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AN EQUILIBRIUM SEARCH MODEL OF THE LABOR MARKET ENTRY OF SECOND-GENERATION IMMIGRANTS AND ETHNIC DANES

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ABSTRACT

Using a search model for Danish labor market entrants, we are one of the first studies to test whether second-generation immigrants have the same job-offer arrival and layoff rates as ethnic Danes have. We contribute to the search literature by incorporating matching as a way to ensure sub-sample homogeneity. Thus, we match second-generation immigrants to their ethnic Danish twins on the basis of parental characteristics and informal network quality. There are big differences before matching, but after matching, second-generation immigrants perform as well or better than their ethnic Dane counterparts do on the labor market, though not with respect to layoffs. This result is mainly driven by the group of high school graduates and those with a primary school education only. Second generation immigrants with vocational education, males in particular, face both significantly lower arrival rates when unemployed and significantly higher layoff rates than those of their ethnic Danish 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 than toward ethnic natives entering the labor market in European countries, given that second-generation immigrants—those born in the country of immigration —are observed to have limited success in the labor market compared to ethnic natives in such countries. If differential behavior among firms exists, it could potentially have a lasting economic impact on second-generation immigrants.[1] Even though the major source of income for many of these individuals may not be own wages, discrimination restricting access to the labor market can have serious consequences for future wage growth and career prospects.

Differential behavior toward second-generation immigrants could potentially operate at various stages and in various ways: 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 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.

Because the equilibrium search approach incorporates both firm and worker behavior and allows for wage dispersion, it augments the existing human capital-based models on assimilation and discrimination found in the migration literature that typically do not address these elements. Furthermore, 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

[1] Second-generation immigrants: Individuals born in Denmark with parents born outside Denmark. Ethnic Danes: Individuals with Danish parents.

differing labor market prospects.[2] Estimating equilibrium search models (ESMs), however, 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 on immigration to Denmark, which allows us to observe and estimate models for second-generation immigrants and comparable ethnic Danes.

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

2 PREVIOUS LITERATURE

The early literature on immigration focused on wage differences between ethnic natives and newly arrived immigrants in Europe, i.e. the first generation. In the time since then, the second and later generations of immigrants have appeared, though in Denmark, the second generation is still rather young: 75% were under age 15 in 2006 (Leibig (2007)). The emergence of this second generation has led to a growing literature on labor market integration of these cohorts. Given the young age of these children, though, researchers have mainly observed their school-to-work transition and their early labor market performance. We draw on two strands of literature that have developed in this area.

2.1 EXISTING LITERATURE ON LABOR MARKET ASSIMILATION OF IMMIGRANTS

There is a large international literature on the theories of first-generation immigrant assimilation as well as a growing literature on second-generation immigrants. This literature includes the classical models and discussions by Borjas and Chiswick from the 1980s and 1990s (Chiswick (1978), Chiswick (1980), Borjas (1985), and Borjas (1994)). The basic finding for first-generation immigrants was that the wage gap declines with the duration of stay in the host country (Chiswick, Le & Miller (2008), Borjas (1999)). For Denmark, Nielsen, Rosholm, Smith & Husted (2004) found that the wage gap between ethnic natives and first-generation immigrants is attributable almost entirely to a lack of qualifications and incomplete assimilation. The second-generation immigrants, however, have grown up and been educated in the host country and have the requisite language skills. Indeed, evidence from the 'old' immigrant-receiving countries, such as the US, Canada, the UK, and Australia, in which the full age range of second-generation immigrants can be observed, shows that the second-generation of immigrants overall appear to be doing almost as well in the

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

labor market as their ethnic native counterparts are doing (see e.g. Card (2005), Aydemir & Sweetman (2007), Miller & Chiswick (2007), Dustman, Fabbri, Preston & Wadsworth (2004)). This may be in part 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 that exists on the educational attainment and labor market status of the second generation immigrants in Europe shows that they lag 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, Rosholm, Smith & Husted (2003), Rooth & Eckberg (2003)).

A number of studies have mapped out the intergenerational transmission mechanisms from the first to the second-generation immigrants (Bauer & Riphahn (2007), Gang & Zimmerman (2000)). These studies find that intergenerational parental capital, such as parental education and host country working experience, is of primary importance in this context although there is substantial heterogeneity across population groups and by ethnicity. Parental capital is important for educational attainment of the second-generation immigrants 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 is an important factor and matters for immigrant integration. As extensively discussed in the classic paper by Chiswick & Miller (2005), ethnic neighborhood concentration reduces immigrants' host country language skills and thereby earnings, and are detrimental also due to the separate negative effects of ethnic concentration on earnings. Enclaves could have positive effects, however, in terms of lowering the costs of 'ethnic goods' and serving as important information networks.

Living in an ethnically concentrated neighborhood may affect school quality due to ethnic segregation, which is intensified by ethnic native flight from public schools in such areas. In Nielsen et al. (2003), it is shown that even when second-generation immigrants have the same length of education as ethnic natives, the returns to education are somewhat lower for second-generation immigrants than they are for ethnic natives. The explanation is that the type and quality of education obtained by second-generation immigrants is inferior to that of their ethnic native counterparts. Recent research on immigrant children's achievement as measured by their performance relative to ethnic natives on the PISA test finds that family background is important in explaining the under-achievement of second-generation immigrants (Ammermüller

(2007), Rangvid (2007)), but neighborhood quality, ethnic concentration in schools, and peer quality are also important factors (Borjas (1995), Schnepf (2007), Entorf & Lauk (2008)).

In an attempt to take such differences into account, Behrenz, Hammarstedt & Maansson (2007) construct matched comparison samples of ethnic natives and second-generation immigrants according to parents' socioeconomic background, age, occupational status, and county of residence, all standardized to values observed in 1970 for both groups of parents. This controls for socio-economic circumstances when making their comparisons. Their results show that second-generation immigrant males from Southern Europe and non-European countries have about a 10% lower probability of having a job than do similar ethnic natives, whereas second-generation females experience a greater disadvantage, even after matching on parental capital and residential location. 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. A resulting comprehensive survey of the labor market integration of immigrants in Denmark concluded that taking all into account, "lack of access to networks, informational asymmetries or selective hiring" seem to account for the inadequate results achieved by the second-generation immigrants (Leibig (2007)). We look next at the existing literature offering demand-side and institutional explanations.

2.2 Existing literature on demand-side and institutional explanations

The literature offering demand-side explanations includes economic models of discrimination (see Becker (1957)) that envision ethnic discrimination in the labor market arising from either employer prejudice against workers of foreign descent or from employee unwillingness to work alongside coworkers of foreign origin. Seen from 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, particularly as ethnicity may convey some information about averages group productivity. 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 relative to that of ethnic natives (Coate & Loury (1993)). Discrimination of either type—preference-based or statistical—would be stronger for descendants of immigrants from Africa or Asia than for immigrants descended from Nordic or Western regions,

whether for perceived productivity reasons or due to their greater ethnic distance from ethnic natives.

In terms of the empirical evidence in this area, a number of studies 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 do (see e.g. Altonji & Blank (1999)). These unexplained differences are commonly attributed to selective screening by employers or discrimination.

As unexplained differences in wage or employment regressions cannot be regarded purely as 'discrimination', researchers have started using methods that can more directly reveal the existence of labor market discrimination against ethnic minorities. Laboratory experiments or field experiments involving either situation testing or correspondence testing establish that employers treat job applicants from minority groups unequally even when minorities' qualification profiles identically match those of ethnic natives (see e.g. Hjarnø & Jensen (1997), Ahmed (2004), Riach & Rich (2002), and Taran (2008).[3]

In terms of institutions, a recent survey paper by Schröder (2010) focuses on, for instance, the role of recruitment channels and other labor market institutions that may unintentionally foster and prolong the problems that immigrant children, both those born in the host country and those who emigrated with their parents, face when making the transition from school to work. 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, to understand how institutions affect labor market disadvantages of immigrant children, we must look at the institutions that pave the way from school to work, such as training or apprenticeship slots. 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. After the first 20 weeks in a program, an apprenticeship contract must be signed with an employer in order to be able to continue in the program.[4] 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

[3] A critique of these methods is that, when all observed differences are controlled for, idiosyncratic differences become even more salient for the purposes of tie-breaking, and such characteristics may vary systematically by ethnicity (Heckman (1998)). On the other hand, recent field experiment shows that negative implicit associations toward minorities held by recruiters significantly impact their hiring decision (Rooth (2010)).

