Negative Attitudes, Networks and Education

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Abstract

This paper theoretically and empirically assesses the potential explanations behind the educational gap between young natives and immigrants using two measures, negative attitudes towards immigrants and networking. The paper considers that two these parameters may influence high and uneducated workers as well as immigrants and natives differently, creating different incentives to acquire education for the two groups. Using rich Danish administrative data, this paper finds suggestive evidence rejecting the theoretical case where negative attitudes decrease 1st generation immigrant education and indications that quality of networks seems to matter more for immigrants than the quantity of individuals in a potential network.

1 Introduction

An OECD report from 2006 reveals that immigrant and immigrant offspring at a very young age express equal or sometimes even higher motivation to learn mathematics than their native counterparts and very positive attitudes towards school and education in general.[1] However, at the age of 15, they under perform compared to the natives. More than a third of the first and second generation immigrant children in Austria, Belgium, Denmark, Germany, Norway and the USA, who have spent all their entire schooling in the host country, perform below the baseline PISA benchmark for mathematics performance, a period at which students begin to demonstrate the kind of skills that enable them to actively use mathematics.[2] Furthermore, when taking their parental background into account, immigrants tend not to perform as well in school as their native peers.[3] This

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[1] OECD 2006
[2] ibid.
[3] Nielsen and Rangvid

fact may then, in turn, influence their choice of further education, and eventually their labour market outcome and performance.

When explaining the educational gap between immigrants and natives, measures which impact immigrants and natives differently are likely to be important. The aim of this paper is to discover the factors that shift the motivation and performance of immigrants when the decision about education beyond compulsory school is taken. For the educational decision, workers compare the value corresponding to acquiring education to the value of not acquiring education. These values depend on the expected incomes which are influenced by both the employment probability as well as wages. The novelty of this paper is to examine theoretically, as well as empirically, whether negative attitudes towards immigrants and networking could influence immigrant employment chances, as well as immigrant wages, differently for educated workers and uneducated workers compared to the same variables for natives. If this were the case, the value of acquiring education may be impacted differently for natives and immigrants and as such, may explain the educational gap between natives and immigrants.

In particular, we will examine the effect of negative attitudes towards immigrants in a region and potential impact of networking through individuals of the same ethnicity living in a region. Negative attitudes towards immigrants may cause discrimination, implying that workers are fired or decide to quit a job. This lowers the value of employment, through both shorter employment periods and lower wages, as the bargaining power of immigrants falls which in turn affects the value of acquiring education.

There are some empirical papers on discrimination and employment and wages (see for example Waisman and Larsen 2016, Kofi Charles and Guryan 2008) but, to our knowledge, no papers on the additional impact through these channels on education. Concerning networking, immigrants from the same home country or region may increase the likelihood of getting a job and improve labour market performance. Hence, more well-educated immigrants from the same home country or region may increase the return of education, implying that more immigrants acquire education. This may work in different ways. Social networks may influence employment outcomes: the more employed contacts the individual has, the more likely it is that the individual will learn about new job openings (Calvo-Armengol and Jackson 2004, Hellerstein et al 2009) and networks may influence both wages and employment opportunities (Fontaine 2007, Galeanios 2014, Damm 2014). Similarly, empirical research confirms that (see for example Andersson et al 2009, Solignac and Tô 2015) more immigrants living in areas with a large number of employed neighbours are more likely to have jobs compared to immigrants living in areas with fewer employed neighbours. This could be due to networking and/or social norm effects. Furthermore, Kramarz and Skans (2014) show for Swedish data that family networks are important, in terms of obtaining the first job after graduation, and that this impact is stronger for youth of uneducated parents and immigrants in regions with high unemployment. Hence, networking may increase employment probability, and more networking among immigrants may, to some extent, offset the decrease in employment prospects and wage modifications due to negative

attitudes or discrimination.

We formulate a Becker-style taste discrimination model within a search and wage bargaining setting. Bowlus and Eckstein (2002), Flabbi (2010), Mailath et al. (2000), and Lang et al. (2005) study discrimination in the presence of search frictions but with no educational decision. We assume that potential negative tastes towards immigrants imply that their transition rate into a job is lower than for the native worker. We model discrimination as a capricious rejection of immigrant applicants. If a negative external event, such as media portraying immigrants in a negative manner, occurs after a vacancy was opened but prior to a match with an immigrant worker, the immigrant is not offered a job. In this way, discrimination implies that immigrants face a lower probability of getting a job than natives. We show that immigrants' potential lower transition rate, ceteris paribus, also implies that the employment chances of all workers searching for a job in a particular sector falls as firms, in turn, supply fewer vacancies. Natives and immigrants decide whether to educate or not. They are aware of the existence of discrimination in the labour market and of the possibility of influencing their chances of getting employed through networking. In terms of negative attitudes towards immigrants, we consider two different cases. In the first case, all immigrant workers are affected by negative attitudes towards them and in the second, only low-educated workers are affected. The channel through which the educational level is affected by networking and negative attitudes in our model is through the impact on the expected employment prospects. However, the possibility that negative attitudes also influence the value of being unemployed directly, that is, over and above the impact on wages and employment chances, could easily be included in the theoretical model and is consistent with the empirical analysis which we perform. These two cases create different incentives for immigrants to acquire education in the presence of negative attitudes, and in the first case, natives acquire more education than immigrants while in the second case, immigrants acquire more education than natives. In terms of networking, we consider the case where networking initially is higher for natives than immigrants and then consider the impact of more immigration on the wages, employment chances and education.

