.163 |

Significance: + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4, panel B shows that male recruiters assign a higher premium to candidates with a socioeconomically disadvantaged background for being in the high track. With male recruiters, Swiss middle-class candidates get no premium for graduating in the middle track or a very small one if in the high track (+0.313, $p < 0.1$). In contrast, candidates with either a foreign or a working-class background, or both, all get higher premia, especially if they attended the high track. As expected, the premium is highest and strongly significant for the most disadvantaged candidates (foreign and working-class, + 0.866, $p < 0.001$).

But are the differences between the premia statistically significant? In order to answer this question, we need to look at the interaction coefficient of male recruiter # social background # school track, reported in the supplementary material, table S5. As can be seen, all the coefficients are positive, meaning that every other combination gets a higher rating than the reference category (Swiss middle class / low track). Out of the six coefficients, 3 are significant at the 5% level (4 if we apply the 10% level). The strongest effect is, as expected, for the extra premium attributed to the most potentially disadvantaged candidate (foreign working class / high track: 0.770, $p < 0.01$). As expected, coefficients for candidates with only one attribute associated with potential disadvantage are still positive but lower and less likely to be significant. We regard these results as compatible with our differential signalling hypothesis.

A differential signalling effect, instead, is absent among female recruiters (table 4, panel A). Female recruiters do attribute a premium to candidates who have attended compulsory school in the high track and to a lesser extent in the middle track, but the premium is similar across groups and does not depend on social background. Female recruiters seem

less likely to apply statistical reasoning and thus to interpret the signalling value of educational credential differently based on candidates' social background. In sum, female recruiters are less likely to discriminate candidates depending on their social origin.

This result is in line with the literature on gender and statistical discrimination considered above. The fact that we control for several respondent levels rules out compositional effects in relation to these variables as an explanation.

Discussion and conclusion

In line with other sociological work on employers' hiring behaviour, in this study we explored the complex interaction between social stratification and the signalling value of education. Theoretically, we argued that those who start from a position of socioeconomic disadvantage are likely to get a higher premium for the same educational credentials (differential signalling hypothesis). Our results show that differential signalling is applied by some recruiters, but not by all of them. In our analysis of heterogeneous effects, we were able to identify a relatively strong inclination to rely on differential signalling among male -but not among female- recruiters. This result is in line with previous findings supporting the notion that male recruiters are more likely to use statistical reasoning when recruiting and thus more prone to discrimination (Carlsson and Rooth 2007; Baert and Verhofstadt 2015).

This article contributes to improving our understanding of labour market signalling in several ways. First, our study contributes to the understanding of the complex interpretative patterns that employers apply when examining candidates. It tests the hypothesis that signals that are emitted by otherwise identical individuals, but embedded in different locations in the social structure, may have a different value. We find that this hypothesis is confirmed, but only for male recruiters. In line with other sociological studies on the value of educational credentials, our results confirm the notion that education is a positional good. The value of a diploma depends on the position of a candidate relative to an assumed distribution of candidates (Di Stasio et al 2016; Di Stasio 2017). Our results corroborate the view that employers consider educational credentials as a positional good but add that the assessment of the relative position is conditional on exogenous factors.

When exogenous factors make it objectively more difficult to attain a given level, the premium for getting there is higher.

Second, the fact that we observe heterogeneity in the extent to which recruiters rely on statistical reasoning, supports the view that studies of signalling and discrimination should pay more attention to such heterogeneous effects in general. Most studies, in fact, are unable to say much about employer/recruiter characteristics. This is largely because the method used, correspondence test, makes it difficult to collect information on the recruiter. However, the studies we quote above and our own research, suggest that heterogeneous effects may be rather widespread. These are not well understood, and further research should try to map and explain such heterogeneous effects.

Studying and understanding heterogeneous effects is important, because signalling theory is not well equipped to explain them. Hypotheses based on signalling theory, are formulated to apply to all employers while empirical analysis suggests that not all employers are equal when it comes to applying statistical reasoning. One seemingly important feature is the gender of the recruiter. This effect is not well understood, and future research should try to uncover what it is about gender that makes male recruiters more likely to apply statistical reasoning when selecting candidates (e.g., self-confidence, trust in one's own "gut" feeling?).