[4] Since 2006, however, the system has been reformed so that practical experience is now integrated throughout the program.

compared to ethnic natives, even if their productivity is the same. A relevant question which Schröder raised in this context is whether administrators of labor market programs and caseworkers stereotype immigrant children as belonging to a problem group and, therefore, tend to place them in less productive settings and less challenging jobs, which would weaken their incentives to remain in the labor market.

Given the wealth of 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 ESMs of the labor market. While experiments, correspondence tests, and field audit studies provide direct and often very compelling evidence of discrimination, they are costly to undertake and have weak power because of small sample sizes. Often, the testers are drawn from a very restricted segment of the population as are the sampled firms, and, therefore, results do not always carry over to other groups of workers or to the labor market as a whole. On the other hand, typical wage equation analysis ignores key features of the working of labor markets, such as the rate at which individuals receive job offers and the rate at which firms lay workers off.

We know of only one previous attempt to apply an ESM to ethnic native-immigrant wage differentials. An unpublished paper by Bartolucci (2008) estimates an ESM using matched employer-employee data for Germany investigating the extent to which wage differences between immigrants and ethnic natives arise due to differences in ability, differences in job search patterns or to discrimination. Bartolucci finds that immigrants are more productive than ethnic natives in similar jobs, are more mobile, but have lower bargaining power, which would mean that, in spite of having positive wage differentials, they are discriminated against. He does not distinguish, however, between immigrant generations, age, gender or the country of origin, all of which are important for making the groups of workers as homogenous as possible, a necessity in the search model. In terms of data, Bartolucci studies only a subsample of the German workforce, four private sectors, when estimating productivity differences. Thus, he assumes that immigrants and ethnic natives are equally distributed across sectors. Moreover the public sector, which is quite large in Germany, as it is in most North European countries, is not included even though it is a growing employer of immigrant labor. Furthermore, both firm and worker data come from a survey in which participation is voluntary, and this introduces selection bias. To account for the very heterogeneous group of workers in his sample, he includes heterogeneity in worker ability as

an exogenous ability distribution in the search model. In addition to the data problems above, Bartolucci also focuses only on the job arrival rate when already employed. Hence, his study fails to take into consideration that unemployment spells can partly explain the difference in wage distribution across ethnicity.

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)

The problem with Mincer-type equations is that they, in essence, describe a labor market without friction. However, once friction is introduced into the model, the relationship between observable worker characteristics and wages is no longer clear. Furthermore, wage differentials across groups are only one dimension, and we need to also take into account differences in the job-finding rate as well as job duration differentials. While a large literature estimating differentials in job-finding and job-retention rates across groups has convincingly established a significant role of friction in wages, much less empirical evidence is available on how much differences in friction patterns can contribute to the wage gap.

Unlike the wage equation, the search model is able to explain wage differences caused by labor market dynamics and friction. For example, it may be the case that second-generation immigrants and ethnic natives have differential job-offer arrival rates either because they search through different channels or behave differently. In addition, second-generation immigrants and ethnic natives may have different layoff rates. This implies that ethnic natives and second-generation immigrants tend to have different rates of career progression even though they receive offers with the same wage distribution. Differences due to behavior can be explained by the search model applied here. Differences in search channels and the quality of job networks are handled by matching, which we return to in the next section.

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. This contrasts with 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. The search model has also been used to discuss race wage differentials in the US (see Bowlus & Seitz (2000) and Bowlus, Kiefer & Neumann (2001)). We follow Bowlus et al. (2001) and base our analysis on the Burdett-Mortensen ESM (Burdett & 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 $\lambda_e > 0$. It is expected that $\lambda_u > \lambda_e$, implying that the reservation wage exceeds the unemployment benefit since the unemployed have a higher contact frequency than employed workers do. 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. For potential employees, jobs have many characteristics, including wages, hours, benefits, working conditions, and collegiality of co-workers and supervisors. To make the model simpler and to fit with the available data, it is assumed that workers base their decision to accept or decline employment solely on wage. In the same way, it is assumed that unemployed workers use only the unemployment benefit net of search costs to form their reservation wage, without taking into account leisure or other pros and cons of not having a job. Alternatively, the utility-of-unemployment parameter b can be interpreted as reflecting both search costs and utility of leisure. With respect to both employment and unemployment, we assume that workers' decisions are independent of whether the workers are ethnic natives or second-generation immigrants, i.e. both are assumed to maximize income. 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. Thus, each individual has a reservation wage, r, which for an unemployed person is the level at which he or she is indifferent between being unemployed and employed. An unemployed person accepts a job offer of wage w if the utility from the offer is higher than the utility from the unemployment benefit b. Workers are homogenous with a common value of nonmarket time. We maintain this assumption when comparing young second-generation immigrants and ethnic Danes, because there is no a priori reason why young second-generation immigrants may have a higher or lower value of nonmarket time than their counterpart ethnic Danes. Following Mortensen & 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.[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. That is, for second-generation immigrant jobs, firms concern themselves only with the behavioral patterns of, and the outside competition for, second-generation immigrant workers when setting wage policy for these jobs. It is likewise for ethnic native jobs. Hence, firms that are equally productive can offer different wages as long as profits of firms within the group are equal in equilibrium. This is consistent with assuming that firms have a linear productivity technology with constant returns to scale and, thus, that the profit functions are additive in worker types.[6] Firms differ according to productivity, and we assume that there are *Q* types of firms with productivity $P_1 < P_2 < P_3 < \ldots < P_Q$, i.e. discrete heterogeneity.[7] Each firm faces the following profit function:

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

[6] The search model used does not capture entry and exit of firms. However, in the short run the equilibrium prevails when there is no time for firms to enter or exit. In the long run the failure to control for entry and exit of firms can be argued to be a problem since differential behavior of firms towards, say second-generation immigrants, can lead such firms to be driven out of business if non-discriminating firms reap profits at their expense. However, as long as markets are not perfectly competitive, i.e. wages do not adjust freely downwards, as is the case in high-wage, high-labor cost markets, differential behavior of firms towards ethnic natives and second generation immigrant workers could persist even in the long run.

[7] Several papers have shown that the inconsistency between the empirical and theoretical wage distributions can be reconciled if firms are heterogeneous in productivity. Heterogeneity in firm productivity can be introduced in two ways. Following Bontemps et al (2000) one could assume productivity is continuously distributed. Alternatively, following Bowlus et al (1995) heterogeneity can be viewed as arising from a finite number of firm types i.e. a discrete distribution. Either approach can fit the wage offer distribution, but there are advantages and disadvantages of the approaches in other respects. A disadvantage of assuming a continuum of firm types is that the assumption creates a one-to-one mapping between productivity and wages, because of the competition faced on either side by any one firm. This assumption rules out the possibility of wage dispersion within firm types. On the other hand, an advantage of this kind of firm heterogeneity is that the estimation problem becomes standard. The advantage of modeling heterogeneity discretely is that it allows for some flexibility in the shape of the wage offer distribution because the key model element of search induced wage dispersion is retained. A disadvantage is that discrete heterogeneity results in a likelihood function that is discontinuous in some of the parameters and estimation is therefore non-standard. We find the advantages of the discrete specification compelling, and therefore pursue the discrete heterogeneity approach here.

$$\pi = (P - w), \tag{2}$$

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. Given the wages offered by all other employers and the distribution of workers' reservation wages, the labor force available to a specific employer evolves in response to the employer's wage. The higher the wage, the larger the steady-state labor force, because higher wage firms attract more workers from, and lose fewer workers to, other employers. Workers are able by way of their on-the-job search to draw higher wages from the wage offer distribution, and, therefore, the steady-state earnings distribution lies to the right of the wage offer distribution *G(w)* (see e.g. Bowlus & Seitz (2000)). Immigrants in particular may have trouble locating 'good' jobs because of the channels of information they use (Mahuteau & Junankar (2007)) or because of less challenging assignments made by caseworkers (Schröder (2010)). The market wage offer distribution *G(w)* is determined endogenously as an equilibrium outcome in this model (for details, see Bunzel, Christensen, Jensen, Kiefer, Korsholm, Muus, Neumann & Rosholm (2001) and Mortensen (1990)). The explicit functional form of the cumulative density function (CDF) under discrete firm heterogeneity results in

$$G_j(w) = \frac{1+z_e}{z_e} + \left(\frac{1+z_e(1-\alpha_{j-1})}{z_e}\sqrt{\frac{P_j-w}{P_j-r_j}}\right) for\ w \in [r_j, h_j], j = 1,2,\dots,Q \tag{3}$$

where P_j is the productivity, $z_e = \frac{\lambda_e}{\sigma}$ is the standardized arrival rate for employers, 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. The model implies the following restrictions: $r_1 = r$ and $G(r_1)=0$, $h_j = r_{j+1}$ and $G(h_j)= \alpha_j$, $j =1,\dots,Q-1$ and $G(h_Q)=1$. These can be used to derive the relation between the productivity level, the wage boundaries and the transition rates for the employed,

$$P_j = \frac{h_j-\theta^2 r_j}{1-\theta^2}, where\ \theta = \frac{1+z_e(1-\alpha_j)}{1+z_e(1-\alpha_{j-1})} \tag{4}$$

Note that the highest wage will always be lower than productivity, $h<P$, which confirms that all firms have monopsony power. As the equation for $G_j(w)$ implies, the wage offer distribution is continuous, upward sloping and convex between adjacent reservation wage rates for the different homogenous groups of firms.