Empirically, we analyse the educational gap between immigrants and natives using Danish Register Data to assess which of these two theoretical cases is most plausible during a period of rapidly increasing negative attitudes from 2011 to 2015 following the European Migrant crisis. Due to the excellent quality of the Danish Register Data, we have the whole population, can link to family members, and have information on employment, education, income, etc. More specifically, we analyse the impact of negative attitudes on education at both the municipality and individual levels by considering how young immigrants' high school decision, which is not obligatory in Denmark, depends on negative attitudes towards immigrants in the area where they live relative to the impact on young natives. We examine this decision to attend high school as it is made at a young age, around 16, and individuals will usually be living at home while attending high school.

Lacking a suitable instrument for negative attitudes at the time an individual is deciding to attend high school, we perform a bounding exercise in an attempt to provide suggestive evidence as to which one of these two opposite signed theoretical predictions for negative attitudes is more plausible. Unobservable factors could drive parents, either in their emigration or subsequent relocation, to locate away from or towards certain municipalities and these unobservable characteristics could be correlated with our negative attitudes measures as well as the child's educational decision. We perform a procedure developed in Oster (2016) which expands upon work of Altonji et al. (2005) to directly examine the importance of omitted unobservable characteristics compared to observables. While this prohibits our empirical analysis from quantifying a causal impact of negative attitudes on immigrant education, under reasonable assumptions regarding the relative importance of unobservables, we are able to assess whether we can bound an effect away from zero. This is particularly informative in relation to our theoretical model, which has two cases predicting opposite signed impacts of negative attitudes on immigrant education. If we are able to bound the impact of negative attitudes away from zero, this provides suggestive empirical evidence rejecting one of these two theoretical predictions.

We first examine the descriptive relationship between negative attitudes and education at the municipality level. We exploit the panel nature of our data to control for unobserved time-invariant factors and find little relationship between negative attitudes and education as well as little evidence of the importance of networking. At the individual level, which takes into account important family and individual level factors, we find a positive and significant correlation between negative attitudes and 1st generation immigrants' probability to attend high school. This is true whether negative attitudes are measured as the level in 2015 or as the change in negative attitudes from 2011 to 2015. We see little evidence of any correlations, either positive or negative, between negative attitudes and education for natives or 2nd generation immigrants. Assessing the degree to which this positive correlation is driven by selection on unobservables, we bound the impact of negative attitudes for males away from zero under reasonable assumptions about the importance of unobservables. Thus, we find suggestive evidence rejecting the first case of our theoretical model which predicts that negative attitudes decrease immigrant education. Additionally, we find a small correlation between the quality of an individual's network, measured as the fraction of individuals of the same nationality who are educated, and an immigrant's education and little evidence of the importance of the quantity of an individual's network, measured as the fraction of same nationality individuals living in the same municipality. Our findings on negative attitudes are similar when controlling for academic performance in compulsory schooling prior to deciding to attend high school and excluding those households who have recently moved.

Overall, our findings reject the explanation that negative attitudes towards immigrants can explain the educational gap between immigrants and natives, as we find suggestive evidence which excludes the theoretical case where negative attitudes decrease

immigrant education, and other factors which differentially impact immigrants and natives are likely mechanisms. The paper is structured as follows. In section 2 the model is setup, then the following sections consider the impact of negative attitudes towards immigrants and the fraction of immigrants. In Section 5 we consider simulations illustrating the theoretical model. Section 6 introduces our empirical analysis and section 7 provides estimation results including those accounting for the importance of unobservables. Section 8 explores the robustness of the individual level results, and Section 9 concludes.

2 The Model

We consider a search and matching model with natives, N and immigrants, I, which may be educated with productivity y^h or non-educated with productivity, y^l where $y^h > y^l$. Workers search for jobs and firms search for workers and the labour force is normalised at one. We then include the two features, which may differ for immigrants and natives, influencing their labour market performance differently and thereby their educational decision - namely negative attitudes towards immigrants and networking effects.

