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Differences in the labor market entry of second-generation immigrants and ethnic Danes

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Abstract

Our study is one of the first to take search friction and cross-firm differences in factor productivity into account when investigating firm behavior towards second-generation immigrants in Denmark. We ensure sub-sample homogeneity in search models by matching second-generation immigrants to their ethnic Danish twins according to parental characteristics and informal network quality. We find that second-generation immigrants with a high-school or primary school education, in particular females, perform as well or better than their ethnic counterparts. Second generation immigrants with vocational education, in particular males, face lower arrival rates when unemployed and higher layoff rates than those of their twins.

JEL classification: J15, J61, J71

Keywords: Firm behavior; Equilibrium search model; Matching; Second-generation immigrants

1 Introduction

A widely discussed issue in the literature on labor market integration is whether or not firms behave differently toward second-generation immigrants[1] than toward ethnic natives entering the labor market in European countries, given that second-generation immigrants are observed to have limited success in the labor market compared to ethnic natives in such countries. If differential behavior on the part of firms exists, it could potentially have a lasting economic impact on second-generation immigrants in terms of future wage growth and career prospects.

Differential behavior toward second-generation immigrants could potentially operate at various stages: in the pre-labor market, in the competition for an apprenticeship, during labor market entry, in wages paid for equivalent work, with opportunities for training, and in terms of involuntary separations.

In the traditional wage equation-based analysis of differential behavior toward minority groups, key labor market factors, such as the job-offer arrival rate and the layoff rate, are often not taken into account. Incorporating these explanations is difficult without a model of how each may contribute to the wage densities of individuals. Search models are particularly well suited for this task since they are easily adapted to include many of the behavioral features of interest here. According to search theory, wage dispersion is largely a consequence of search friction and cross-firm differences in productivity. It is possible that the job-finding rate and the job-retention rate are

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different for ethnic natives and second-generation immigrants, either because these two groups search through different channels, their networks differ in quality, they do not receive the same number of offers or they experience different layoff rates.

By estimating our models separately for matched samples of ethnic natives and second-generation immigrants, we gain new insight into whether observationally equivalent ethnic Danes and second-generation immigrants entering the labor market for the first time face differing labor market prospects.[2] Estimating equilibrium search models (ESMs) requires a rich longitudinal data set, including information about an individual's labor market history on a weekly or monthly basis. In contrast to many studies, we use register data containing the labor market histories of the population of immigrants in Denmark, which allows us to observe and estimate models for both second-generation immigrants and comparable ethnic Danes.

The paper is outlined as follows. Section 2 reviews the two strands in the migration literature. Section 3 looks at the theoretical and empirical search models. Section 4 introduces individual-level panel data and descriptive statistics. Section 5 presents the estimation results and Section 6 presents the conclusions.

2 Previous literature

The emergence of the second (in some cases higher) generation of immigrants[3] has led to a growing literature on the school-to-work transition and early labor market performance of these cohorts. We draw on two strands of literature in this area.

2.1 Existing literature on labor market performance on second & higher generation immigrants

Evidence from the 'old' immigrant-receiving countries (e.g. US, Canada, the UK, and Australia) in which the full age range of second-generation immigrants is observed shows that the second-generation overall appear to be doing almost as well in the labor market as their ethnic native counterparts (see e.g. Card (2005), Aydemir and Sweetman (2007), Miller and Chiswick (2007), Dustman et al. (2004)). In part this is due to the relatively high level of education of second-generation immigrants compared to ethnic natives in these countries (i.e. positive selection), with the exception of certain ethnic groups.

In continental Europe earlier generations of relatively educated guest workers and immigrants from other European countries are being replaced by refugees and asylum-seekers, who tend to have lower educational attainment and employability. Not surprisingly, the evidence from these settings shows second generation immigrants lagging substantially behind their ethnic native counterparts in terms of educational achievement and, in particular, labor force participation, success in finding a job and wages (Nielsen et al. (2003), Rooth and Eckberg (2003)).

A number of studies find that parental capital and family background are important for educational attainment and achievement of the second-generation immigrants (Ammermüller (2007), Rangvid (2007)) and even more so for their waiting time until the first job and the duration of their first job spell. Besides parental capital, the ethnic concentration in a neighborhood matters for immigrant integration. As extensively discussed in the classic papers by Chiswick and Miller (2005) and Borjas (1995), ethnic neighborhood concentration reduces immigrants' host country language skills, and

thereby, educational achievement and earnings, and are detrimental also due to their independent negative effects on earnings. Enclaves could have positive effects, however, in terms of lowering the costs of 'ethnic goods' and serving as important information networks.

In an attempt to take such differences into account Behrenz et al. (2007) construct matched comparison samples of ethnic natives and second-generation immigrants according to parents' socioeconomic background, age, occupational status, and county of residence. Results from probit employment models show that second-generation immigrant males and females face at least a 10 percentage point lower probability of having a job than do similar ethnic natives even after matching. The fact that native–second generation immigrant differences persist in Scandinavian countries even after taking parental and neighborhood networks into account have led some researchers to point instead to demand side factors and institutional explanations.

2.2 Existing literature on demand-side and institutional explanations

This literature includes economic models of ethnic discrimination in the labor market (see Becker (1957)) arising from either employer prejudice against workers of foreign descent or from employee unwillingness to work alongside coworkers of foreign origin. In a different view, the statistical discrimination or screening model (see e.g. Arrow (1972) and Phelps (1972)) explains the existence of labor market discrimination against ethnic minorities as cost-saving behavior on the part of employers, who use ethnicity as an effective sorting device when determining the (unknown) productive abilities of workers. The implication of both models is that individuals of foreign descent will be discriminated against in the labor market in terms of hiring, firing and remuneration. These individuals may even be given less training if employers perceive them to be less productive, which may reinforce statistical discrimination against them if, as a consequence of obtaining less training, their productivity suffers (Coate and Loury (1993)). Empirical investigations from different countries using different econometric models have found that even after controlling for age, education and other background characteristics, immigrants earn lower wages than ethnic natives (see e.g. Altonji and Blank (1999)). These unexplained differences are commonly attributed to selective screening by employers or discrimination.

In terms of institutions, a recent survey paper by Schröder (2010) focuses on the role of recruitment channels and other labor market institutions. Most jobs vacancies are filled through personal networks and informal recruitment channels, and there are differences in both the size and quality of the networks of ethnic natives and immigrants. Furthermore, institutions that pave the way from school to work, such as training or apprenticeship slots can foster and prolong labor market disadvantage. Colding (2005) finds a much higher dropout rate from vocational education in Denmark among children of immigrants (60% compared to 30% among ethnic natives), which is presumably due to the difficulties immigrant children face in finding an internship. Thus, if employers perceive immigrant children as being harder to train or more risky to employ in a setting where the wage for unskilled labor is given, this will result in higher unemployment for immigrant children compared to ethnic natives, even if their productivity is the same.