Are there alternative explanations to the observed pattern? One possibility would be some form of positive discrimination for candidates with a disadvantaged background. Recruiters may be motivated by the objective to increase diversity in their firm, and when they receive applications from suitable candidates from minorities and/or with working class parents, prefer them over equally qualified Swiss middle-class candidates. We cannot rule out this alternative explanation. However, the fact that we observe this effect only for male recruiters questions its plausibility, as it is unclear why increasing diversity in firm personnel would be an objective for male but not for female recruiters. In contrast, our preferred explanation, i.e., that men are more likely to resort statistical reasoning than women, has some basis in the literature, at least empirically and possibly theoretically even though the reasons for it are clearly undertheorized.

This study has some limitations. Most importantly, it focused on a very specific labour market, the market for apprentices. In this labour market, trainability is an essential

quality together with productivity. We can assume that in the regular labour market, productivity will play a bigger role, even though trainability arguably matters in most labour markets (Di Stasio 2014; Di Stasio and van de Werfhorst 2016). As a result, while our findings cannot directly be generalised to standard labour markets, there are reasons to believe that they might have some relevance on a more general level.

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Supplementary material for the article: Does social disadvantage boost the signalling value of education? Evidence from a survey experiment in the apprenticeship market

Figure S1: Largest immigrant groups in the French-Speaking Canton of Vaud, Switzerland (2010-2016)