In the model, workers are assumed to be homogenous. 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 second-generation immigrants, and non-Western second-generation immigrants, and in some models, we divide up the sample into three educational levels (high school, vocational school and primary school), we believe that the subsamples are homogenous.[8] We will further use a matching procedure to make sure that the sample across ethnicity is relatively homogenous. We estimate the model separately for second-generation immigrants and ethnic natives. For the ethnic natives, we furthermore estimate separate models for the matched sample with characteristics matching second-generation immigrants, and for all ethnic natives. To interpret the results, it is then important to specify the technical assumption about which workers operate in the same market, and which are in separate markets. Thus, after estimation, we compare estimates across subsamples. If all the parameters are similar across two subsamples, then it is reasonable to assume that all workers in the two subsamples are in the same market and behave similarly. The fact that we have chosen to estimate the subsamples separately only means that each of the two estimates for the wage distribution etc. is inefficient. This can be repaired by a subsequent final estimation where the two subsamples are merged, and common parameters estimated, now efficiently, using the full market for the two groups. The initial splitting of the two groups simply served to test that they were similar. 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. The interpretation is that there are wage offers that are specifically directed toward individuals in this group. In practice, it may be difficult to see that two markets (in the terminology of the search model) operate alongside one another, but there are many examples in the literature showing that wage offers can differ by worker characteristics. The alternative route, not pursued here, when parameter estimates differ across subsamples, would be to change the model to allow for different types of workers (with different search behavior) operating in the same market (see e.g. Bowlus & Eckstein (IER, 2002). We follow Burdett and Mortensen and consider the submarkets to consist of homogenous workers. With this interpretation, once different estimates have been obtained for separate subsamples, then the full sample estimates, are strictly speaking, no longer valid, since they do not pertain to a homogenous sample. Similarly to the above mentioned studies Bowlus (1997), Bowlus & Seitz (2000), and Bowlus et al. (2001), we will compare behavioral patterns across the samples. If all workers are treated the same, the behavioral parameters will be identical, assuming that the groups being compared have the same marginal product. However, if labor market dynamics and frictions are different across second-generation

[8] 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=v

immigrants and ethnic natives, then the behavioral parameters will be different. 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.

To estimate the Burdett & Mortensen (1998) model, we use the methodology developed by Bowlus, Kiefer & Neumann (1995). The random variables are unemployment duration, job duration, job destination, accepted wages and earned wages. Fortunately, the distributions of all of these variables are known from the model. The structural parameters to be estimated in our models are $\phi=(\lambda_u, \lambda_e, \sigma, P, b)$. For the construction of the likelihood function, see Appendix 2 in Kromann (2009). We will just note that Christensen & Kiefer (1997) prove that the minimal data set that permits identification of all structural parameters consists of a panel where at least some of the individuals are observed with unemployment duration, reemployment wage and subsequent jobs. Thus, to be able to identify the parameters of interest, our individual-level panel data must contain information on a spell of unemployment, the wage received on the job found, and the length of time spent at that job. Since all this information is available in our data, all our parameters are identified separately.

3.2 USING THE ESM FOR ANALYZING IMMIGRANT BEHAVIOR

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 to prevent findings associated with differences in productivity or differences in search behavior (self-selection).

First of all, regarding productivity, the recent study by Bartolucci (2008) finds that immigrants are more productive than ethnic natives in similar jobs, and this is so even though he pools first and second-generation immigrants together.[9]

Second, even though differences in search behavior were not mentioned in any of the search

[9] If the case were the same in Denmark, then if our findings showed that second-generation immigrants had a lower wage, the gap would even be greater than what we find because second-generation immigrants should be paid more as they are more productive. Bartolucci uses both a search model and a production function (using firm data) to examine the difference in productivity across ethnicity in Germany, a country that has received immigrants of similar background and characteristics as those in Denmark (see Liebig (2007) for the latter fact). This study shows that immigrants in Denmark do not have worse qualifications relative to immigrants in other European countries. In fact, immigrants in Denmark appear to be overrepresented at both end of the educational spectrum, and in contrast to many other European countries, a relatively large share holds a tertiary level education.

papers we reviewed, different search patterns among our groups might be a problem. This explanation has not been captured in earlier wage regressions, employment regressions or 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 transform in the search model into differences in the arrival rates of offers. Hence, in order to assume that ethnic natives and second generation immigrant workers are similar in terms of labor market abilities, we need to restrict the sample to be strictly homogenous.

In this paper, we propose to deal with this issue using the method of matching, matching on parental capital and the quality of one's employment network. We select these two factors precisely because previous research has shown that parental capital and neighborhood effects are important determinants of the differences between the job-finding rate and the duration of the first employment spell of second-generation immigrants in Denmark (Nielsen et al. (2003)). Ideally, we should also match on grades and the proportion of one's compulsory school class being immigrants to control for exposure to Danish language and type of peers. Unfortunately, this data is not available to us.

The variables used to proxy parental capital are measured by 10 variables: 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. If information on a parent's educational level is missing, which happens for 10% of the fathers and 5% of the mothers, we include these parents in the basic group containing individuals with a primary education or lower.[10] As far as we know, networks have not been implemented within the kind of search model that is used in this paper. We could, therefore, either extend the existing search model or include network variables in the matching analysis so that the neighborhood of the ethnic Danish twins resembles that of the second-generation immigrants.[11] We follow the second approach and use the employment rate in the neighborhood a person lives in during the first spell observed as a matching variable. The choice of network variable and the matching method used are discussed in more detail below.

[10] If information on the parents' employment status is missing, which happens for 3% of parents, the dummy variable takes the value zero. The reason for missing parental information is either that both parents are dead or that 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. Furthermore, there is always a risk when deleting observations as that might make the sample non-random.

[11] Ethnic Danish twin: An ethnic Dane with similar background characteristics as a second-generation immigrant, found by using matching (see section 4.2).

3.2.1 NETWORKS

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 (Allard & Danziger (2003), Andersson (2004), Arrow & Borzekowski (2004), Clark & Drinkwater (2002), Holloway & Mulherin (2004), van der Klaauw & van Ours (2003), Musterd & Andersson (2006), Musterd, Ostendorf & de Vos (2003), Reingold, van Ryzin & Ronda (2001), and Calvo-Armengol & Jackson (2004)). For this reason, these effects should be taken into consideration. For example, Calvo-Armengol & 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. Thus, the more employed contacts an individual has, the more likely the individual will learn about new job openings. Furthermore, Arrow & 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 income earned among blacks and whites in the US.

A network is usually defined as a web of interconnected people who directly or indirectly interact with each other daily (see e.g. Andersson, Burgess & Lane (2009)). Neighbors may exert important social influences on individuals. For instance, living in a neighborhood where the majority is unemployed may influence residents' work ethics negatively. Pinkster (2009) explains this by 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. However, neighborhood influences can work in the other direction as well. High employment among one's neighbors 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 (see Pinkster (2009)).

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 difficult as we want to use the network variables in a matching analysis and, therefore, need to use variables that are comparable across ethnicity. Previous literature most commonly uses geographic areas or ethnicity in defining networks (see e.g. Topa (2001)). We follow this literature and assume networks are geographic areas. The data includes information on the postal code area in which the individual is residing during each year during the whole observation period.

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 1019 postal code areas. Thus, whereas previously geographical areas have often been defined as metropolitan areas that are large and heterogeneous, we follow Andersson et al. (2009) and use much smaller geographical areas for the purpose of ensuring that they are similar in terms of population characteristics, economic status and living conditions. The main reason for doing this is to make 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.