Given the evidence above on the importance of taking into account both individual and employer behavior, we describe below a methodological approach that can address these behaviors in a common framework.

2.3 The equilibrium search approach

Formally providing a structure for the workings of the demand side of the labor market and its institutions is the focus of equilibrium search models (ESMs) of the labor market.

We know of only a few attempts to apply an ESM to ethnic native-immigrant wage differentials and none to second generation immigrants. The most relevant are two unpublished paper by Bartolucci (2008) and Bowlus et al. (2013) both analyzing first generation immigrants. Bartolucci finds that immigrants are more productive than ethnic natives in similar jobs, are more mobile, but have lower bargaining power. Bowlus et al. conclude that immigrants take on average 13 years to acquire the native search parameters, using a version of the ESM used here allowing for different worker types in the same labor market.

3 The economic and empirical models

We start out briefly explaining the search model. We then discuss how the search model can be applied to analyze issues such as the possible discrimination of second-generation immigrants at the time of labor market entry.

3.1 The equilibrium search model (ESM)

Job search theory extends neoclassical theory by incorporating the notion that workers only have partial information about employment opportunities. Given this fact, employers have monopsony power in the sense that a higher wage relative to those offered by competing employers will attract more workers giving employers an incentive to differentiate wage policy, which implies wage dispersion. In the search model, differences in firm behavior are possible because of the presence of search friction, and this can explain the persistence of differences even over time, in contrast to the wage equation approach (Mortensen (2003)).

The first attempt to use an ESM to interpret wage differentials was made by Bowlus (1997). In her paper, Bowlus focused on the effect of gender differences in friction patterns on wage differentials. We are similarly interested in applying the search model to try to identify if and how labor market dynamics and friction explain ethnic native–immigrant entry wage and early career differences in Denmark.[4] We follow Bowlus et al. (2001) and base our analysis on the Burdett-Mortensen ESM (Burdett and Mortensen (1998)).

The Burdett-Mortensen general ESM characterizes the labor market as having two states (employment and unemployment) with on- and off-the-job searches and a job destruction process. Workers receive a wage offer while unemployed at rate $\lambda_u > 0$ and employed at rate $\lambda_e > 0$. Jobs are destroyed at rate σ. It is assumed that there are a continua of F firms and L workers in the labor market analyzed. We assume that workers base their decision to accept or decline employment solely on the basis of wage and that the decision is independent of whether they are ethnic natives or second-generation immigrants. Workers take the wage offer distribution of the firms as given

and solve the standard search utility maximization problem by adopting a state-dependent reservation wage strategy. Following Mortensen and Neumann (1988), a worker's reservation wage r while unemployed is

$$r = b + (\lambda_u - \lambda_e) \int_r^h \left(\frac{(1 - G(x_i))}{\lambda_e(1 - G(x_i)) + \sigma} \right) dx_i \qquad (1)$$

showing that the optimal reservation wage depends on market opportunities as summarized in the wage-offer distribution $G(w)$, the transition rates and supply-side factors. Lastly, h is the highest wage paid to the workers and b is unemployment benefit.[5]

Employers maximize profit by setting wages for the workers, taking reservation wages and wage offer distributions as given. The wages are chosen given the wage posting of the other firms and the search strategies of the workers. Profit maximization requires that employers of the same type earn the same profit in equilibrium. Our approach is to incorporate possible differential firm behavior by estimating structural parameters separately for second-generation immigrants and ethnic Danes rather than by relaxing the profit maximization condition. We allow firms to be heterogeneous in productivity by assuming that there are Q types of firms with productivity $P_1 < P_2 < P_3 < ... < P_Q$, i.e. discrete heterogeneity.[6] Each firm faces the following profit function:

$$\pi = (P - w) \qquad (2)$$

where prices have been normalized to one, the firm productivity is P and the wage for the worker is w.

In equilibrium, each employer maximizes profit given the search strategies of the workers and the wages offered by the other employers. At the same time, each worker searches sequentially from the wage offer distribution using an expected wealth maximizing stopping strategy. The market wage offer distribution $G(w)$ is thus determined endogenously as an equilibrium outcome in this model (for details, see Bunzel et al. (2001)). The explicit functional form of the cumulative density function (CDF) under discrete firm heterogeneity results in

$$G_j(w) = \frac{1 + z_e}{z_e} + \left(\frac{1 + z_e(1 - \alpha_{j-1})}{z_e} \sqrt{\frac{P_j - w}{P_j - r_j}} \right) \text{ for } w \in [r_j, h_j], \, j = 1, 2, ..., Q \text{ where } z_e = \frac{\lambda_e}{\sigma} \qquad (3)$$

where P_j is the productivity, α_j is the fraction of firms with productivity P_j or less, r_j is the lowest wage offered by a firm of type j, and h_j is the highest wage paid by these firms. To estimate the model, we use the methodology developed by Bowlus et al. (1995).

Overall, the ESMs are good for exploring wage variation, which is difficult to correlate with observables. However, it is less well suited for understanding the effect of variables that correlate with wages. Thus, it is important to compare groups that are similar in terms of wage-enhancing characteristics. Since the sample we examine only contains young individuals, and we estimate the model separately for males and females as well as for ethnic natives, Western, and non-Western second-generation immigrants, and we divide the sample into three educational levels (high school, vocational school and primary school), we believe that the subsamples are homogenous.[7] For the ethnic

natives, we furthermore estimate separate models for a matched sample with characteristics matching second-generation immigrants.

After estimation, we compare estimates across subsamples. If all the parameters are similar across two subsamples (i.e. natives and immigrants), then it is reasonable to assume that all workers in the two subsamples are in the same market, behave similarly and are treated equally. On the other hand, if some of the parameters are different across two subsamples, then we technically assume that a separate market exists for each of the two subgroups, and the homogenous search model applies to each market, and the degree of search friction will influence the degree of wage dispersion. For example, Nielsen et al. (2003) found significant differences in the job-finding rate and the duration of the first employment spell between ethnic natives and second-generation immigrants, differences that were partially explained by parental capital and neighborhood effects. These differences in job arrival and separation across ethnic natives and second-generation immigrants could reflect potential differences in firm behavior, and, thus, cannot be handled in traditional human capital wage regressions. Although hazard based transition reduced-form models also are able to estimate job and unemployment durations, they cannot simultaneously estimate the wage offer distribution. Thus, the added value of the ESM approach is the joint modelling of the wage distribution and the unemployment and job durations, including in particular that the job arrival rate is conditional on wages, however, at the cost of assuming separate markets and thus ruling out any spillovers and externalities between competing groups.