We model discrimination as a capricious rejection of immigrant applicants. If a negative external event, such as media portraying immigrants in a negative manner, occurs after a vacancy was opened but prior to a match with an immigrant worker, the immigrant is not offered a job. In this way, discrimination implies that immigrants face a lower probability of getting a job than natives. This occurs in a match with probability $a^m,\ m = h, l$.[4]

On the other hand, more immigrants may make it easier to obtain employment through networking. We here follow Fontaine (2007) by assuming that networking, $\lambda_i^m, i = N, I,\ m = h, l$ is increasing in the number of people of the same origin as the individual. One may argue that a very large number of own ethnicity may not be as important as a relative smaller number, a potential network may grow so big that it is not really a usually network in terms of employment prospects. This could be included in the analysis by changing the functional form of the network variable, so that it is increasing in the number the worker's own nationality but at a decreasing rate. We will return to this issue below.[5]

2.1 Matching

The transition rate for an unemployed native worker is given by $f_N\left(\theta_N^m\right) = \left(\theta^m\right)^\alpha$ where $\theta^m,\ m = h, l$, captures labour market tightness. As negative attitudes may disrupt a match, the immigrant worker's transition rates into employment may be reduced relat-

[4] An alternative is to model discrimination on exit, where an immigrant worker is either fired or forced to resign with a higher probability than a native worker. This alternative set up delivers results similar to those in our model.

[5] One simple way of including networking for high productivity immigrants and natives is given by: $\lambda_I^h = t^h \frac{I(1-\hat{e}_I)}{(N+I)(1-\hat{e_I})} = t^h I$ and $\lambda_N^h = t^h \frac{N(1-\hat{e}_N)}{(N+I)(1-\hat{e_N})} = t^h N = t^h (1-I)$ as $N + I = 1$, and that networking for low productivity immigrants and natives is given by: $\lambda_I^l = t^l \frac{I\hat{e}_I}{(N+I)\hat{e_I}} = t^l I$ and $\lambda_N^l = t^l \frac{N\hat{e}_N}{(N+I)\hat{e_N}} = t^l N = t^l (1-I)$ as $N + I = 1$, where $0 < t^m < 1,\ m = h, l$, and $\hat{e}_i,\ i = N, I$ is the number of low-educated workers and $1 - \hat{e_i},\ i = N, I$, is the number of educated workers.

ive to those of natives, $f_I(\theta^m) = (\theta^m)^{\alpha}(1-a^m)$, which depend on negative attitudes, a^m, $m = h, l$ and may differ for low productivity and high productivity workers. Similarly, the transition rates for firms is $q(\theta^m) = (\theta^m)^{\alpha-1}$.[6]

2.2 The Firm

The firm chooses the number of vacancies so as to maximize profits subject to negative attitudes towards immigrants and natives and subject to networking effects. Each worker produces y^m, $m = h, l$ and receives the bargained wage, $w_i^m, i = N, I,\ m = h, l$ and there are $L_i^m, i = N, I,\ m = h, l$ employees. We denote the discount rate by ρ and hiring costs are increasing in productivity, ky^m, $m = h, l$. A firm chooses the number of vacancies to advertise, $V^m,\ \ m = h, l$ and takes into account that its employees also produce applicants through networking. Each firm solves the following maximization problem:

$$maxE\Pi = \int_0^{\infty} e^{-\rho t}\left(\left(\left(y^m - w_N^m\right)\left(1-\eta_I^m\right) + \left(y^m - w_I^m\right)\eta_I^m\right)L^m - ky^m V^m\right)dt, \quad (1)$$

$$m = h, l,\ s.t.$$

$$\dot{L}^m = \left(\Lambda^m L^m + V^m\left(\left(1-\phi_I^m\right) + \phi_I^m\left(1-a^m\right)\right)\right)(\theta^m)^{\alpha-1} - sL^m,\ m = h, l, \quad (2)$$

where $\Lambda^m = \left(\lambda_N^m \eta_N^m + \lambda_I^m \eta_I^m\right),\ m = h, l$, and where the fraction of employed natives and immigrants are $\eta_N^m = \frac{L_N^m}{L^m} = 1 - \eta_I,\ \eta_I^m = \frac{L_I^m}{L^m}$ and $\phi_N^m = 1 - \phi_I^m$ and ϕ_I^m are the fractions of unemployed immigrants in the two different labour forces, $m = h, l$. The fractions will be determined below.