Regarding networks and ethnicity, the papers of Borjas (1992) and Borjas (1995) are among the first to assume that networks are based on ethnic similarity instead of geography. In essence, Borjas (1992) uses mean outcomes in the ethnic group of parents to measure network, referred to as ethnic capital. However, since we use the network in a matching approach, this would not be possible. As a second best, we instead match on parents' characteristics, such as education and employment status. It should be noted that for Denmark, a recent study shows that both the ethnic composition and the quality of an immigrant enclave affect the labor market outcomes of refugees (Damm (2009)). Therefore, we would like also to incorporate ethnicity in our network definition, as Andersson et al. (2009) do; however, we are only able to do this indirectly, by including parental characteristics in addition.

One possibility would be to create an 'exposure index'(see Borjas (1999), Nielsen et al. (2003)), defined as the proportion of immigrants with a certain ethnicity in the area divided by the corresponding proportion in Denmark as a whole, and the employment rate for individuals of that ethnicity in the area. However, it is not possible to match either of the two variables onto ethnic natives because the employment rate is considerably lower for second-generation immigrants compared to that of ethnic natives and, for the obvious reason, that ethnic natives are the majority in most of the postal code areas. Although networks are uniformly important for promoting careers, low-educated workers working in unskilled or low-skilled jobs tend to use more informal job search strategies (see Pinkster (2009)). As second-generation immigrants are more likely than ethnic natives to work in these jobs, informal networks might be more important on average for them. In our analysis, we will match on the network variables and assume that matched ethnic natives and second-generation immigrants have similar informal search levels. In particular, by matching on the quality of the network, the ethnic Danish twins and the second-generation immigrants should have similar access to job information and referrals. This is especially so because we also employ the level of education of parents and whether or not they are employed as additional matching variables.

3.2.2 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. do (2007) 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 genders 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.

In the matching literature, the differentiating variable (here, immigrant status) is considered the 'treatment' variable, and it is assumed that all relevant differences for the outcome between the control (ethnic Danes) and treatment (second generation immigrant) groups are captured by their observed characteristics (conditional independence). This means that conditioning on observables, *X*, both observed and unobserved differences between the treatment and control group are eliminated, in essence simulating random assignment. Accordingly, we select our ethnic Dane counterparts from the pool of non-treated so that they are as similar as possible to second-generation immigrants in terms of their observed characteristics. If the number of covariates, *X*, is large, it is difficult to match on each characteristic, thereby lowering the chances of finding an exact match. A way to circumvent this curse of dimensionality is to match according to the estimated probability of treatment or propensity score (Rosenbaum & Rubin (1983)). 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. 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 & Todd (2005).

We considered also matching on individual characteristics, but since differential treatment can occur already in pre-labor market institutions, this would lead to an underestimate of possible discrimination. However, we have estimated the search model separately on samples of high school, vocational school and primary school graduates to learn whether there are any differences in the results when ethnic Danes and second-generation immigrants have the same education.

4 DATA AND SUMMARY STATISTICS

The data used in this study is individual-level data maintained by Statistics Denmark. The data contain yearly information on education, age, country of origin, parents' education, earnings, etc. This has been merged with a longitudinal data set that, on a weekly basis, records separately spells of employment, unemployment and absence from the labor force. If a change in employer occurs, that information is also registered.

Employment status is taken from the labor force registers; demographic characteristics (country of origin, gender, age, municipality of residence, date of immigration) are from the population registers; and Danish education is from the integrated pupil registers. Education attained prior to immigration (relevant for the immigrant parents) comes from a survey-based register. The individual records are linked using a unique person identifier. Because individuals are linked to their family members, it is possible to identify fathers and mothers of these young individuals. Earnings data are obtained from the income tax registers deflated by the consumer price index, which uses 2000 as its base year. The earnings information is used to construct an hourly wage by taking the worker's annual earnings and dividing it by a measure of annual hours employed derived from the employer's contributions to the ATP pension scheme.[12] 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.[13]

In our ESM, we examine the wage from the first job after graduation from the highest educational level attained—either primary school, high school or vocational school, following Bowlus (1997). Thus, the wage used is defined on the basis of the wage information from the register data in the year the first spell started. We are aware of the shortcoming of not having the wage for each separate spell, but only a yearly wage rate.. However, the yearly information of the wage rate is the measure currently available to researchers. The data report on all individuals between 15 and 70 years of age living in Denmark for the period 1980-2007.[14] Labor market history, however, is only available for 1985-2003. We select individuals immediately after they attain their highest educational degree—either primary school, high school, or vocational school—and follow them for two spells to examine entrance into the labor market. In practice, this

[12] Employer contributions to the ATP is a step-wise function of the extent of employment measured as weekly hours intervals, for example, 0-9, 10-19, 20-29, etc..

[13] 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.

[14] For the main analysis we only use data on individuals younger than 35, but for the calculation of the percentage of individuals that is employed in a person's postal code area used in matching we use the full sample.

means finding the spell when they finish studying and then following them over two successive spells[15].

We exclude from the data three groups of individuals. First individuals, who finish their education before 1996, which is done because the group of second-generation immigrants is almost non-existent before 1996 – only children of guest workers from mainly Turkey were living in Denmark before that time. Secondly, individuals, who continue on to higher education immediately after high school (and who do not drop out of education and thus actually obtain a higher degree) were deleted 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 in order to, first, ensure similar educational background for all the included young individuals in our sample and, second, not to run into problems with individuals not having the requisite host country language skills. As a result of the above exclusions, the final data set consists of 404,527 graduates, 7,289 of which are second-generation immigrants and 393,197 are ethnic Danes.

For the search model, we record the duration of the spells of employment and unemployment, the wage, and the duration of a subsequent spell, along with the destination, i.e. information on whether the job ended in a layoff or a voluntary separation for employed spells. A layoff is defined as a transition from employment to unemployment, whereas a voluntary separation (resignation) is defined as a transition from employment to employment. Finally, we observe whether a spell is censored.[16]

4.1 Preliminary analyses

In Table 1, we estimate OLS wage and employment equations to be able to validate the basic findings from our sample. The wage equations include age, gender and ethnicity dummies, parental education, parental employment and network quality variables, and individuals' own completed education. For second-generation Western males, we see that 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 have.

This finding is similar to that of Nielsen et al. (2003) who find that education is the single most important factor explaining wage differences between ethnic Danes and second-generation

[15] 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).

[16] We adopt the definition of labor market states as suggested by Statistics Denmark, i.e. our measure of unemployment consists of both states of unemployment and participation in active labor market programs (ALMPs). While this approach may be considered problematic, it is a useful approximation to make when institutional differences more than individual behavioral differences across countries influence transitions between these states. As previous research has shown, the distinction between these two states is not always clear-cut and can be regarded as opposite ends of a continuum of job search intensity (Jones & Riddell (1999) and Jones & Riddell (2002)).

immigrants, in particular males. For the three other ethnic groups, there is still a negative penalty of 2.3% to 8.2%, even after controlling for parental capital, network quality and own education. Although these wage differences may not seem as much as in other countries, they are economically significant since income distribution tends to be relatively more compressed in welfare-state countries, such as Denmark. Furthermore, if lower starting wages for the second-generation immigrants feed back into a lowered work effort or a shorter career, large differences in lifetime income can result.

The wages of ethnic native or second-generation non-Western females are 9% less than those of ethnic-native males, even when we only consider graduates from recent cohorts who finished their education after 1996. The regression accounts for 32% of the variation. However, the area employment rate is not significant. Thus, even controlling for parental capital, network quality and own education leaves around 70%, of the difference in wages unexplained.

In terms of the probability of obtaining employment, Table 1 shows that second-generation immigrants have a 2.7% to 5.6% lower likelihood of obtaining employment. Although not shown here, including own education actually makes the penalty larger, especially for second-generation non-Western immigrants. Thus, education seems to have contradictory effects, and one explanation could be, as found by Nielsen et al. (2003), that educated second-generation females do not appear to earn any returns on their education since their post-education working experience is very limited. The network variable is positive and highly significantly associated with the probability of obtaining a job, and the effect increases continuously, starting with a 4% higher probability of finding a job if one lives in a postal area with an employment rate between 65% to 70%, and rises to a nearly 15% increase in the likelihood of becoming employed if ones lives in a postal area with greater than 85% employment. These wage and employment regressions confirm the importance of matching according to parental capital and neighborhood quality when examining the entry of workers into the labor market. Own education is also extremely important and is taken into account when we estimate heterogeneous effects in the ESM by completed educational type.