3.2 The ESM and network contributions

Recent research has shown that an individual's network contributes significantly to the job search process. In particular, individuals' successes or failures in the labor market are, to a large extent, influenced by the characteristics of the social networks in the local neighborhood. For example, Calvo-Armengol and Jackson (2004) show that individuals living close to a large number of employed neighbors are more likely to have jobs than are individuals living in areas with fewer employed neighbors. Furthermore, Arrow and Borzekowski (2004) show by way of simulations that differences in the number of ties workers have with firms can lead to substantial inequality and explain roughly 15% of the unexplained gap in wages and a substantial part of the disparity between black and white incomes in the US.

Pinkster (2009) uses the 'social isolation' hypothesis according to which individuals living in disadvantaged neighborhoods are cut off from good job opportunities primarily because most of their contacts (their neighbors) are also out of work and, thereby, unable to provide them with important information about jobs openings and employers. High employment among one's neighbors, on the other hand, can increase the chances of getting tips about openings, valuable information about employers and even recommendations. Furthermore, neighbors could directly assist with writing job applications or share their experiences with certain employers.

We believe that different search patterns among our groups might be a problem. This explanation has neither been captured in earlier wage regressions, employment regressions nor in duration models and this would not be captured in the ESM we use. If it is believed that second-generation immigrants behave differently in terms of the number

of jobs applied for, how they write their applications or how they prepare for the job interview, this difference will in the search model transform into differences in the arrival rates of offers and give biased results. The solution is either to extend the existing search model or use matching to ensure homogeneity. We follow the second approach.

Because of the difficulty in obtaining a direct measure of contacts, a key challenge in the literature is how to construct a measure of an individual's network. For our paper, this problem is even more complicated as we want to use the network variables in a matching analysis and, therefore, need to use variables that are comparable across ethnicity. We follow the previous literature and assume networks are geographic areas (see e.g. Topa (2001)). The data includes information on the postal code area in which the individual is residing. Based on this information, we construct a variable which we call 'postal code employment rate' defined as the percentage of individuals employed in the postal code area for each of 1,019 postal code areas. We thus follow Andersson et al. (2009) and use small homogenous areas in terms of population characteristics, economic status and living conditions, for making the assumption of conditional independence of contacts more plausible. We expect that the 'postal code employment rate' captures the relevant network effect for finding jobs. We furthermore control for differences in labor market abilities through ten variables to proxy parental capital: four dummy variables for the education level of each of the parents and two dummy variables indicating whether the father and mother, respectively, are employed.[8]

3.2.1 Matching

The goal of matching is to make the two groups, second-generation immigrants and ethnic Danes, comparable in every way except for immigrant status. To do this we ensure, as Behrenz et al. (2007) do that both groups have grown up under similar socioeconomic circumstances. Thus, we use matching to construct comparison samples of ethnic Danes according to their parents' socioeconomic background, employment status and education. Furthermore, own age and gender are also used to match on to properly compare entry into the labor market. For example, whether an individual enters the labor market before or after 18 years of age will have a large impact on the wage rate and, therefore, might also have an effect on the likelihood of finding employment.

We find the 'statistical ethnic Danish twins' of second-generation immigrants among the ethnic Dane population, with the same background who face similar labor markets, by using propensity score matching (Rosenbaum and Rubin (1983). Since the pool of ethnic Danes consists of the whole population, it is possible to use nearest neighbor without replacement as the matching method and get a good match. After matching, we test whether the two groups are balanced with respect to the covariates using equality of means in the treated and non-treated groups, which is similar to the standardized difference test used by, for example, Smith and Todd (2005).

4 Data and summary statistics

We select individuals immediately after they attain their highest educational degree—either primary school, high school, or vocational school—and follow them for two successive spells to examine entrance into the labor market.[9]

The data for individuals between 15 and 70 years old is maintained by Statistics Denmark and contains yearly information on education, age, country of origin, parents' education, etc. and weekly information about labor market status. Education attained prior to immigration (relevant for the immigrant parents) comes from a survey-based register and earnings data are obtained from the income tax registers deflated by the consumer price index, using 2000 as its base year.[10]

We exclude from the data three groups of individuals. First, we exclude individuals, who finish their education before 1996, because only children of guest workers from mainly Turkey were living in Denmark before that time. Secondly, we exclude individuals, who continue on to higher education immediately after high school and obtain a higher degree, mainly because the observed period is not long enough to allow this group of young individuals to find a job after a higher education. Lastly, we exclude first-generation immigrants to ensure similar educational background and host country language skills. The final data set consists of 404,527 graduates, 7,289 of which are second-generation immigrants and 393,197 of which are ethnic Danes.

4.1 Matching

In the sample analyzed, close to 2% of individuals are second-generation immigrants. Table 1 shows matching variables relating to parental background by ethnicity and gender (see notes to the table for column definitions). For each matching variable, we test for equality in means between the immigrant sample and its matched native group using a standard t-type test. The table shows that the fraction of fathers and mothers with a middle-range or higher education is lower for those from non-Western countries. After matching, however, the test cannot reject that these values are equal across the matched samples.

The employment rate for ethnic Danes is different for Western second-generation mothers, and non-Western second-generation fathers and mothers. But when matched, the parental employment rate in the ethnic Danish twin sample is at the same level as that for immigrant parents. Finally, to find ethnic Danish twin counterparts, we have also matched on individuals' own age within gender groups, and on the year their first spell starts.

Table 2 shows details for matching by network, which is the percentage of all individuals that are employed in a person's postal code area. The matching according to network quality across ethnicity has been done in intervals of 5 percentage points in the range 60%-85%. Before matching second-generation immigrants, especially of non-Western ethnicity, are substantially less likely to live in areas with more than 85% employment, making it an important factor to match on. After matching, the differences are evened-out in all instances, except for second-generation Western immigrants, who are still observed to a greater extent to be living in areas with less than 60% employment (difference only weakly significant).

To show the effect of matching on the wage distribution, we include Figure 1, showing the empirical distribution for males and females, respectively, before and after matching. The upper and lower left-hand side graphs present the empirical CDFs of wages from the first full-time job after graduation by ethnicity for females and males, respectively. For both genders, the CDF for ethnic Danes lies to the right of the CDF's