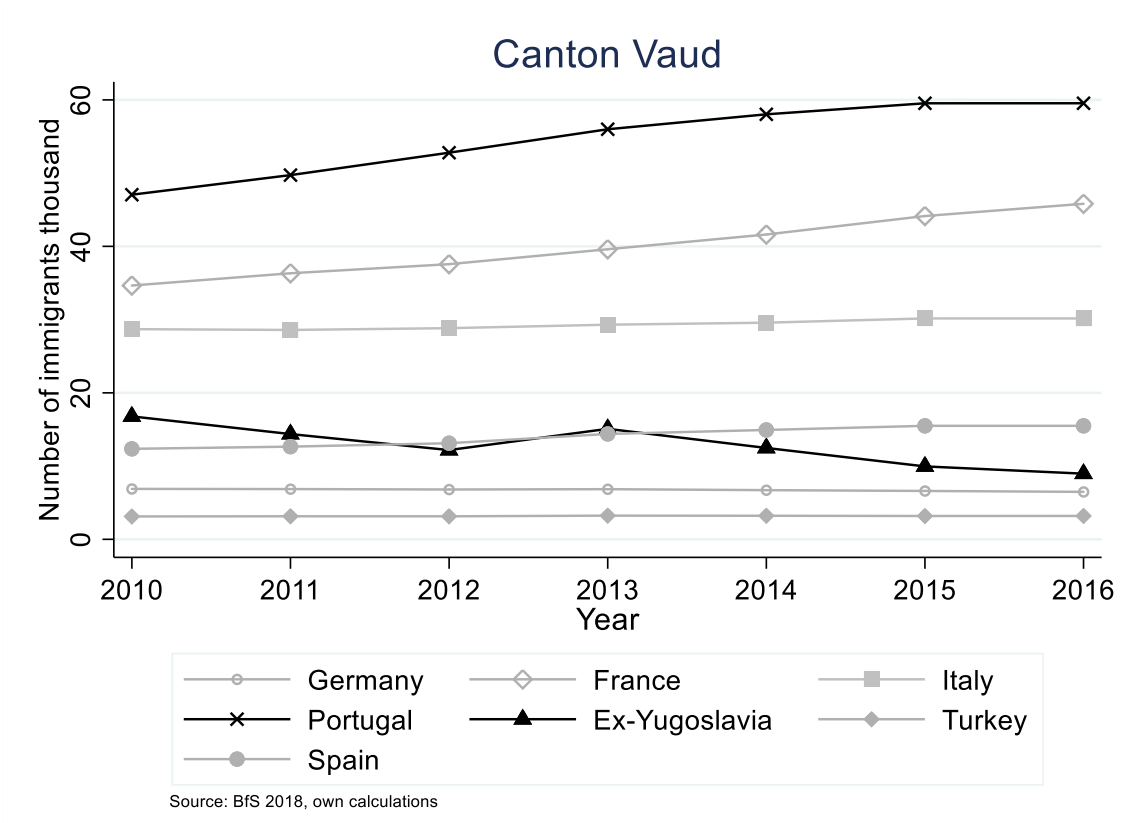


Table S1: Experimental protocol

| Date | Step |
|---------------|--|
| 3 March 2017 | Postal letter announcing the survey |
| 8 March 2017 | Electronic survey link |
| 14 March 2017 | Reminder to those who had not yet responded |
| 3 April 2017 | Second reminder to those who had not yet responded |
| | Survey closed |
| Response rate | 63.20 per cent (completed surveys 840 of 1329) |

Figure S2: First screen of the vignette experiment: Instructions about the task of evaluating two different apprenticeship positions

Evaluation

Dans la partie qui suit, nous allons vous demander d'évaluer quelques candidat·e·s fictif·ve·s de deux apprentissages différents: **Employé·e de commerce CFC (profil élargi)** et **Assistant·e de commerce de détail (AFP)**.

Figure S3: Second screen of the vignette experiment: Description of apprenticeship positions

Employé·e de commerce CFC (profil élargi)

Nous vous présentons à présent **cinq candidat·e·s fictif·ve·s** pour un apprentissage d'**Employé·e de commerce CFC (profil élargi)** dans votre entreprise/organisation.

(Dans le cas où votre entreprise/organisation n'embauche pas ce type d'apprenti·e, veuillez néanmoins évaluer ces candidat·e·s en **imaginant** qu'une décision sera prise de mettre au concours un poste de ce type dans un avenir proche.)

Veillez noter que chaque profil doit être évalué indépendamment l'un de l'autre.

Tous les candidats ont **16 ans**, ils/elles ont **achevé l'école obligatoire en Suisse** et ils/elles sont très **motivé·e·s** par la perspective d'entamer leur formation professionnelle.

Figure S4: Third to seventh screens: Respondents are presented with five candidate descriptions (order is randomized)

Candidat(e)

La candidate a des parents d'origine suisse. La profession de son père est ouvrier dans le secteur de la construction. À l'école, elle a suivi la voie générale niveau 1 en maths et en français. Elle a atteint la note de 4.5 en français et la note de 4.0 en mathématiques. Dans un test d'aptitude Multicheck, elle a obtenu une valeur de 60 comme résultat global, indiquant qu'elle a dépassé les exigences pour un apprentissage dans la profession concernée. Dans son temps libre, elle fait de la danse hip-hop. De plus, elle est cheffe scout.

Veillez indiquer dans quelle mesure vous seriez prêt(e) à engager ce(tte) candidat(e), 0 = pas du tout prêt(e), 10 = tout à fait prêt(e).

| | | | | | | | | | | |
|--------------------------|---|---|---|---|---|---|---|---|---|---------------------------|
| Pas du tout prêt(e) 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Tout à fait prêt(e) 10 |
|--------------------------|---|---|---|---|---|---|---|---|---|---------------------------|



Note: This experiment was followed by a second experiment for the second apprenticeship position. The order of the experiments is randomised.

Table S2: Correlation matrix for all candidates by occupation, whole sample (N=7877)