4.2 MATCHING

In the sample analyzed, close to 2% of individuals are second-generation immigrants. We furthermore divide the group into second-generation Western immigrants (designated 2nd-generation West in the tables) and second-generation non-Western immigrants (designated 2nd-generation Non-West in the tables). Since the group of second-generation immigrants is expected to be significantly different from the group of ethnic Danes, different samples of ethnic Danes have been constructed using one-to-one matching. We create matched samples of ethnic

Danes and second-generation immigrants taking into account parental characteristics (to capture favorable as well as unfavorable parental capital) as well as individuals' own network characteristics. The matched ethnic Danes are further classified as to whether they match a second-generation Western immigrant (designated Ethnic Danes West in the tables) or whether they match a second-generation non-Western immigrant (designated Ethnic Danes Non-West in the tables). Tables 2 and 3 show the matching variables by gender for second-generation immigrants and ethnic Danes. For parents, four dummy variables are added, one for each parent, measuring their highest degree obtained, plus an indicator for whether or not they are employed at the time observed. Furthermore, we include one measure of individuals' network quality: the employment rate in a person's narrow geographic area (postal code). As explained earlier, this network variable should capture whether people live in an area where their closest network consists of mostly employed individuals or not.

Table 2 shows that the education distribution for fathers varies across ethnicity.[17] A larger share of the fathers of second-generation immigrants has only primary education, and this is especially true for individuals coming from non-Western countries. This is not shown in the table since we do not match on this variable directly as it also includes the individuals with missing information on education, as mentioned earlier (10% of fathers and 5% of mothers). For fathers with high school degrees, a similar pattern is observed, however, in reverse, i.e. the percentage of fathers who completed high school is higher for ethnic Danes than it is for second-generation immigrants. This difference disappears after matching. Generally the fraction of fathers and mothers with a middle-range or higher education is lower when they are from non-Western countries. After matching, however, the test cannot reject that these values are equal across the matched samples. For short-range education, there is a larger share of mothers with this type of degree among those arriving from Western countries. Also, when looking at fathers and mothers from Western countries, we see that more of them have a long-ranging education. Thus, trying to match on the parent who obtained the higher education is possible to do quite precisely for the non-Western second-generation immigrant sample, but less successful for the Western second-generation immigrant sample for the short- or long-range educational type.

Another variable used in matching is a dummy for whether the parent is employed or not.

[17] Table 2 has 10 columns. The first 5 columns include the samples for females: "Ethnic Danes all" consists of all ethnic Danish females in the sample, Ethnic Danish West consists of one-to-one matches of ethnic Danes to second-generation Western immigrants, Ethnic Danish Non-West consists of one-to-one matches of ethnic Danes to second-generation non-Western immigrants, 2nd-generation West consists of second-generation Western females, and 2nd-generation Non-West consists of second-generation non-Western females. The second group of 5 columns includes similar information for males. For each of the matching variables, we test for equality in means between the immigrant sample and its matched native group using a standard t-type test.

Here, the employment rate is similar for ethnic Danes and Western second-generation immigrant fathers, but different for Western second-generation mothers, though the difference vanishes when matched. For the fathers and mothers of second-generation immigrants from non-Western countries, there is a large difference in the employment rates compared to those of ethnic Danes. But again, when matched, it is possible to control for that, which leaves the parental employment rate in the ethnic Danish twin sample at the same level as that for non-Western second-generation immigrant parents. Finally, it should be mentioned that to find ethnic Danish twin counterparts, we have also matched on individuals' own age within gender groups, as shown in the first row of the table, and on the year their first spell starts.

Table 3 shows details for matching by network, which is the percentage of individuals that are employed in a person's postal code area. This variable is constructed on the basis of all individuals in Denmark between 15 and 70 years of age, including first generation immigrants. Thus, the total group of people that could potentially be active in the labor market is included in constructing this rate, not only the individuals included in our sample. On average, there are 4,346 individuals in each postal code area, with a minimum of 2 individuals and a maximum of 72,815. The matching according to network quality across ethnicity has been done in intervals of 5 percentage points of the network variable in the range 60%-85%, as almost all postal codes have at least 60% employment. The last interval contains postal codes with an employment rate of above 85%, as there are too few observations to split it up more finely. Before matching, it can be seen that second-generation Western immigrants and, especially, second-generation non-Western immigrants are substantially less likely to live in areas with more than 85% employment. Instead, they are distributed more in areas with lower employment shares than are ethnic Danes. This indicates that the difference in the employment rates of the neighborhoods might in part explain differences in labor market entry across groups of ethnic Danes and second-generation immigrants, 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, although this difference is 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. Graphs 1 and 3 in Figure 1 present the empirical CDFs of wages from the first full-time jobs after graduation by ethnicity for females and males, respectively. For both genders, the CDF for ethnic Danes lies to the right of the second-generation Western and non-Western immigrant CDFs. Examining the graphs, it is clear that the wage is more spread out for males than it is for females. The graphs to

the right present the same CDF for second-generation Western and non-Western immigrants, but for ethnic Danes, it shows the CDF after using matching. The graphs confirm what was shown in Table 2 and 3, that after matching, most of the wage difference disappears. Comparing second-generation non-Western immigrants with ethnic Danes, the CDFs are now much closer to each other; 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 in the lowest part of the distribution and for males.

4.3 Education level

Education differences by ethnicity are of course very important to take into account. Table 4 shows the education level of the individuals included in the sample. The level of education has been divided into four groups: primary school, traditional high school, business and technical high school, and vocational school.[18] Individuals in the sample might go on to higher education later, but since the focus is on entering the labor market, we observe these individuals just after finishing high school or vocational school. The reason for not basing the selection on individuals observed after having obtained their highest degree is that some individuals might start studying after an unemployment spell precisely because they cannot find a job, and this might especially be the case for second-generation immigrants. By conditioning on the employment spell right after the completion of upper secondary education, we avoid encountering this type of withdrawal from the labor market.

Table 4 shows that the educational distribution varies significantly over ethnicity. For ethnic Danes, 26% of males have only primary school education, which is higher than expected, but in line with the findings in Kristensen (2008): "in Denmark, about one in five leaves the formal schooling system either as functional illiterates or without any formal qualifications beyond 9th grade". Additionally, 21% have a traditional high school degree, 11% have a business or technical high school degree, and 42% have a vocational degree. When comparing these numbers to those of second-generation males, starting with second-generation Western males, 30% of these have only primary education, whereas 32% have a traditional high school degree—11 percentage points more than that for ethnic Danish males. For business and technical high school degrees, the percentage is similar, but the share of second-generation males is around 16 percentage point less with respect to vocational education compared to that for ethnic Danish males. Regarding second-generation non-Western immigrants, 31 percentage points more than ethnic Danish males

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

finished only primary school, and this is even though we only examine immigrants born in Denmark. Along with the high rate finishing only primary school, fewer finished high school—4 percentage point less than ethnic Danish males, and even fewer finished vocational school—26 percentage point less than ethnic Danish males. The native–immigrant differences are similar for females, although females in both groups are more educated than males, with a lower share completing only high school and a higher proportion finishing with a high school degree. 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, both for males and females. After matching on parental characteristics, network variables, and individuals' age and gender, the difference is still significant for all groups of second-generation non-Western immigrants, with one exception: males with primary school education. For second-generation Western immigrants, matching on parental and neighborhood characteristics still leaves differences in education attained. Thus, 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, which is that second-generation immigrants lag substantially behind their ethnic native counterparts, but that there is a positive selection of second-generation Western immigrants. This may explain these children's relatively higher educational qualifications. Because of these differences in educational attainment, we estimate separate search models for matched individuals given three educational levels—less than high school, vocational school, traditional high school.

Next we examine the means for the variables used in the equilibrium search model, shown in Table 5. Again we have the same columns as in the above tables. For females the average duration of the unemployment spell is 6 months for ethnic Danes, 5 months for Western second-generation immigrants and 7 months for non-Western second-generation immigrants. For males, the duration is slightly shorter for all three types. The same pattern holds for the employment duration, where for both males and females the average is 11 months for ethnic Danes, 10 months for Western second-generation immigrants and 9-10 months for non-Western second-generation immigrants. Lastly, the hourly wage for females is 1 DKK higher for ethnic-Danes compared to Western second-generation immigrants and 7 DKK higher compared to non-Western second-generation immigrants. For males the hourly wages are in general higher, with a gap of 7 DKK compared to second-generation Western immigrants and 17 DKK compared to second-generation non-Western immigrants. This might seem like a very small difference but on a yearly basis it is actually around 13,000 DKK for second-generation Western immigrants and 32,000 DKK for second-generation

non-Western immigrants. The average hourly wage is very similar across males and females among second-generation non-Western immigrants.