Table 1 Matching variables by ethnicity and gender

	Females					Males				
	Ethnic Danes			2nd-generation		Ethnic Danes			2nd-generation	
	All	West	Non-West	West	Non-West	All	West	Non-West	West	Non-West
Age	21.27	21.00	19.54	20.94	19.51	20.72	20.52	19.39	20.69	19.34
Test				0.25	0.40				-0.85	0.78
FATHER:										
High School	0.41	0.24	0.20	0.23	0.21	0.42	0.29	0.20	0.28	0.20
Test				0.28	-0.69				0.45	-0.09
Short-range	0.05	0.04	0.03	0.05	0.03	0.05	0.05	0.02	0.05	0.03
Test				-0.14	-0.31				0.40	-0.83
Middle-range	0.10	0.11	0.03	0.10	0.04	0.11	0.10	0.04	0.12	0.04
Test				0.19	-1.48				-0.94	-1.80
Long-range	0.06	0.12	0.02	0.13	0.02	0.06	0.08	0.02	0.08	0.03
Test				-0.55	-0.20				-0.32	-1.69
Employed	0.87	0.83	0.59	0.82	0.58	0.88	0.78	0.59	0.78	0.59
Test				0.40	0.75				0.14	0.03
MOTHER:										
High School	0.33	0.31	0.13	0.31	0.13	0.34	0.31	0.12	0.30	0.12
Test				0.06	-0.09				0.38	-0.19
Short-range	0.04	0.04	0.02	0.07	0.02	0.04	0.06	0.02	0.07	0.02
Test				-1.57	0.10				-0.58	-1.27
Middle-range	0.18	0.18	0.03	0.18	0.03	0.18	0.17	0.04	0.17	0.04
Test				-0.23	-0.62				0.08	-0.46
Long-range	0.03	0.06	0.01	0.07	0.01	0.03	0.04	0.01	0.07	0.01
Test				-0.99	-1.09				-2.36	-0.98
Employed	0.81	0.73	0.43	0.75	0.43	0.82	0.71	0.44	0.71	0.44
Test				-0.55	-0.20				-0.06	0.18
Year dum.	-	Yes	Yes	Yes	Yes	-	Yes	Yes	Yes	Yes

Note: The 3 groups for ethnic Danish females are All: all Ethnic Danes, West: Ethnic Danish twins matched to the second-generation Western females, Non-West: Ethnic Danish twins matched to the second-generation non-Western females. The 2 groups for 2nd-generation immigrants are West: second-generation immigrants with parents born in Western countries and Non-West: second-generation immigrants with parents born in non-Western countries. Test: test for equality of coefficient for ethnic Danish twins and their 2nd-generation comparable group. Source: Sample of young individuals, 1996-2003 (Statistics Denmark data).

of second-generation immigrants. The graphs confirm the findings in Tables 1 and 2, that after matching, most of the wage difference disappears, however, second-generation non-Western immigrants, in particular males, still have a lower wage. For second-generation Western immigrants, on the other hand, the CDF is now to the right of that of the ethnic Dane CDF for most of the distribution for females and in the lowest part for males.

4.2 Education level

Table 3 shows that the educational distribution (divided into primary school, traditional high school, business and technical high school, and vocational school[11]) varies significantly over ethnicity. For instance 31 percentage points more second generation Non-western male immigrants only have a primary school education and 26 percentage

Table 2 Matching variables by ethnicity and gender

	Females					Males				
	Ethnic Danes			2nd-generation		Ethnic Danes			2nd-generation	
	All	West	Non-West	West	Non-West	All	West	Non-West	West	Non-West
Postal area employment rate:										
<-60%	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.01
Test				-1.34	-0.68				-1.91	0.23
60-65%	0.00	0.01	0.03	0.01	0.03	0.00	0.01	0.03	0.01	0.04
Test				0.71	-0.98				-0.91	-2.06
65-70%	0.01	0.02	0.05	0.02	0.04	0.01	0.03	0.05	0.04	0.05
Test				0.63	0.56				-0.66	-0.82
70-75%	0.04	0.07	0.11	0.08	0.11	0.04	0.07	0.11	0.07	0.11
Test				-0.35	-0.78				0.23	-0.08
75-80%	0.20	0.26	0.29	0.26	0.28	0.18	0.27	0.28	0.27	0.28
Test				0.00	0.55				0.07	0.37
80-85%	0.39	0.39	0.34	0.40	0.34	0.39	0.36	0.35	0.35	0.34
Test				-0.18	0.31				0.18	0.61
85%->	0.35	0.24	0.19	0.24	0.19	0.37	0.26	0.17	0.25	0.17
Test				0.28	-0.09				0.46	0.20

Note: The 3 groups for ethnic Danish females are All: all Ethnic Danes, West: Ethnic Danish twins matched to the second-generation Western females, Non-West: Ethnic Danish twins matched to the second-generation non-Western females. The 2 groups for 2nd-generation immigrants are West: second-generation immigrants with parents born in Western countries and Non-West: second-generation immigrants with parents born in non-Western countries. Test: test for equality of coefficient for ethnic Danish twins and their 2nd-generation comparable group. Source: Sample of young individuals, 1996-2003 (Statistics Denmark data).

point less have a vocational education before matching. The native–immigrant differences are similar for females, although females in both groups are more educated than males. A lower share of females of all ethnicities has a vocational education, pointing to gender differences in occupational preferences. Before matching, there are clearly large differences between ethnic Danes and second-generation immigrants, for both genders. After matching on parental characteristics, network variables, and individuals' age and gender, the difference is still significant for all groups of second-generation non-
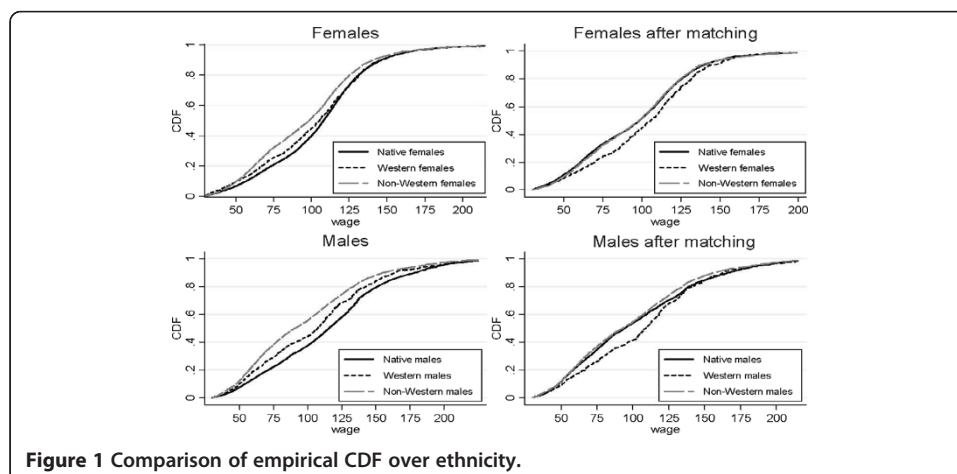

Figure 1 Comparison of empirical CDF over ethnicity.