With identical firms, using equations (1) and (2), we obtain the non-trivial solution in the steady state determining labour market tightness, $\theta^m,\ \ m = h, l$:

$$\frac{\left(y^m - w_N^m\right)\left(1-\eta_I^m\right) + \left(y^m - w_I^m\right)\eta_I^m}{s + \rho - \Lambda^m q(\theta^m)} = \frac{ky^m}{q(\theta^m)\left(\phi_N^m + \phi_I^m\left(1-a^m\right)\right)}. \quad (3)$$

The partial equilibrium results are the following: more severe negative attitudes, a higher a^m, will tend to reduce labour market tightness and more networking, a higher λ_i^m, will raise labour market tightness.

2.3 The Worker

Let U_i^m be the value of being an unemployed worker and $E_i^m, m = h, l,\ i = N, I$ be the value of being an employed worker. The values are determined by

$$\rho U_i^m = \left(f_i(\theta_i^m) + \lambda_i^m\right)\left(E_i^m - U_i^m\right) - \Gamma(m)\, c(e_i), i = N, I,\ m = h, l, \quad (4)$$

$$\rho E_i^m = w_i^m + s(U_i^m - E_i^m) - \Gamma(m)\, c(e_i), i = N, I,\ , m = h, l \quad (5)$$

[6] Alternatively, we could assume that separation rates depended on negative attitudes and then not assume any discrimination in the matching function, so that separation rates for immigrants would be, $s_I^m = s_N\left(1 + a^m\right) \geq s_N$, which depend on negative attitudes, a^m, $m = h, l$ and may differ for low productivity and high productivity workers. Hence, matches between immigrants and the firm may be dissolved more often than matches for natives and also may differ for high- and low-educated workers. This would deliver similar results as this paper. See a previous version of this paper, Bennett et al 2015, for details.

We assume that workers have different abilities, e_i, and therefore different costs of obtaining education, $c(e_i)$. The variable e_i is uniformly distributed, $e_i \in [0,1]$ where educational costs are decreasing in ability at a decreasing rate, $c'(e_i) < 0, c''(e_i) > 0$. In order to guarantee a non-trivial solution where some, but not all, individuals choose to acquire education, the individual with the highest ability faces a very low cost of education, $c(1) = 0$, and the individual with the lowest ability level face very high costs of education, i.e. $lim_{e_i \to 0} c(e_i) = \infty$. $\Gamma(m), m = h, l$, is an indicator function, taking the value zero if the worker does not acquire education and one, if the worker acquires education. Hence, $\Gamma(h) = 1$ and $\Gamma(l) = 0$.[7]

2.4 Wages

Wages are determined by Nash bargaining and that the bargaining power is a half, so that $X_i^m = E_i^m - U_i^m$, $i = N, I$, $m = h, l$, where from equation (3) we have that $X^m = ky^m / (q(\theta^m)) = \frac{(y^m - w_N^m)\eta_N^m + (y^m - w_I^m)\eta_I^m}{s+\rho-\Lambda^m q(\theta^m)}$. We assume that the hiring cost parameter, k, is equal across firms, but that productivity and therefore actual hiring costs are higher for firms employing educated workers. Using this expression, subtracting equation (4) from equation (5) and solve the system of equations give the wage equations,

$$w_N^m = \frac{(\rho + s + f(\theta^m) + \lambda_N^m) y^m}{(2(s+\rho) + f(\theta^m)(1 - a^m \eta_I^m) + \Lambda^m (1 - q(\theta^m)))}, \tag{6}$$

$$w_I^m = \frac{(\rho + s + f(\theta^m)(1 - a^m) + \lambda_I^m) y^m}{(2(s+\rho) + f(\theta^m)(1 - a^m \eta_I^m) + \Lambda^m (1 - q(\theta^m)))} \tag{7}$$

We note that wages are increasing in labour market tightness, networking and productivity of the specific type. Substituting for wages into the equation determining labour market tightness, we obtain the equations for labour market tightness (3) as a function of parameter values and independently of productivity as hiring costs are a function of productivity:

$$\frac{1 - a^m \phi_I^m}{(2(s+\rho) + f(\theta^m)(1 - a^m \eta_I^m) + \Lambda^m (1 - q(\theta^m)))} = k(\theta^m)^{1-\alpha}. \tag{8}$$

For simplicity and in order to isolate the impact of negative attitudes and networking, we consider 3 different cases. In the first two cases, there is no networking, $\lambda_i^m = 0$, $i = N, I$, $m = h, l$ and in the first case both uneducated and educated immigrant workers experience equal negative attitudes towards them, $a^h = a^l = a > 0$, whereas in case 2, only uneducated workers experience negative attitudes towards them, $a^l > 0$, $a^h = 0$. In case 3, negative attitudes are not present for any of the workers but instead networking may be important. We let natives experience more networking than immigrants. In case 1, the labour market tightness equations become:

[7] We assume that the educational cost is a cost to acquire and maintain education or skills. This is a simplifying assumption and is not important for the results. The assumption enables us to use a model without having workers continuously being born and dying. Such a model would deliver similar qualitative expressions.