5 RESULTS

In the following sections, we examine results from the ESM: first for the overall samples and then for the different subgroups subdivided into three education levels. 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. Whether we use the parameters from models with five homogenous firm groups or more, the conclusions are the same, which is why we only report the results for the ESM with five homogenous firm groups (Q=5) here.

5.1 COMPARISON OVER ETHNICITY

The estimation results of the heterogeneous ESM with five firm groups are presented in Tables 6 and 7. Differences in behavior are summarized by different rates of transition between employment and unemployment. First, the transition rates for all the models are significantly different from zero, and the job-offer arrival rate for the unemployed (λ_u) is higher than the job-offer arrival rate for the employed (λ_e), confirming one of the central assumptions of the model. Focusing on the level of the transition rates and comparing across gender, the picture is very clear. Males receive more offers when unemployed, but they receive slightly fewer offers when employed, and they are laid off at a rate similar to that of females. For both females and males, ethnic Danes or second-generation immigrant jobs tend to lead to another job rather than to unemployment ($\lambda_e < \sigma$).

For each of the three parameters, 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 twin) in the table). The tables also report the average productivity of each of the sub-groups calculated using equation (4). In the last two rows of the table, we report the test statistics and *P*-values for a Wald-type test of the joint equality of all three coefficients, which is calculated using the full covariance matrix. The null hypothesis of the test is that the coefficients are equal for

ethnic Danish twins and second-generation immigrants with Western or non-Western ethnicity, respectively. The test statistic is chi-squared distributed with three degrees of freedom, and large values lead to rejection of the null hypothesis. Table 6 shows the transition rates for females. To interpret the parameter estimates, note that for an unemployed ethnic Danish female, the probability of receiving and accepting an offer before three months of unemployment is 35%, whereas it is 76% before 10 months of unemployment.[19] These rates are reasonable in the Danish labor market for the age group of young people considered here. Likewise, the probability of being employed next month given that one is unemployed now is 14%. In the same way, the probability of receiving a new offer before 3 months of employment is 28%.[20] However, for an employed worker, it is not certain that the person actually accepts the offer. Finally, the parameters imply that the probability of being laid off for an ethnic Danish female is 13% before 3 months of employment.

5.1.1 COMPARISON OVER ETHNICITY, FEMALES

The comparison of estimates across the three groups of females in Table 6 reveals that ethnic Danes and second-generation Western females face a similar rate of offers both when unemployed and employed. The layoff rate is also comparable. In fact, the tests of equality cannot reject that the two groups are identical. Comparing ethnic Danes with second-generation non-Western females we see that the latter have a lower arrival rate of offers when unemployed and employed. Moreover, compared to ethnic Danes, their layoff rate is higher. The tests of equality are all rejected showing that the two groups differ with respect to the arrival rates and the layoff rate in the labor market.

When compared with ethnic Danish twins instead of ethnic Danes in general, it is clear that for both Western and non-Western second-generation females, the arrival rate of jobs when unemployed is actually higher than that for their ethnic Danish twins, and the difference is even significantly so in the case of second-generation non-Western females. The arrival rate when employed is not significantly different for any of the groups compared to their ethnic Danish twins. Both the joint and individual tests conclude that second-generation non-Western females perform better in the labor market than their ethnic Danish twins do.

All in all, matching makes considerable difference for females with non-Western ethnicity. Before matching, they have significantly lower arrival rates for both unemployment and employment and a significantly higher layoff rate. After matching, they actually outperform their ethnic Danish twins. The implication is that poorer parental characteristics and a lower network

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

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

quality compared to those of ethnic Danes explain the observed underachievement of second-generation non-Western females. When compared with ethnic Danes who come from a similar background, second-generation non-Western females have better labor market outcomes. Productivity differences across the groups are small, but they show that second-generation non-Western females and their ethnic Danish twins have the highest productivity.

5.1.2. COMPARISON OVER ETHNICITY, MALES

Similar to what was found for females, males' transition rates from unemployment to employment is higher for ethnic Danes than for both second-generation Western and non-Western males. When comparing the probability of having received and accepted an offer before three months of unemployment, it is 42% for ethnic Danes, 39% for second-generation Western males, and 30% for non-Western second-generation males. Looking at the unemployed male workers in Table 7, the arrival rate is highest for ethnic Danes and lowest for second-generation non-Western males. Thus, second-generation males get fewer offers than do both ethnic Danes and second-generation Western males. However, this is not the case for the arrival rate of jobs when employed. Here, second-generation Western and non-Western males have a significantly higher arrival rate of jobs than ethnic Danes do. The layoff rate, however, is highest for second-generation non-Western males, i.e. ethnicity does affect layoffs.

As with the case of females, matching also alters the results for males. For second-generation Western males, all three parameters are higher than those for their ethnic Danish twins. In fact, the joint Wald test rejects that the two groups are statistically the same only at the 7% level. After matching, second-generation non-Western males even succeed in closing the gap in arrival rate of jobs when unemployed and continue to have a significantly higher rate than their ethnic Danish twins have in terms of the arrival rate of jobs when employed. However, they still experience a significantly higher layoff rate than their ethnic Danish twins do. Both the individual tests for the arrival rates and the joint Wald test conclude that second-generation non-Western males perform better in the labor market than their ethnic Danish twins do, except when it comes to the layoff rate.

This result is informative because it may indicate that young, second-generation non-Western males tend to be employed in relatively lower quality jobs and this may explain their higher layoff rate. Much previous research has shown that low wage jobs tend to dissolve more easily, either for reasons of low demand or because workers do not find low-wage work rewarding. Job quality in terms of rates of destruction is not a factor we can match on a priori, and some previous evidence suggests that immigrants in particular, may have trouble finding 'good' jobs (Mahuteau & Junankar (2007)). An alternative explanation, offered earlier in Section 2.2, is that young

second-generation males may be considered a 'problem group' by caseworkers and social authorities, who tend to assign them to less productive or less challenging jobs, which weakens their incentives to remain in the job (Schröder (2010)). Finally, this group may differ along some dimension of unmeasured skill that our matching procedure does not adequately capture. However, this cannot explain the higher layoff rate for second-generation non-Western males because it can be seen that second-generation Western males also work in less productive firms than their ethnic Danish twins, but face the same layoff rate.

In conclusion, the findings for males and females are similar. When not matching, ethnic Danes and second-generation Western immigrants are very similar, but second-generation non-Western immigrants are treated differently. However, after matching, both second-generation Western and non-Western male and female immigrants outperform ethnic Danes except for a higher layoff rate among second-generation non-Western males.

We find that firms are not against employing second-generation non-Western females. In fact, it is the opposite, since they experience both, a higher offer arrival rate while unemployed, the same arrival rate when employed and a lower layoff rate than that of their ethnic Danish twins. Compared to second generation non-Western males, they have a lower layoff rate, although they appear to get fewer offers while employed or unemployed.

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 because they have chosen so themselves or because Danish immigrant housing policies have over a number of years placed immigrants in the same areas. Geographical dispersion policies, which were in place between 1986 and 1999, were successful in their initial placement of refugee immigrants although not the long-term residential distribution (Damm (2009)). Immigrants placed in the same city sections by the government often ended up in areas with a high unemployment rate among ethnic Danes. 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. In term of the matched ethnic Danish twins, if individuals' own network characteristics are not included in the matching procedure, the results show that the pattern before matching is retained with a significantly smaller share of immigrants living in areas with more than 85% employment. Thus, the differences are not evened-out, showing that the parents' socioeconomic background alone does not control for the difference in the employment distribution across the country. However, whether it has an effect on the arrival rate of jobs can only be answered by estimating the search model for all the ethnic Danish twins again.

Having estimated the models, we test the hypothesis that network has a significant effect on the arrival rates and the layoff rate for the ethnic Danish twins, and find, because of the small samples and, hence, the large standard errors, that 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. Network has an ambiguous effect on all the subsamples for ethnic Danish twins. 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 chosen as an ethnic Danish twin, seen across education, network most 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 unemployment rate has negative effects.[21]

5.3 COMPARING INDIVIDUALS WITH SIMILAR EDUCATION

There might be differences across education level in how second-generation immigrants fare on the Danish labor market. Therefore, in Tables 8 and 9, the transition rates from the search model are shown separately for high school graduates, vocational school graduates, and individuals with only primary school education. Both columns and rows are similar to the earlier tables.