| All candidates | Gender | Nationality | Profession | French | Math | AT | Track | Hobby 1 | Hobby 2 |
|--------------------------------------|--------|-------------|------------|--------|-------|--------|-------|---------|---------|
| Gender | 1 | | | | | | | | |
| Nationality | 0.01 | 1 | | | | | | | |
| Profession | 0.01 | 0.00 | 1 | | | | | | |
| French | 0.00 | 0.02 | 0.01 | 1 | | | | | |
| Math | -0.00 | 0.00 | -0.00 | 0.01 | 1 | | | | |
| AT test | -0.00 | 0.01 | -0.00 | 0.00 | 0.02 | 1 | | | |
| Track | 0.01 | 0.01 | 0.03 | 0.00 | 0.03 | -0.01 | 1 | | |
| Hobby 1 | -0.01 | 0.01 | -0.01 | -0.00 | 0.01 | 0.0018 | -0.02 | 1 | |
| Hobby 2 | -0.02 | -0.01 | 0.00 | 0.01 | -0.02 | -0.01 | 0.01 | 0.01 | 1 |
| Higher-skilled position (CFC) | Gender | Nationality | Profession | French | Math | AT | Track | Hobby 1 | Hobby 2 |
| Gender | 1 | | | | | | | | |
| Nationality | 0.00 | 1 | | | | | | | |
| Profession | 0.03 | 0.00 | 1 | | | | | | |
| French | -0.01 | 0.00 | 0.01 | 1 | | | | | |
| Math | 0.01 | 0.00 | 0.02 | 0.01 | 1 | | | | |
| AT test | 0.01 | -0.01 | 0.00 | 0.01 | 0.01 | 1 | | | |
| Track | -0.01 | -0.01 | 0.04 | 0.01 | -0.01 | -0.01 | 1 | | |
| Hobby 1 | 0.01 | 0.00 | -0.03 | 0.00 | 0.01 | 0.00 | -0.01 | 1 | |
| Hobby 2 | -0.01 | 0.02 | -0.01 | -0.02 | -0.02 | -0.01 | 0.01 | 0.00 | 1.00 |

| Lower-skilled position (AFP) | Gender | Nationality | Profession | French | Math | AT | Track | Hobby 1 | Hobby 2 |
|-------------------------------------|--------|-------------|------------|--------|-------|-------|-------|---------|---------|
| Gender | 1 | | | | | | | | |
| Nationality | 0.04 | 1 | | | | | | | |
| Profession | 0.04 | -0.01 | 1 | | | | | | |
| French | 0.00 | -0.01 | -0.01 | 1 | | | | | |
| Math | 0.00 | 0.01 | 0.01 | 0.01 | 1 | | | | |
| AT test | 0.01 | 0.00 | 0.02 | 0.01 | 0.03 | 1 | | | |
| Track | 0.01 | -0.01 | 0.02 | 0.02 | 0.00 | 0.01 | 1 | | |
| Hobby 1 | 0.01 | 0.00 | -0.02 | -0.02 | 0.02 | 0.01 | 0.00 | 1 | |
| Hobby 2 | -0.01 | -0.01 | 0.02 | -0.02 | -0.03 | -0.01 | -0.01 | 0.01 | 1.00 |

Figure S5: Distribution of the dependent variable: employers' rating of apprentice profiles by occupation (whole sample, N=7877)