$$\frac{1-a^m\phi_I^m}{2\left(s+\rho\right)+f\left(\theta^m\right)\left(1-a^m\eta_I^m\right)}=k\left(\theta^m\right)^{1-\alpha},\ m=h,l. \tag{9}$$

In case 2, labour market tightness for firms hiring uneducated and educated workers are, respectively,

$$\frac{1-a^l\phi_I^l}{2\left(s+\rho\right)+f\left(\theta^l\right)\left(1-a^l\eta_I^l\right)}=k\left(\theta^l\right)^{1-\alpha}, \tag{10}$$

$$\frac{1}{2\left(s+\rho\right)+f\left(\theta^h\right)}=k\left(\theta^h\right)^{1-\alpha}. \tag{11}$$

Finally, in case 3 we obtain:

$$\frac{1}{\left(2\left(s+\rho\right)+f\left(\theta^m\right)+\Lambda^m\left(1-q\left(\theta^m\right)\right)\right)}=k\left(\theta^m\right)^{1-\alpha}. \tag{12}$$

2.5 Unemployment and Employment

In equilibrium, inflows are equal to outflows. The equilibrium flows characterising the labour market for workers are then, $\left(\left(\theta^m\right)^\alpha+\lambda_i^m\right)\mu_i^m=sn_i^m, i=N,I,\ m=h,l$, and $n_i^h+\mu_i^h=\left(1-\hat{e}_i\right)i,\ i=N,I,\ n_i^l+\mu_i^l=\hat{e}_i i,\ i=N,I$, where employment is $n_i^m,\ i=N,I,\ m=h,l$ and unemployment is $\mu_i^m, i=N,I,\ m=h,l$. The labour force is normalised to one, $N+I=1$, giving the following expression for natives' unemployment rates: $u_N^m,\ m=h,l$: $u_N^m=s/\left(\left(\theta^m\right)^\alpha+\lambda_N^m+s\right)$. For immigrants we obtain the following unemployment and employment rates:

$$u_I^m=\frac{s}{\left(\theta^m\right)^\alpha\left(1-a^m\right)+\lambda_I^m+s},\ n_I^m=\frac{\left(\theta^m\right)^\alpha\left(1-a^m\right)+\lambda_I^m}{\left(\theta^m\right)^\alpha\left(1-a^m\right)+\lambda_I^m+s},\ m=h,l. \tag{13}$$

The result is the following.

Proposition 1. In case 1, where negative attitudes are present in both the high and low productivity sector, $a^h=a^l>0$, and in the absence of networking, $\lambda_i^m=0$, the unemployment rate of natives is smaller than the unemployment rate of immigrants, $u_N^m<u_I^m,\ m=h,l$. In case 2, where negative attitudes are present in the low productivity sector only, $a^l>a^h=0$, and in the absence of networking, $\lambda_i^m=0$, then the unemployment rate of an uneducated immigrant is greater than that of natives, $u_I^l>u_N^l$, whereas the unemployment rates for educated workers are identical for natives and immigrants, $u_I^h=u_N^h$. In case 3, when there are no negative attitudes, $a^m=0$, and when networking is equal for educated and uneducated workers, $\lambda_i^h=\lambda_i^l$ and higher for natives than immigrants, $\lambda_N>\lambda_I$ then the unemployment rate of natives is lower than the unemployment rate of immigrants, $u_I\geq u_N$.

The fraction of uneducated employed and unemployed immigrants, $\eta_i^l,\ i=N,I,\ \phi_i^l,\ i=N,I,$ and natives will be:

$$\eta_I^l = \frac{n_I^l \hat{e}_I I}{n_N^l \hat{e}_N N + n_I^l \hat{e}_I I} \tag{14}$$
$$= \frac{1}{\frac{\hat{e}_N N}{\hat{e}_I I} \frac{(\theta^l)^\alpha + \lambda_N^l}{(\theta^l)^\alpha (1-a^l) + \lambda_I^l} \frac{(\theta^l)^\alpha (1-a^l) + \lambda_I^l + s}{(\theta^l)^\alpha + \lambda_N^l + s} + 1}, \ \eta_N^l = 1 - \eta_I^l,$$
$$\phi_I^l = \frac{1}{\frac{\hat{e}_N N}{\hat{e}_I I} \frac{(\theta^l)^\alpha (1-a^l) + \lambda_I^l + s}{(\theta^l)^\alpha + \lambda_N^l + s} + 1}, \ \phi_N^l = 1 - \phi_I^l. \tag{15}$$