5.3.1. COMPARING INDIVIDUALS WITH SIMILAR EDUCATION, FEMALES

Table 8 shows the parameters for females. The arrival rates of jobs for both employed and unemployed are, in general, much higher for females finishing high school compared to females finishing a vocational education. Females finishing primary school are not as easily comparable to females completing the two other educational levels as the pattern is not as clear cut. For example, the arrival rate of jobs when employed is lower than for those finishing a high school degree, but compared to females finishing a vocational education, the arrival rate when employed is higher. Average productivity, however, is highest for female vocational school graduates. Comparing the arrival rate of jobs when unemployed for females entering the labor market after finishing high school, it is clear that both second-generation Western and non-Western females receive fewer offers than ethnic Danes do. 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, however, females with non-Western background have a lower arrival rate than ethnic Danes have even when compared to their ethnic

[21] Results available on request.

Danish twins. However, all groups have similar layoff rates. Before matching, the findings for high school graduates are similar to those found in Table 6, which does not distinguishing between education level. After matching, the ethnic Danish twins have a higher arrival rate of jobs while employed than second-generation non-Western immigrants have.

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. However, non-Western females have the highest arrival rate when employed, although this is only significantly different from the arrival rates of ethnic natives. This can be interpreted as showing that 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. 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 by employers.

Comparing the arrival rate of jobs when unemployed for females entering the labor market after finishing primary school, it is clear that 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. All in all, the result can be interpreted as saying that second-generation females finishing primary school education can more easily find the first job, but change to new jobs less often. Furthermore, firms appear to want to hold on to them more than they want to hold on to ethnic Danes with a similar background.

5.3.2. COMPARING INDIVIDUALS WITH SIMILAR EDUCATION, MALES

Table 9 shows the results for males finishing high school, vocational school, and primary school, respectively. 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 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 for second-generation non-Western males. In fact, the layoff rate is around 1.5 times the rate for ethnic Danes and second-generation Western males. Thus, second-generation non-Western males face difficulties making the transition from school to work even with their degree in hand. One possible explanation for this is that they are not able to make the right contacts early on in the vocational education program—getting the right apprenticeships or internships, as pointed out by Schröder (2010). Note, however, that second-generation non-Western males have a higher average productivity than do their ethnic Danish twins and second-generation Western males. This evidence 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.

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 the case with 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. These results can be interpreted as saying that second-generation non-Western males get jobs more easily after finishing primary school both while they are unemployed and employed. However, when employed they, together with second-generation Western males, have more trouble keeping their jobs even though both groups have higher productivity on average than their ethnic Danish twins. Still, this is a somewhat positive result since 57% of second-generation non-Western males only have a primary school education in Denmark in the period we study. Overall, not distinguishing between education types, the results we find for second-generation males are driven by the group of high school graduates and those with a primary school education. For both males and females the separate subsample estimates of the ESM show that the full sample estimates are, strictly speaking, not valid as both the job-offer arrival and layoff rate are significantly different across the subsamples, meaning that we cannot claim that the full samples consist of homogenous workers. However, we retain the results for the full samples in Tables 6 and 7 so that the differences between the estimates can be readily seen.

6 Conclusion

Second-generation immigrants are making their debut into European labor markets in larger and larger numbers these days, and are typically observed to have limited labor market success compared to that of ethnic natives. This seems to be especially the case 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.

The purpose of this paper has been to study the possible favoritism toward ethnic Danes by firms when making decisions on hiring and firing in Denmark. Using an ESM, 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 backgrounds of second-generation immigrants might differ from those of ethnic Danes, even though all have been raised in Denmark, we use matching to control for socioeconomic circumstances. Furthermore, recent studies show that most jobs vacancies are filled through personal networks and informal recruitment channels and that there are differences in both the size of such networks and in their quality when comparing the experiences of ethnic Danes and second-generation immigrants. We try to capture this by matching on the employment rate in the neighborhood where ethnic Danes and second-generation immigrants reside. Finally, to control for differing educational tracks selected by ethnic Danes and second-generation immigrants, we estimate the model separately for high-school graduates, vocational school graduates and primary school graduates.

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, hourly earnings are lower for second-generation non-Western immigrants, whereas the difference is small between ethnic Danes and second-generation Western immigrants. Also, 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 important results. Our study shows that the differences in transition rates across ethnicity for females are small after matching, so that

second-generation females, both of Western and non-Western origin, do just as well or even better compared to the success of their ethnic Danish twins after controlling for parental characteristics and personal networks. For males, matching makes an even bigger difference. Second-generation males have a higher arrival rate of jobs compared to that of their ethnic Danish twins, but also face the highest layoff rates.

When separating by highest education attained, for males the results is driven by high school graduates and males with only a primary school education. For the new entrants with vocational education ethnic Danes perform better than the second generation immigrants do on the labor market, which as mentioned earlier might be due to not having the right contacts.
For females the pattern is not as clear cut, but overall the result is similar to that found when not dividing up into the three education levels.

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. At the other end of the educational spectrum as well, second-generation non-Western immigrants with a primary school degree appear to do well compared to their ethnic Danish counterparts. Policymakers now need to give Danish employers offering jobs requiring vocational qualifications greater incentives to hire and retain young second-generation immigrants, in particular, those of non-Western origin.

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7 TABLES

Table 1: OLS Wage and LP Employment regressions

	LN(WAGE)	EMPLOYMENT
Non-Western females	-0.082***(0.017)	-0.56***(0.018)
Non-Western males	-0.029*(0.017)	-0.053***(0.017)
Western females	-0.023***(0.008)	-0.042***(0.008)
Western males	0.017**(0.007)	-0.027***(0.008)
Ethnic Danish females	-0.091***(0.001)	-0.056***(0.001)
Age	0.009***(0.000)	-0.006***(0.000)
FATHER'S EDUCATION		
Short-range	0.002(0.003)	0.030***(0.003)
Middle-range	-0.002(0.002)	0.021***(0.002)
Long-range	-0.000(0.003)	0.048***(0.003)
MOTHER'S EDUCATION		
Short-range	0.000(0.003)	0.032***(0.004)
Middle-range	0.006***(0.002)	0.015***(0.002)
Long-range	-0.009**(0.004)	0.035***(0.005)
Father employment	0.006***(0.002)	0.062***(0.002)
Mother employment	0.010***(0.002)	0.077***(0.002)
AREA EMPLOYMENT RATE		
60-65%	-0.031*(0.018)	0.011(0.017)
65-70%	0.026(0.016)	0.042***(0.016)
70-75%	0.016(0.016)	0.057***(0.015)
75-80%	0.007(0.015)	0.076***(0.015)
80-85%	0.004(0.015)	0.109***(0.015)
85% ->	0.003(0.015)	0.146***(0.015)
OWN EDUCATION		
High school, regular	0.429***(0.002)	0.063***(0.002)
Business & technical	0.388***(0.002)	0.078***(0.003)
Vocational education	0.558***(0.002)	-0.024***(0.002)
R-Squared	0.32	0.05

Note: Standard errors in parentheses. *significant at 10%, ** 5%, *** 1%. Number of observations is 400,486. Short-range education level is individuals with a high school degree or less. Medium-range education is individuals with more than a high school degree, but less than a bachelor's. Long-range education is individuals with a bachelor's or more. Source: sample of young individuals, 1996-2003.

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
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 dummies	-	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)

Table 3: 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

See notes to Table 1.

Table 4: 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	NonWest
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

See notes to Table 1.

Table 5: Means for 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
Unemp. dur.	5.76	5.80	7.80	5.21	6.63	4.46	4.87	5.98	4.90	6.06
Test				1.17	4.69				-0.08	-0.40
Emp. dur.	10.5	10.1	8.90	9.82	9.60	10.8	10.6	9.83	9.57	8.59
Test				0.44	-2.75				1.53	4.86
Hourly wage	107	108	97	106	100	118	116	105	111	101
Test				1.14	-2.61				1.95	3.00

See notes to Table 1.

Table 6: ESM for females

	FEMALES				
	Ethnic Danes			2nd-generation	
	All	West	Non-West	West	Non-West
Sample size	19639	557	3026	557	3026
Arrival rate of jobs,	0.1436	0.1382	0.1019	0.1443	0.1235
when unemp.(λu)	(0.0016)	(0.0087)	(0.0026)	(0.0095)	(0.0033)
test (to 'twins')				-0.4716	-5.1365
test (to All)				-0.0688	5.5052
Arrival rate of jobs,	0.0934	0.1073	0.0904	0.0978	0.0857
when emp. (λe)	(0.0008)	(0.0053)	(0.0022)	(0.0048)	(0.0020)
test (to 'twins')				1.3274	1.6151
test (to All)				-0.9040	3.6816
Layoff rate	0.0452	0.0508	0.0542	0.0456	0.0505
when emp.(σ)	(0.0003)	(0.0023)	(0.0011)	(0.0021)	(0.0010)
test (to 'twins')				1.6372	2.4973
test (to All)				-0.2053	-4.9692
Average productivity	204.15	199.69	210.08	194.97	212.13
Joint Wald test statistic				4.27	45.29
P-value				0.23	0.00

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.