Table 3 Education by ethnicity and gender

	Females					Males				
	Ethnic Danes			2nd-generation		Ethnic Danes			2nd-generation	
	All	West	Non-West	West	Non-West	All	West	Non-West	West	Non-West
Primary school	0.20	0.23	0.47	0.22	0.44	0.26	0.32	0.56	0.30	0.57
Test				0.26	2.54				0.63	-0.82
High school, regular	0.37	0.40	0.24	0.44	0.27	0.21	0.23	0.12	0.32	0.17
Test				-1.49	-2.24				-3.60	-5.61
Business & technical	0.08	0.07	0.06	0.11	0.10	0.11	0.12	0.07	0.12	0.10
Test				-2.36	-5.06				-0.27	-5.42
Vocational educ.	0.35	0.30	0.22	0.23	0.19	0.42	0.34	0.26	0.26	0.16
Test				2.94	2.70				3.06	9.57

Note: The 3 groups for ethnic Danish females are All: all Ethnic Danes, West: Ethnic Danish twins matched to the second-generation Western females, Non-West: Ethnic Danish twins matched to the second-generation non-Western females. The 2 groups for 2nd-generation immigrants are West: second-generation immigrants with parents born in Western countries and Non-West: second-generation immigrants with parents born in non-Western countries. Test: test for equality of coefficient for ethnic Danish twins and their 2nd-generation comparable group. Source: Sample of young individuals, 1996-2003 (Statistics Denmark data).

Western immigrants, except for males with primary school education. For second-generation Western immigrants, only primary school completion for males and females and business or technical high school completion for males is not significantly different from that of the ethnic Danish twin. This finding is similar to what other studies in Europe have found, i.e. that there is a positive selection of second-generation Western immigrants. Because of these differences in educational attainment, we estimate separate search models for matched individuals given three educational levels—less than high school, vocational education, and high school.

4.3 Main variables in the ESM

Next we examine the means for the variables used in the equilibrium search model, shown in Table 4. Overall, the analysis of means shows that labor market history seems to play a smaller role for females than it does for males in terms of explaining the differences in wages, as it is only for vocational education where ethnic Danes appear to do better. A wage disadvantage for immigrant females does in general not exist as we see that non-Western immigrant females appear to have the highest average yearly income for primary school education and Western immigrants for vocational education. However, these observations are based purely on means, and not on empirical analysis such as through the ESM. A search model will help us in understanding if differences in, for instance, spell length can explain the difference in wages across ethnicity.

For males, for all three groups yearly income is higher for ethnic Danes. When examining the average spell length there seems to be a relation between the two for individuals with only either primary school education or vocational education – this is especially evident in terms of employment spells. However, since many of the differences are still present after matching, it indicates that more can be learned by estimating an ESM.

Table 4 Means for the main variables in the search model

	Females					Males				
	Ethnic Danes			2nd-generation		Ethnic Danes			2nd-generation	
	All	**West**	**Non-West**	**West**	**Non-West**	**All**	**West**	**Non-West**	**West**	**Non-West**
Primary school	38611	124	1327	124	1327	51462	180	1769	180	1769
Duration, emp.	8.41	7.51	8.27	9.44	9.34	9.89	*9.71*	*8.72*	8.17	8.01
Test to all				-1.09	-12.07				3.52	46.33
Test to matched				-1.44	-7.83				1.49	7.44
Dur. unemp.	9.67	10.94	10.41	5.84	8.41	7.43	5.3	7.67	6.43	7.16
Test to all				4.3	4.44				1	1.75
Test to matched				1.05	3.44				-0.79	1.82
Yearly income	37006	33355	31685	31435	43378	53246	*51579*	45257	36006	*45930*
Test to all				0	0				0	0
Test to matched				0	0				0	0
High school	88884	306	1108	306	1108	63052	262	843	262	843
Duration, emp.	8.34	8.26	8.06	8.43	9.24	9.06	*8.89*	8.73	8.26	*9.09*
Test to all				-0.37	-8.25				0.84	-0.38
Test to matched				-0.31	-6.5				0.84	-1.41
Dur. unemp.	5.44	4.36	6.37	5.75	5.34	4.57	*3.43*	5.05	4.18	*4.54*
Test to all				-0.29	1.11				-2.13	-5.88
Test to matched				-0.98	4.1				-2.13	2.4
Yearly income	78488	75904	75467	76613	64914	87422	86081	81395	73678	78139
Test to all				0	0.01				0	0
Test to matched				0	0				0	0

Table 4 Means for the main variables in the search model *(Continued)*

Vocational educ	68895	127	589	127	589	82293	152	500	152	500
Duration, emp.	14.5	13.18	11.64	13.72	10.99	12.71	13.2	*11.45*	*13.34*	9.64
Test to all				0.38	9.92				-0.04	*1.95*
Test to matched				-0.12	0.91				-0.04	2.7
Dur. unemp.	4.54	5.75	4.63	4.14	5.79	3.21	*3.5*	*4.35*	4.26	5.21
Test to all				1.42	-7.37				-1.21	-3.3
Test to matched				1.53	-3.99				-1.21	-1.39
Yearly income	151681	149201	147114	156608	132160	189467	192604	184311	185585	156928
Test to all				0	0				0	0
Test to matched				0	0				0	0

Note: The 3 groups for ethnic Danish females are All: all Ethnic Danes, West: Ethnic Danish twins matched to the second-generation Western females, Non-West: Ethnic Danish twins matched to the second-generation non-Western females. The 2 groups for 2nd-generation immigrants are West: second-generation immigrants with parents born in Western countries and Non-West: second-generation immigrants with parents born in non-Western countries. Test: test for equality of coefficient for ethnic Danish twins and their 2nd-generation comparable group. Source: Sample of young individuals, 1996-2003 (Statistics Denmark data).

5 Results

In the following sections, we examine ESM results for the different subgroups subdivided into three education levels.[12] An examination of the fit of the model to the data aids in determining how well it explains the empirical CDFs. Figure 2 shows the empirical and estimated CDFs of the wages from the first full-time job after graduation by ethnicity for females and males before matching. For all six subsamples, the largest part of the estimated CDF fits the empirical CDF very well. When the number of homogenous firm groups (Q) is increased above five in the ESM, the model fits the empirical distribution even in the tails but the conclusions remain the same, which is why we only report the results for the ESM with five homogenous firm groups here.

5.1 Heterogeneous ESM models

5.1.1. Comparison by gender

The estimation results of the heterogeneous ESM are presented in Tables 5 and 6 for females and males respectively. Focusing on the level of the transition rates and comparing across gender, males receive more offers when unemployed, but they receive slightly fewer offers when employed (except in the case of vocational education), and they are laid off at a slightly lower rate than females. For both females and males, irrespective of ethnicity, jobs tend to lead to another job rather than to unemployment ($\lambda_e < \sigma$).