Similarly for educated immigrants and natives, $\eta_i^h,\ i = N, I,\ \phi_i^h,\ i = N, I,$ we have

$$\eta_I^h = \frac{n_I^l \left(1 - \hat{e}_I\right) I}{n_N^l \left(1 - \hat{e}_N\right) N + n_I^l \left(1 - \hat{e}_I\right) I} \tag{16}$$
$$= \frac{1}{\frac{(1-\hat{e}_N) N}{(1-\hat{e}_I) I} \frac{(\theta^h)^\alpha + \lambda_N^h}{(\theta^h)^\alpha (1-a^h) + \lambda_I^h} \frac{(\theta^h)^\alpha (1-a^h) + \lambda_I^h + s}{(\theta^h)^\alpha + \lambda_N^h + s} + 1}, \ \eta_N^h = 1 - \eta_I^h,$$
$$\phi_I^h = \frac{1}{\frac{(1-\hat{e}_N) N}{(1-\hat{e}_I) I} \frac{(\theta^h)^\alpha (1-a^h) + \lambda_I^h + s}{(\theta^h) + \lambda_N^h + s} + 1}, \ \phi_N^h = 1 - \phi_I^h. \tag{17}$$

With respect to negative attitudes, we consider two different cases. In the first case, we assume that all immigrants, both educated and uneducated workers may experience negative attitudes, that is, $a^h = a^l = a$ whereas in case two only uneducated workers potentially face negative attitudes, $a^h = 0$ and $a^l > 0$. We notice that when $a^m > 0$, either for h or l or both, and $\lambda_I^m = \lambda_N^m = 0,\ m = h, l$, is the fraction of immigrants among the unemployed larger than the fraction of immigrants among the employed workers, $\phi_I^m > \eta_I^m$.

2.6 Education

When individuals decide on whether to educate or not, they compare the value of acquiring education to the value of remaining uneducated. That is, at each point in time, as an unemployed worker, they compare the value of being unemployed as a educated worker to the value of being unemployed as an uneducated worker. Workers with high educational costs find it too costly to obtain education, whereas high ability workers and low educational costs individuals find it more than worthwhile to do so. The marginal worker has the ability level, $\hat{e_i}, i = N, I$, which makes the worker just indifferent between acquiring education or remaining uneducated. For simplicity, we assume that natives and immigrants are identical with respect to the distribution of educational costs.[8] We write the condition determining the educational costs of the marginal worker as

$$\rho U_i^h \left(\hat{e_i}\right) = \rho U_i^l,\ i = N, I. \tag{18}$$

[8]We are aware that this may not be the case, if for example immigrants have some language and cultural issues. However, in order to focus on the differences between natives and immigrants caused by negative attitudes and networking. In the empirical analysis we control for factors which may be different for natives and immigrants, such as, parental background and years since immigration.

The higher $\hat{e_i}$ is, the higher is the ability level of the marginal worker acquiring education. Hence, fewer workers acquire education, and a smaller fraction of the workers will be educated. In case one, disregarding networking, $\lambda_i^m = 0,\ i = N, I,\ m = h, m$ and using equations (4)-(5) and (18), the bargaining condition together with the free entry condition, to obtain the following simplified condition in the first case where $a^h = a^l$ for immigrants and $a = 0$ for natives:

$$\left(y^h\theta^h - y^l\theta^l\right)(1-a)\,k = c\left(\hat{e}_I\right). \tag{19}$$

$$\left(y^h\theta^h - y^l\theta^l\right)k = c\left(\hat{e}_N\right), \tag{20}$$

Equation (19) gives $\hat{e}_I$, as a function of the endogenous labour market tightness variables, $\theta^m,\ m = h, l$. The higher the productivity difference is as well as the labour market tightness difference, the higher are wage differences, and then the more people will acquire higher education. Similarly, equation (20) gives the marginal ability level of natives acquiring education, $\hat{e}_N$. As natives and immigrants face the same productivity and labour market tightness rate, equation (19) and (20) imply that $c\left(\hat{e}_I\right) = (1-a)\,c\left(\hat{e}_N\right)$ and therefore that $\hat{e}_I > \hat{e}_N$ corresponding to the fact that less immigrants than natives acquire higher education.

In the second case, disregarding networking, $\lambda_i^m = 0,\ i = N, I,\ m = h, m$ the result changes for immigrants whereas the natives' educational decision is still given by equation (20), i.e. when $a^h = 0$ and $a^l > 0$ then we obtain:

$$\left(y^h\theta^h - y^l\theta^l\left(1-a^l\right)\right)k = c\left(\hat{e}_I\right). \tag{21}$$

In this case, we now obtain that $\hat{e}_N > \hat{e}_I$ as low productivity immigrants are worse of than natives in terms of a lower transition rate into a job $\left(\theta^l\right)^\alpha(1-a) < \left(\theta^l\right)^\alpha$, and lower wages and high productivity immigrants have the same wages and employment probability as natives. Hence, due to that uneducated immigrants are relative worse of than natives, immigrants in this case experience stronger incentives for acquiring education that natives.