Table 7: ESM for males

	MALES				
	Ethnic Danes			2nd-generation	
	All	West	Non-West	West	Non-West
Sample size	19681	594	3112	594	3112
Arrival rate of jobs,	0.1805	0.1515	0.1187	0.1674	0.1417
when unemp.(λu)	(0.0021)	(0.0095)	(0.0031)	(0.0105)	(0.0037)
test (to 'twins')				-1.1239	-4.7651
test (to All)				1.2189	9.0691
Arrival rate of jobs,	0.0819	0.0772	0.0772	0.0922	0.0897
when emp. (λe)	(0.0007)	(0.0039)	(0.0018)	(0.0046)	(0.0020)
test (to 'twins')				-2.4934	-4.5418
test (to All)				-2.2309	-3.6095
Layoff rate	0.0413	0.0472	0.0506	0.0516	0.0572
when emp.(σ)	(0.0003)	(0.0021)	(0.0010)	(0.0023)	(0.0011)
test (to 'twins')				-1.4083	-4.3994
test (to All)				-4.4551	-13.6568
Average productivity	227.91	230.16	233.186	221.69	223.3984
Joint Wald test statistic				7.15	42.91
P-value				0.07	0.00

See notes to Table 6

Table 8: Heterogeneous ESM for females across education levels

		Ethnic Danes		2nd-generation	
HIGH SCHOOL	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
		Ethnic Danes		2nd-generation	
VOCATIONAL	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
		Ethnic Danes		2nd-generation	
PRIMARY SCHOOL	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
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

See notes to Table 6

Table 9: Heterogeneous ESM for males across education levels

		Ethnic Danes		2nd-generation	
HIGH SCHOOL	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
		Ethnic Danes		2nd-generation	
VOCATIONAL	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
		Ethnic Danes		2nd-generation	
PRIMARY SCHOOL	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
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 6

8 FIGURES

Figure 1: Comparison of empirical CDF over ethnicity

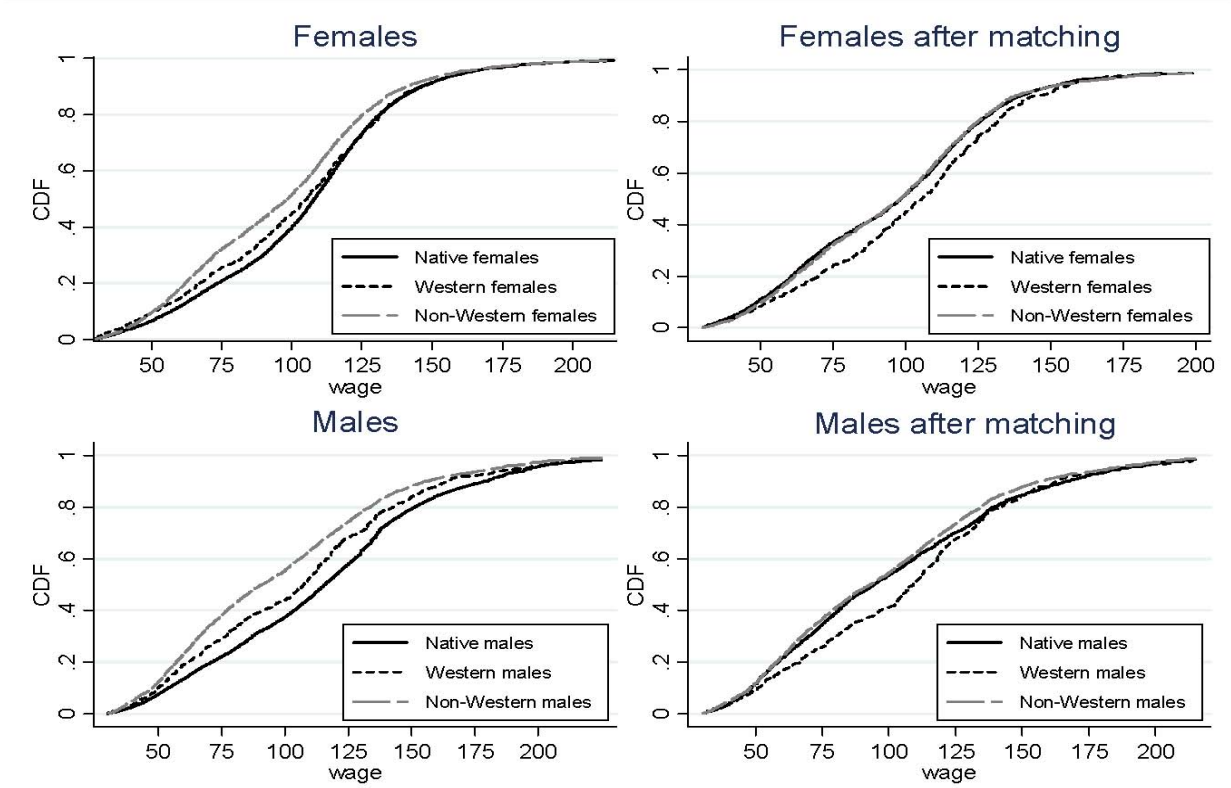
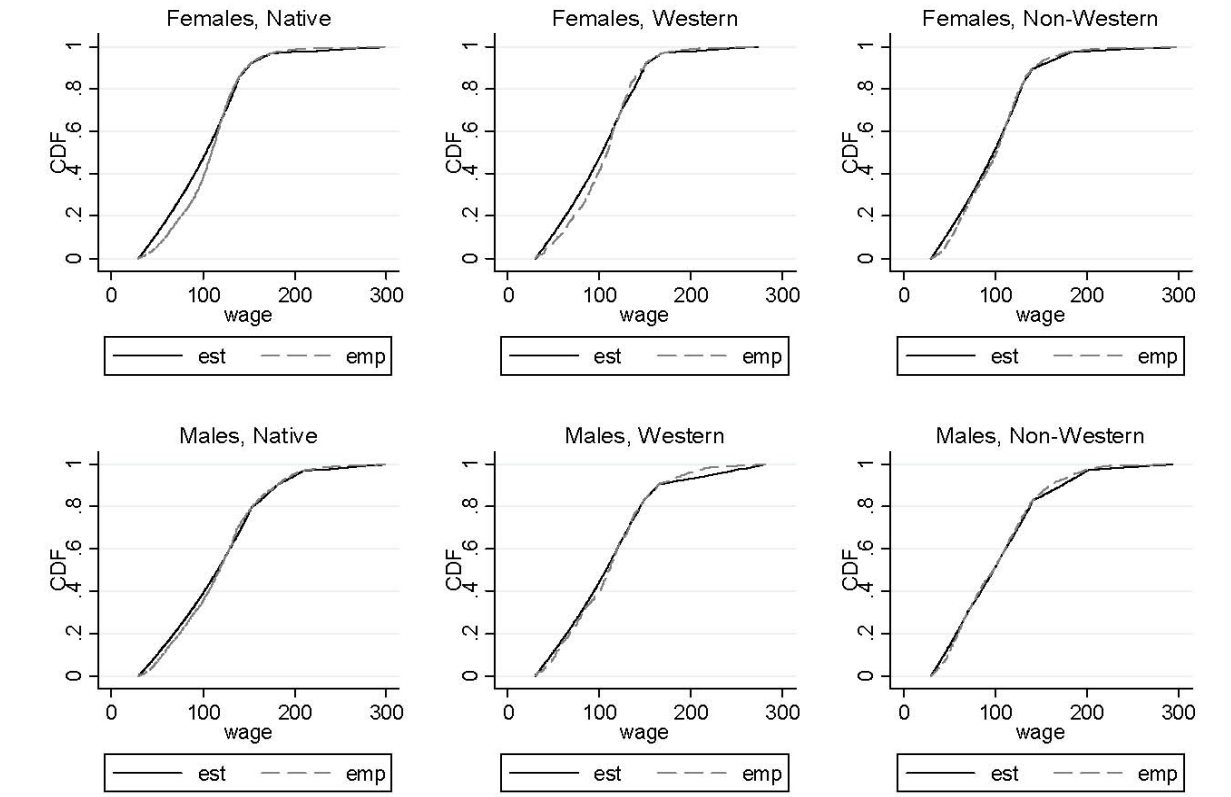


Figure 2: Comparison of estimated (est) and empirical (emp) CDF;



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