For each of the three parameters shown, we report a test of the equality of the coefficients for ethnic Danes in general compared to second-generation immigrants with Western or non-Western ethnicity, respectively (designated test (to All) in the table). We also report a test of equality of the coefficients between second-generation immigrants and their ethnic Danish twins (designated test (to 'twins') in the table). The tables also report the *P*-values for a Wald-type test of the joint equality of all three coefficients, which is calculated using the full covariance matrix. To interpret the parameter estimates, note that for an unemployed ethnic Danish female (male) with a high school degree, the probability of receiving and accepting an offer within three months
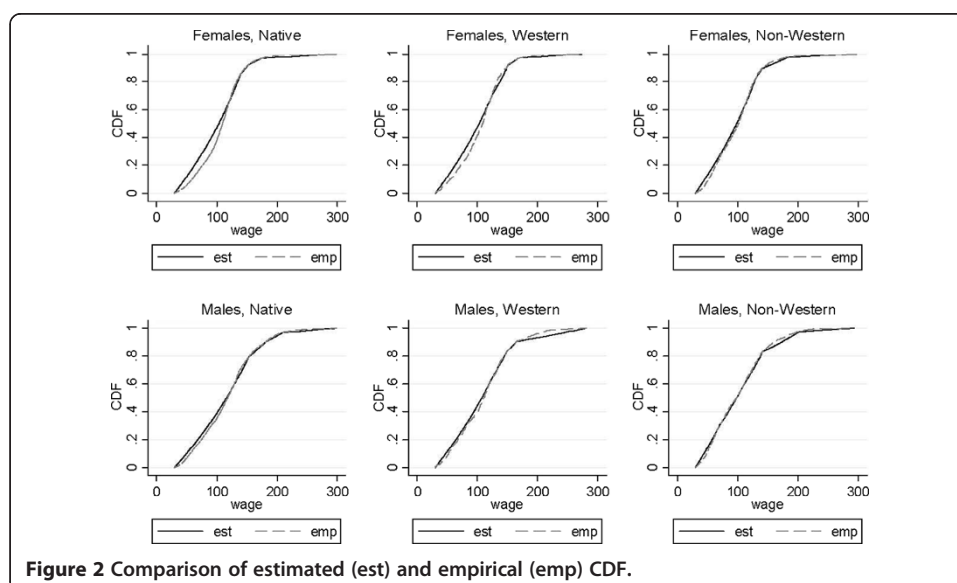

Figure 2 Comparison of estimated (est) and empirical (emp) CDF.

Table 5 Heterogeneous ESM for females across education levels

High school	Ethnic Danes			2nd-generation	
	All	**West**	**Non-West**	**West**	**Non-West**
Sample size	8888	306	1107	306	1107
Arrival rate of jobs,	0.1851	0.1731	0.1277	0.1516	0.1486
When unemp. (λ_u)	(0.0033)	(0.0165)	(0.0057)	(0.0136)	(0.0072)
Test (to 'twins')				1.0040	-2.2846
Test (to All)				2.3898	4.6304
Arrival rate of jobs,	0.1349	0.1262	0.1338	0.1324	0.1144
When emp. (λ_e)	(0.0015)	(0.0078)	(0.0045)	(0.0082)	(0.0039)
Test (to 'twins')				-0.5481	3.2541
Test (to All)				0.3100	4.9029
Layoff rate	0.0473	0.0459	0.0494	0.0471	0.0470
When emp. (σ)	(0.0005)	(0.0028)	(0.0016)	(0.0029)	(0.0016)
Test (to 'twins')				-0.3073	1.0369
Test (to All)				0.0443	0.1598
Average productivity	183.01	180.36	176.29	172.09	192.76
Joint Wald test statistic				1.59	17.97

Vocational	Ethnic Danes			2nd-generation	
	All	**West**	**Non-West**	**West**	**Non-West**
Sample size	6890	127	589	127	589
Arrival rate of jobs,	0.1396	0.1310	0.1282	0.1252	0.1029
When unemp. (λ_u)	(0.0024)	(0.0164)	(0.0076)	(0.0161)	(0.0057)
Test (to 'twins')				0.2487	2.6580
Test (to All)				0.8817	5.8909
Arrival rate of jobs,	0.0581	0.0640	0.0729	0.0742	0.0761
When emp. (λ_e)	(0.0009)	(0.0079)	(0.0040)	(0.0081)	(0.0045)
Test (to 'twins')				-0.8994	-0.5243
Test (to All)				-1.9714	-3.8970
Layoff rate	0.0403	0.0494	0.0481	0.0407	0.0553
When emp. (σ)	(0.0005)	(0.0047)	(0.0021)	(0.0039)	(0.0025)
Test (to 'twins')				1.4195	-2.2042
Test (to All)				-0.1125	-5.9531
Average productivity	240.11	235.69	234.61	218.95	242.26
Joint Wald test statistic				4.14	16.66

Primary shool	Ethnic Danes			2nd-generation	
	All	**West**	**Non-West**	**West**	**Non-West**
Sample size	3861	124	1327	124	1327
Arrival rate of jobs,	0.1040	0.1226	0.0847	0.1432	0.1189
When unemp. (λ_u)	(0.0024)	(0.0157)	(0.0031)	(0.0219)	(0.0048)
Test (to 'twins')				-0.7649	-5.9750
Test (to All)				-1.7766	-2.7698
Arrival rate of jobs,	0.0952	0.1031	0.0996	0.0870	0.0848
When emp. (λ_e)	(0.0019)	(0.0114)	(0.0038)	(0.0097)	(0.0030)
Test (to 'twins')				1.0768	3.0513
Test (to All)				0.8276	2.9204

Table 5 Heterogeneous ESM for females across education levels (Continued)

Layoff rate	0.0510	0.0524	0.0588	0.0426	0.0499
When emp. (σ)	(0.0009)	(0.0054)	(0.0019)	(0.0046)	(0.0015)
Test (to 'twins')				1.3929	3.6480
Test (to All)				1.8187	0.6272
Average productivity	170.52	140.71	175.95	133.86	179.84
Joint Wald test statistic				3.87	72.48

Note: see notes to Table 1. The number of homogenous firm groups is 5 in all estimations. Standard errors are in parentheses. Test (to 'twin'): t-type test for equality of coefficients of ethnic Danish twins and second-generation immigrants. Test (to All): t-type test for equality of coefficients of ethnic Danes and second-generation immigrants. Joint Wald test statistic: test for joint equality of all coefficients of Ethnic Danish twins and second-generation immigrants.

of unemployment is 43% (48%), whereas it is 84% (88%) within 10 months of unemployment.[13] Likewise, the probability of receiving a new offer within 3 months of employment is 21% (32%) for ethnic Danish females (males).[14] Finally, the parameters imply that the probability of being laid off for an ethnic Danish female (male) with a high school degree is 13% (12%) within 3 months of employment.

5.1.2 Comparison across education and ethnicity, females

Comparing the arrival rate of jobs when unemployed for females entering the labor market after finishing high school, both second-generation Western and non-Western females receive fewer offers than ethnic Danes. Second-generation non-Western females have the lowest arrival rate, but not when one compares them to their ethnic Danish twins, in which case it is reversed. For the arrival rates of jobs when employed, though, high-school educated females with non-Western background have a lower arrival rate than ethnic Danes have even when compared to their ethnic Danish twins. However, all groups have similar layoff rates.