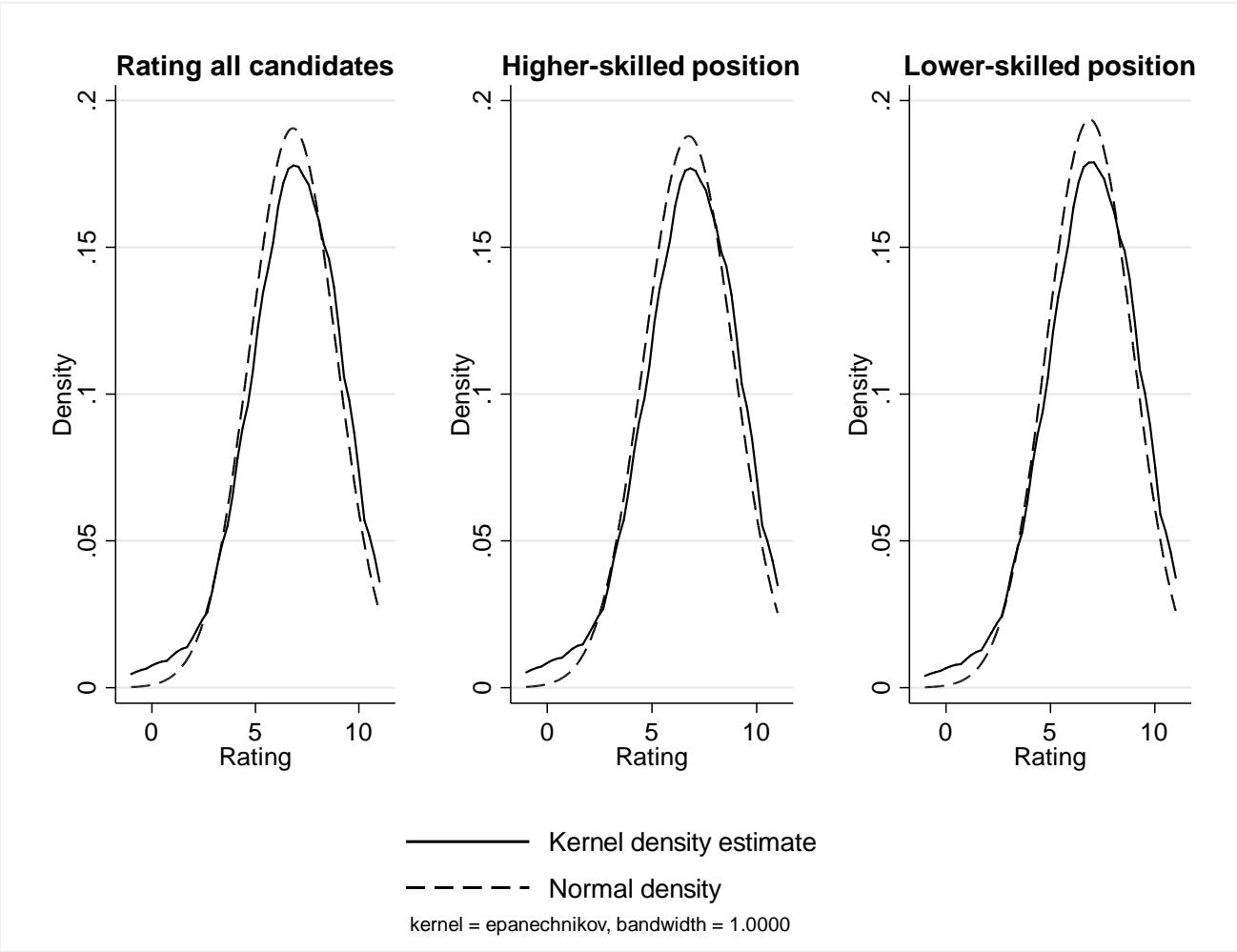


Table S3: Correlations between vignette dimensions and employer characteristics (whole sample, vignette N=7877)

| Vignette dimensions | Gender | Nationality | Profession | French | Math | AT | Track | Hobby 1 | Hobby 2 |
|---|--------|-------------|------------|--------|-------|-------|-------|---------|---------|
| Gender | 1 | | | | | | | | |
| Nationality | 0.02 | 1 | | | | | | | |
| Profession | 0.04 | -0.01 | 1 | | | | | | |
| French | 0.00 | 0.00 | 0.01 | 1 | | | | | |
| Math | 0.00 | 0.01 | 0.01 | 0.01 | 1 | | | | |
| AT test | 0.00 | 0.00 | -0.00 | 0.00 | 0.02 | 1 | | | |
| Track | -0.00 | -0.00 | 0.03 | 0.00 | 0.00 | 0.01 | 1 | | |
| Hobby 1 | 0.00 | 0.01 | -0.02 | -0.01 | 0.02 | 0.00 | -0.00 | 1 | |
| Hobby 2 | -0.01 | -0.01 | 0.01 | -0.02 | -0.01 | 0.01 | 0.00 | 0.01 | 1 |
| Respondent/ firm characteristics | | | | | | | | | |
| Gender resp. | -0.01 | -0.00 | 0.01 | 0.00 | -0.00 | 0.00 | -0.00 | 0.00 | 0.00 |
| Nationality resp. | -0.00 | -0.00 | 0.00 | 0.00 | 0.01 | -0.00 | -0.00 | 0.00 | -0.00 |
| Age resp. | -0.00 | -0.00 | 0.00 | 0.00 | 0.00 | 0.01 | -0.00 | -0.00 | -0.00 |
| Difficulty recruiting apprentices | -0.00 | -0.00 | -0.01 | -0.01 | -0.00 | -0.00 | 0.00 | 0.01 | 0.00 |
| No. apprentices | 0.01 | 0.00 | -0.00 | 0.00 | -0.00 | -0.01 | -0.00 | -0.01 | 0.00 |
| No. employees | 0.00 | 0.01 | -0.00 | 0.00 | 0.00 | -0.00 | -0.00 | -0.01 | -0.01 |
| Years worked firm | -0.00 | 0.01 | -0.00 | 0.01 | -0.00 | 0.01 | -0.00 | -0.00 | -0.00 |
| Years recruiting experience | 0.00 | -0.00 | -0.01 | 0.01 | 0.00 | 0.00 | -0.01 | -0.00 | -0.00 |