In the third case, where $a^h = a^l = 0$ and $\lambda_i^h = \lambda_i^l > 0,\ i = N, I$,[9] we obtain

$$y^h\theta^h\left(1 + \frac{\lambda_I}{(\theta^h)^\alpha}\right) - y^l\theta^l\left(1 + \frac{\lambda_I}{(\theta^l)^\alpha}\right) = \frac{1}{k}c\left(\hat{e}_I\right). \tag{22}$$

$$y^h\theta^h\left(1 + \frac{\lambda_N}{(\theta^h)^\alpha}\right) - y^l\theta^l\left(1 + \frac{\lambda_N}{(\theta^l)^\alpha}\right) = \frac{1}{k}c\left(\hat{e}_N\right). \tag{23}$$

Thus, if immigrants and natives have equal networking opportunities, then they acquire equal education whereas better networking opportunities for natives than immigrants will tend to raise education for natives relative to immigrants. This is summarised in the following Proposition.

[9] We assume that networking is equal for educated and uneducated workers in order the isolate the impact of different networking for natives and immigrants.

Proposition 2. In case 1, where negative attitudes are present in both the high and low productivity sector, $a^h = a^l > 0$, and networking of natives and immigrants are equal to zero, $\lambda_i^m = 0,\ m = h, l,\ i = N, I$, natives acquire more education than immigrants, that is, $\hat{e}_I > \hat{e}_N$. In case 2, where negative attitudes are present in the low productivity sector only, $a^l > a^h = 0$, and networking of natives and immigrants are equal to zero, $\lambda_i^m = 0,\ m = h, l,\ i = N, I$, then immigrants acquire more education than natives $\hat{e}_I < \hat{e}_N$. Finally, in case 3, without negative attitudes, but including networking, $a^h = a^l = 0$ and networking of natives and immigrants are different from zero and equal for educated and uneducated workers, $\lambda_i^h = \lambda_i^l = \lambda_i > 0,\ i = N, I$, when natives experience more networking than immigrants, $\lambda_N > \lambda_I$, natives acquire more education than immigrants, that is, $\hat{e}_I > \hat{e}_N$.

3 Equilibrium

The equilibrium is derived by solving equations (8), $m = h, l$, (14), (15), (16), (17), (20) and (19) in case one, (21) in case two for $m = h, l$ and equations (46) and (45) in case three. That is, in order to isolate the importance of the two potential channels for the difference between immigrants and natives in terms of educational choice, we first disregard networking effects, and then examine the impact of negative attitudes on the equilibrium variables. Next, we disregard negative attitudes and examine the impact of networking. For all proofs see Appendix *A*.

3.1 Negative Attitudes

We let $\lambda_I^m = \lambda_N^m = 0,\ m = h, l$. In case 1 we obtain that equations (20) and (19) determine $\hat{e}_I$ relative to $\hat{e}_N$ for given labour market tightness in sector h and l. In this case, $\hat{e}_I/\hat{e}_N > 1$, less immigrants than natives acquire education. From equation (9), $m = h, l$, we can show that $\theta^h \geq \theta^l$ as $\theta^h < \theta^l$ is not a possible solution. From equations (14) and (16) as well as (17) and (15) we note $\phi_I^m > \eta_I^m,\ m = h, l$, and that $(1 - \hat{e}_N)/(1 - \hat{e}_I) > \hat{e}_N/\hat{e}_I$ tends to imply that $\eta_I^l > \eta_I^h,\ \phi_I^l > \phi_I^h$, that is, that there is a larger share of employed and unemployed immigrants among the uneducated workers than among the educated workers. However, the other part of the denominators of equation (14) - (17) is decreasing in θ^m. For the share of educated natives relative to immigrants being relatively high, the impact from relative education levels will dominate resulting in $\eta_I^l > \eta_I^h$ and $\phi_I^l > \phi_I^h$. In case 2, equations (20) and (19) result in $\hat{e}_N/\hat{e}_I > 1$, more immigrants than natives acquire education. From equations (10) and (11) we can show that $\theta^h \geq \theta^l$ as $\theta^h < \theta^l$ is not a possible solution. Furthermore, from equations (14) and (15) we obtain that $\phi_I^l > \eta_I^l$, that is, the share of immigrants among the unemployment uneducated workers is higher than the share of immigrants among the employed uneducated workers.