Second-generation Western females with a vocational education are again indistinguishable overall from their ethnic Danish twins, while second-generation non-Western females have a significantly lower arrival rate when unemployed than the other two groups have. Yet, non-Western females have the highest arrival rate when employed, although this is only significantly different from the arrival rates of ethnic natives.

Comparing the arrival rate of jobs when unemployed for females entering the labor market after finishing primary school, both Western and non-Western females receive more offers than ethnic Danes do, both in general and when compared with ethnic Danish twins. Second-generation Western females have the highest arrival rate. For the arrival rate of jobs when employed, however, ethnic Danish females have the highest arrival rate. The same pattern is found for the layoff rate, meaning that ethnic Danes are more likely to be laid off.

5.1.3. Comparison across education and ethnicity, males

Table 6 shows similar results for males. For ethnic Danish males finishing high school, the arrival rate of jobs when unemployed is not significantly different than that for second-generation Western males although it is higher than that for second-generation non-Western males. The arrival rate when employed is highest for second-generation Western males, although their layoff rate is also the highest. In general, after matching, second-generation males with a high school degree seem just as valuable to employers

Table 6 Heterogeneous ESM for males across education levels

High school	Ethnic Danes			2nd-generation	
	All	West	Non-West	West	Non-West
Sample size	6305	262	834	262	834
Arrival rate of jobs,	0.2160	0.1703	0.1641	0.2190	0.1765
When unemp. (λ_u)	(0.0049)	(0.0179)	(0.0091)	(0.0224)	(0.0099)
Test (to 'twins')				-1.6983	-0.9185
Test (to All)				-0.1291	3.5856
Arrival rate of jobs,	0.1157	0.0978	0.1123	0.1294	0.1025
When emp. (λ_e)	(0.0015)	(0.0068)	(0.0044)	(0.0084)	(0.0041)
Test (to 'twins')				-2.9296	1.6388
Test (to All)				-1.6026	3.0300
Layoff rate	0.0442	0.0411	0.0476	0.0512	0.0504
When emp. (σ)	(0.0006)	(0.0028)	(0.0018)	(0.0034)	(0.0019)
Test (to 'twins')				-2.3241	-1.0716
Test (to All)				-2.0497	-3.1325
Average productivity	200.85	195.02	207.12	193.82	203.43
Joint Wald test stat				11.65	6.21

Vocational	Ethnic Danes			2nd-generation	
	All	West	Non-West	West	Non-West
Sample size	8229	152	499	152	499
Arrival rate of jobs,	0.2084	0.1954	0.1950	0.1474	0.1282
When unemp. (λ_u)	(0.0037)	(0.0252)	(0.0136)	(0.0179)	(0.0076)
Test (to 'twins')				1.5545	4.2775
Test (to All)				3.3381	9.4443
Arrival rate of jobs,	0.0787	0.0832	0.0847	0.0749	0.0863
When emp. (λ_e)	(0.0010)	(0.0079)	(0.0045)	(0.0076)	(0.0054)
Test (to 'twins')				0.7613	-0.2298
Test (to All)				0.5022	-1.3861
Layoff rate	0.0386	0.0460	0.0407	0.0425	0.0619
When emp. (σ)	(0.0004)	(0.0039)	(0.0020)	(0.0037)	(0.0030)
Test (to 'twins')				0.6593	-5.9415
Test (to All)				-1.0668	-7.7600
Average productivity	245.77	254.32	239.68	244.19	249.74
Joint Wald test stat				2.84	71.99

Primary school	Ethnic Danes			2nd-generation	
	All	West	Non-West	West	Non-West
Sample size	5146	180	1769	180	1769
Arrival rate of jobs,	0.1267	0.1126	0.1047	0.1391	0.1342
When unemp. (λ_u)	(0.0028)	(0.0130)	(0.0035)	(0.0152)	(0.0047)
Test (to 'twins')				-1.3189	-5.0626
Test (to All)				-0.7969	-1.3743
Arrival rate of jobs,	0.0794	0.0758	0.0866	0.0731	0.0953
When emp. (λ_e)	(0.0013)	(0.0076)	(0.0027)	(0.0082)	(0.0029)
Test (to 'twins')				0.2427	-2.1714
Test (to All)				0.7566	-4.9590

Table 6 Heterogeneous ESM for males across education levels *(Continued)*

Layoff rate	0.0400	0.0435	0.0525	0.0613	0.0584
When emp. (σ)	(0.0006)	(0.0038)	(0.0014)	(0.0054)	(0.0015)
Test (to 'twins')				-2.6936	-2.8121
Test (to All)				-3.9043	-11.0291
Average productivity	166.5867	158.859	178.4932	193.0557	194.2319
Joint Wald test stat				9.14	28.92

See notes to Table 5.

as their ethnic Danish twins are, and in fact, second-generation Western males with this type of educational background get more job offers.

For males with a vocational education, the pattern is the same as it is for those with a high school education, but mostly with somewhat lower rates. The crucial differences, as mentioned before, are a significantly lower offer arrival rate when unemployed and a much higher layoff rate (1.5 times higher) for second-generation non-Western males.

In the group of males with a primary school education, 26% are ethnic Danes, 30% are second-generation Western males, and an astonishing 57% are second-generation non-Western males. As with females, second-generation males have a higher arrival rate when unemployed than ethnic Danes and ethnic Danish twins. In contrast to females, second-generation non-Western males have a higher arrival rate when employed than ethnic Danes and ethnic Danish twins, but this does not hold for second-generation Western males. The layoff rate is lowest for ethnic Danes followed by the ethnic Danish twins and highest for second-generation Western males, and the differences between both groups of male immigrants and the ethnic Danes are significant.

5.2 The importance of network in the analysis

In Denmark, especially in the largest cities, such as Copenhagen, Aarhus and Odense, a majority of immigrants are residentially segregated either through self-selection or because Danish immigrant housing policies, in place between 1986 and 1999, have placed immigrants in the same areas. Immigrants placed in the same city sections by the government often ended up in areas with a high unemployment rate among ethnic Danes (Damm (2009)). For this reason, we include the characteristics of the network in our matching procedure. As a robustness check, however, we exclude the network variables in the matching procedure and re-estimate the ESM for the different subsamples.

Having estimated the models, we test the hypothesis that network has a significant effect, and find because of the small samples and, hence, large standard errors, the hypothesis is most often rejected. However, if we examine the rates with and without network in the matching procedure, the differences are relatively large. For males, in most cases, network has a negative effect on the arrival rate of jobs, both while being unemployed and employed, meaning that the likelihood of finding a job is lower when you match on network. For females ethnic Danish twin network mostly affects those with a vocational education. For these workers, matching on network has a negative effect while they are unemployed. Comparing across ethnicity, the results are very clear when including network in the matching analysis. In particular, the arrival rate of jobs

for the ethnic Danish twins is lower, indicating that living in an area with a high un-employment rate has negative effects.[15]

6 Conclusion

Second-generation immigrants are typically observed to have limited labor market success compared to ethnic natives in high wage, high labor cost regimes. A widely discussed question is whether firms behave differently toward second-generation immigrants entering the labor market in these countries in terms of hiring and firing decisions.