Table S4: Evaluation of candidates on a 0-10 scale. Model with interaction social background # school track

| | | |
|---|----------|---------|
| Gender: Female | (ref.) | |
| Male | -0.051 | (0.034) |
| Socioeconomic background: Swiss middle-class | (ref.) | |
| Swiss working-class | -0.066 | (0.105) |
| Foreign middle-class | -0.042 | (0.074) |
| Foreign working-class | 0.055 | (0.088) |
| Track: Low track | (ref.) | |
| Mid track | 0.294*** | (0.088) |
| High track | 0.546*** | (0.085) |
| Aptitude test score: Low (40p) | (ref.) | |
| Medium (50p) | 1.372*** | (0.040) |
| High (60p) | 1.579*** | (0.040) |
| French Grade: 4.0 (pass) | (ref.) | |
| 4.5 (satisfactory) | 0.476*** | (0.040) |
| 5.0 (good) | 0.782*** | (0.039) |
| Mathematics grade: 4.0 (pass) | (ref.) | |
| 4.5 (satisfactory) | 0.269*** | (0.039) |
| 5.0 (good) | 0.546*** | (0.040) |
| Extracurricular #1 : Handball | (ref.) | |
| Skateboard | 0.005 | (0.040) |
| Violin | 0.021 | (0.039) |
| Extracurricular #2 : None | (ref.) | |
| Theater | 0.158*** | (0.040) |
| Scout leader | 0.210*** | (0.039) |
| Apprenticeship type: 3 years (CFC) | (ref.) | |
| 2 years (AFP) | 0.115*** | (0.032) |
| Interaction Socioeconomic background: # school track | | |
| Swiss working-class # mid track | 0.062 | (0.153) |
| Swiss working-class # high track | 0.188 | (0.145) |
| Foreign middle-class # mid track | 0.080 | (0.108) |
| Foreign middle-class # high track | 0.088 | (0.106) |
| Foreign working-class # mid track | -0.070 | (0.128) |
| Foreign working-class # high track | 0.088 | (0.125) |
| Constant | 4.667*** | (0.091) |

| | | |
|-------------------------------------|------------|---------|
| Variance of respondents' intercepts | 1.646 | (0.092) |
| Variance of vignettes (residual) | 2.000 | (0.033) |
| N | 7877 | |
| aic | 29651.919 | |
| bic | 29833.183 | |
| ll | -14799.959 | |

Table S5: Heterogeneous effects. Evaluation of candidates on a 0-10 scale. Model with cross-level interaction between respondent's gender, socioeconomic background and school track

| | | |
|---|----------|---------|
| <i>Vignette person variables (applicant)</i> | | |
| Gender: Female | (ref.) | |
| Male | -0.047 | (0.036) |
| Socioeconomic background: Swiss middle-class | (ref.) | |
| Swiss working-class | 0.092 | (0.131) |
| Foreign middle-class | 0.100 | (0.091) |
| Foreign working-class | 0.277* | (0.110) |
| Track: Low track | (ref.) | |
| Mid track | 0.400*** | (0.110) |
| High track | 0.721*** | (0.105) |
| Aptitude test score: Low (40p) | (ref.) | |
| Medium (50p) | 1.353*** | (0.041) |
| High (60p) | 1.575*** | (0.041) |
| French Grade: 4.0 (pass) | (ref.) | |
| 4.5 (satisfactory) | 0.463*** | (0.041) |
| 5.0 (good) | 0.762*** | (0.041) |
| Mathematics grade: 4.0 (pass) | (ref.) | |
| 4.5 (satisfactory) | 0.281*** | (0.041) |
| 5.0 (good) | 0.553*** | (0.041) |
| Extracurricular #1 : Handball | (ref.) | |
| Skateboard | -0.000 | (0.041) |
| Violin | 0.025 | (0.041) |
| Extracurricular #2 : None | (ref.) | |
| Theater | 0.158*** | (0.041) |

| | | |
|--|----------|---------|
| Scout leader | 0.209*** | (0.041) |
| Apprenticeship type: 3 years (CFC) | (ref.) | |
| 2 years (AFP) | 0.124*** | (0.033) |
| Respondent level variables | | |
| Respondent's gender: Female | (ref.) | |
| Male | 0.169 | (0.166) |
| Respondent's age | -0.004 | (0.006) |
| Years of experience | 0.016* | (0.008) |
| Type of employer: Public | (ref.) | |
| Mixed private-public | 0.231 | (0.210) |
| Independent enterprise | -0.321** | (0.116) |
| Enterprise part of a franchise | -0.708* | (0.306) |
| Non-profit organisation | 0.211 | (0.216) |
| Other | 0.223 | (0.208) |
| Employer size: 1-9 employees | (ref.) | |
| 10-49 | -0.029 | (0.133) |
| 50-249 | 0.193 | (0.143) |
| More than 250 | 0.284 | (0.176) |
| 2-ways interactions | | |
| Interaction resp. gender# Socioeconomic background: | | |
| Male # Swiss working-class | -0.456* | (0.229) |
| Male # Foreign middle-class | -0.359* | (0.163) |
| Male # Foreign working-class | -0.607** | (0.197) |
| Interaction resp. gender# school track | | |
| Male # Mid track | -0.246 | (0.194) |
| Male # High track | -0.409* | (0.191) |
| Interaction Socioeconomic background #school track | | |
| Swiss working-class # Mid track | -0.160 | (0.190) |
| Swiss working-class # High track | 0.008 | (0.179) |
| Foreign middle-class # Mid track | -0.081 | (0.134) |
| Foreign middle-class # High track | -0.096 | (0.130) |
| Foreign working-class # Mid track | -0.215 | (0.160) |
| Foreign working-class # High track | -0.197 | (0.155) |

| | | |
|--|------------|----------|
| 3-way interaction | | |
| Resp. gender#social background#school track | | |
| Male # Swiss working-class # Mid track | 0.670* | (0.337) |
| Male # Swiss working-class # High track | 0.465 | (0.323) |
| Male # Foreign middle-class # Mid track | 0.456^ | (0.237) |
| Male # Foreign middle-class # High track | 0.490* | (0.236) |
| Male # Foreign working-class # Mid track | 0.397 | (0.285) |
| Male # Foreign working-class # High track | 0.770** | (0.278) |
| Constant | 4.559*** | (0.278) |
| Variance of respondents' intercepts | 1.569 | (0.0921) |
| Variance of vignettes (residual) | 2.000 | (0.034) |
| N | 7441 | |
| aic | 28030.414 | |
| bic | 28362.322 | |
| ll | -13967.207 | |

Standard errors in parentheses

^ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table S6: Qualitative interviews

| Interview No | Position | Date | Interviewers | Duration of interview |
|---------------------|---|--------------------|---------------------|------------------------------|
| 1 | HR Manager with responsibility for apprentices in a large public organization | May 25, 2016 | Author 1, Author 3 | 53 minutes |
| 2 | Head of the apprenticeship division, Cantonal government, Vaud | June 15, 2016 | Author 1, Author 3 | Approx. 1 hour |
| 3 | Trainer of apprentices in a large public organization | June 16, 2016 | Author 3 | 1 hour |
| 4 | Career advisor for youth starting upper secondary education | September 27, 2016 | Author 1, Author 3 | 47 minutes |

Table S7: Sectors of activity of the recruiters

| | Freq. | Percent |
|----------------------------|-------|---------|
| Public administration | 184 | 22.14 |
| Industry | 39 | 4.69 |
| Public transport | 5 | 0.60 |
| Wholesale and retail trade | 83 | 9.99 |
| Accounting and real estate | 80 | 9.63 |
| Banking | 21 | 2.53 |
| Private insurance | 28 | 3.37 |
| Other services | 189 | 22.74 |
| Other | 201 | 24.19 |
| Total | 830 | 100 |