Our study is one of the first to take search friction and cross-firm differences in factor productivity into account when investigating firm behavior towards second-generation immigrants. Because the background of second-generation immigrants might differ from those of ethnic Danes, even though all have been raised in Denmark, we use the matching method to control for socioeconomic circumstances.

Before matching, there is a big difference between the parental characteristics of second-generation immigrants and ethnic Danes, but after matching most of these differences disappear. Regarding networks, on average ethnic Danes tend to live in areas with higher average employment than second-generation immigrants do. However, here too, the differences even out after matching. Based on the descriptive analysis of the data, we make some important observations. First, the employment rate is lower for second-generation immigrants for both males and females, independent of their parents' country of origin. Furthermore, a considerably lower share of second-generation immigrants have vocational education compared to that of ethnic Danes, while a considerably higher share of second-generation immigrants have primary school education only compared to that of ethnic Danes.

Finally, from the search model, we uncover several key results. First of all, the estimated wage offer distribution which is the key ingredient of the equilibrium search model fits rather well the empirical distribution for all sub-groups confirming the predictive power of the approach. Our study shows that the differences in transition rates across ethnicity and education for females are small after matching, so that second-generation females, both of Western and non-Western origin, do as well or even better compared to their ethnic Danish twins. For second generation non-Western females the results after matching are a bit mixed, though firms seem to prefer hiring and retaining the high-school and primary-school educated non-Western females over their ethnic Danish twins but they also receive fewer offers as employed. Second generation non-Western females face difficulties getting a vocational education, and the few who do seem to experience trouble getting into the labor market after completing their education, perhaps due to the existence of hiring discrimination. However, once they manage to get a job, they get as many offers as ethnic Danes get, although they still tend to be laid off at a higher rate.

For males, matching makes a bigger difference to the results. Second-generation males with high-school or primary school education have a higher arrival rate of jobs both while unemployed and employed compared to that of their ethnic Danish twins, but have more trouble keeping their jobs. For the new male entrants with vocational education ethnic Danes perform significantly better than second generation immigrants do in terms of higher arrival rates when unemployed and lower layoff rates. Thus, even

with their degree in hand, second-generation immigrant males with vocational education seem not to be able to make the right contacts early on in the vocational education program, i.e. getting the right apprenticeships or internships. At the same time, they have higher average productivity parameters than do their ethnic Danish twins and second-generation Western males. This tends to discredit the job volatility/unmeasured skill explanation of higher layoff rates of second-generation non-Western males, and points instead to the existence of other, possibly preference-based explanations i.e. discrimination.

A positive finding from our study is that employers in Denmark seem to have reacted to recent labor market initiatives to enhance integration by hiring qualified new entrants from the immigrant community, especially second-generation immigrants with a high school degree whose arrival rates out of unemployment and layoff rates are not substantially different from those of their ethnic Danish twins. Policymakers now need to give Danish employers offering jobs requiring vocational qualifications greater incentives to hire and retain young second-generation immigrants, in particular males of non-Western origin, as our results indicate that this group faces possible discrimination related to both hiring and layoff.

Endnotes

[1]Second-generation immigrants: Individuals born in Denmark with both parents born outside Denmark. Ethnic Danes: Individuals with Danish-born parent(s).

[2]Observationally equivalent ethnic Danes (labeled Ethnic Danish 'twin'): An ethnic Dane with similar background characteristics as a second-generation immigrant, found by using matching (see Section 4.2).

[3]In Denmark, the second generation is still rather young: 75% were under age 15 in 2006 (Leibig (2007)).

[4]The search model has also been used to discuss race wage differentials in the US (see Bowlus and Seitz (2000) and Bowlus et al. (2001)).

[5]For simplicity of exposition, workers and employers are assumed not to discount the future (see Burdett and Mortensen (1998)).

[6]Several papers have shown that the inconsistency between the empirical and theoretical wage distributions can be reconciled if firms are heterogeneous in productivity. We follow Bowlus et al. (1995) where heterogeneity can be viewed as arising from a finite number of firm types i.e. a discrete distribution.

[7]Western second-generation immigrants: Children of immigrants from Western countries. The definition of Western and non-Western countries is taken from Statistic Denmark's homepage: http://www.dst.dk/Vejviser/dokumentation/hvadbetyder.aspx?keyword=vestligelande. Western countries include EU, Andorra, Australia, Canada, Iceland, Liechtenstein, Monaco, New Zealand, Norway, San Marino, Switzerland, USA and the Vatican. All other countries are considered non-Western. In earlier work, we have estimated the ESM model for the non-Western second-generation group separately by Asian and African ethnicity (available on request).

[8]We include these parents in the basic group containing individuals with a primary education or lower. If information on the parents' employment status is missing, which happens for 3% of parents, the dummy variable takes the value zero (i.e. not employed).

Parental information is missing if either both parents are dead or they have emigrated from Denmark. We could have deleted the individuals for whom parental information is missing. However, since we only use this information for matching purposes, we retain them, rather than introduce potential non-randomness.

[9]Primary school, vocational school or high-school degrees make up nearly 60% of the highest educational degree obtained by age 30 in 2012 in Denmark (Statistics Denmark).

[10]The wage information reported needs to be handled with care: Some individuals have an hourly wage rate outside the acceptable range, which is set between 30 and 300 DKK—1% of the wages are above and 3% are below. About 4% of the wages are missing. These cases have been deleted from the sample. To check that this does not affect our results, we used regression imputation for the 8% of the observations using yearly wage, ethnicity, education and employment. Using the full sample does not change any of the results notably.

[11]If an individual holds a high school degree and has also taken vocational education, the one obtained last is reported here.

[12]OLS estimates of the wage and employment equations show that for second-generation Western males, their wages would, in fact, exceed those of ethnic Danes by 1.7% if they had the same parental background, neighborhood conditions and educational profile as ethnic Danes. For the three other ethnic groups, there is still a negative penalty of 2.3% to 8.2%. These wage differences are economically significant in a welfare-state country such as Denmark where the income distribution tends to be relatively more compressed. Furthermore, if lower starting wages feedback into a lowered work effort or a shorter career, large differences in lifetime income can result. In terms of the probability of obtaining employment, second-generation immigrants have a 2.7% to 5.6% lower likelihood.

[13]These probabilities are calculated as $F(t) = 1 - exp(-\lambda_u t)$.

[14]These probabilities are calculated as $F(t) = 1 - exp(-h_e t)$, where $h_e(t) = (\sigma + \lambda_e)\left(\sqrt{\frac{P-w}{P-r}}\right) - \sigma$.

[15]Results available on request.

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