3.2 Networking

In this subsection we assume away negative attitudes, that is, we let $a^m = 0$ and consider the impact of networking on education by inspection of equation (22) and (23). If both

natives and immigrants, as well as educated and uneducated workers experience the same networking, $\lambda_i^m = \lambda$, then natives and immigrants receive the same educational level and thereby from equation (14) and (16) we note that the fractions of immigrants among the employed are identical for firms employing educated and uneducated workers and therefore also labour market tightness for the two sectors, $\theta^h = \theta^l$, see equation (12), $m = h, l$.

In Case 3, where natives experience more networking than immigrants, $\lambda_N^h = \lambda_N^l > \lambda_I^h = \lambda_N^l$ then using equations (22) and (23) we can show that natives educate more than immigrants, $\hat{e}_N/\hat{e}_I < 1$, and therefore that $\hat{e}_N/\hat{e}_I < (1-\hat{e}_N)/(1-\hat{e}_I)$, which implies that the fraction of immigrants among the employed educated workers tend to be lower than the fraction of immigrants among the uneducated workers, see equation (16) and (14). However, the relative size of η_I^l and η_I^h will depend on the relative size of θ^h and θ^l. By inspection of equation (12) for $m = h, l$ we can show that the relative size of θ^h and θ^l is indeterminate.

4 Negative Attitudes and Immigration

Finally, in this section we examine what happens to the equilibrium variables, education in particular, when negative attitudes become more pronounced or the fraction of immigrants increases.

4.1 Negative Attitudes

In the first case, where $a^h = a^l = a$, an increase in negative attitudes directly reduces labour market tightness for the sector supplying jobs to educated workers as well as firms supplying jobs to uneducated workers, see equation (9). Also, a higher a has a direct positive effect on the fraction of unemployed immigrants among the workers in both sectors as well as a direct negative impact on the fraction of employed immigrants in both sectors. Furthermore, a higher a reduces the fraction of educated immigrants relative to the fraction of educated natives, $(1-\hat{e}_N)/(1-\hat{e}_I)$ increases and $\hat{e}_N/\hat{e}_I$ falls (see equation (20) and (19)). Both the increase in a and the impact on relative education will increase the fraction of immigrants among the uneducated unemployed workers, ϕ_I^l increases, whereas the impact on the fraction of immigrants among the employed is undetermined, η_I^h may increase or fall. This increase in ϕ_I^l will tend to reduce labour market tightness for the sector supplying jobs to uneducated workers as more immigrants in the unemployment pool will reduce the profitability of supplying a jobs, whereas if η_I^l increases it will tend to increase labour market tightness in this sector as both native and immigrants wages fall in this sector. In case labour market tightness is below one, θ^l falls as the positive impact through lower wages is not dominating. With respect to the sector employing educated workers, the increase in a reduces the fraction of employed immigrants, both directly and through the increase in $(1-\hat{e}_N)/(1-\hat{e}_I)$. The increase in a tends to increase the fraction of unemployed immigrants among the educated workers but the increase in $(1-\hat{e}_N)/(1-\hat{e}_I)$ tends to reduce it. The impact on labour market tightness in the sector employing educated workers is therefore ambiguous.

For the second case, that is, where $a^l > a^h = 0$, an increase in negative attitudes directly increases the number of educated immigrants and has no direct impact on the number of educated natives. Therefore $\hat{e}_N/\hat{e}_I$ increases and $(1-\hat{e}_N)/(1-\hat{e}_I)$ falls. The increase in a will tend to increase the fraction of unemployed immigrants in the sector employing uneducated workers and the impact on relative education will tend to reduce the fraction of immigrants among the uneducated unemployed workers, making the impact on ϕ_I^l ambiguous, whereas the impact on the fraction of immigrants among the employed hired in the sector hiring uneducated workers is negative, η_I^l tends to fall. This latter impact will tend to decrease wages for all workers in sector l and the impact from higher a will tend to reduce wages for immigrants further. This increase in a will tend to reduce labour market tightness in sector l directly as less jobs will be formed, and indirectly if ϕ_I^l increases as then more immigrants will be in the unemployment pool for uneducated workers. On the other hand, lower wages will tend to increase labour market tightness for sector l. The impact on labour market tightness in sector l is thus ambiguous. In case labour market tightness in sector l falls, the impact will be lower for immigrants than for natives, which will tend to increase the incentives for education less for immigrants than natives. In case labour market tightness in sector l increases, the increase will be smaller for immigrants than natives and therefore reduce the incentives for education less for immigrants than natives. The supply of vacancies in the sector employing educated workers is unaffected.

As a caveat, notice, that we could allow for the possibility that negative attitudes affect the value of being unemployed also directly, and not only indirectly through wages and employment chances. This can be taken into account in the empirical investigation, where the impact on education is considered. To conclude

Proposition 3. In the absence of networking effects, we consider two cases. In case 1 where negative attitudes are equally present in the two sectors, $a^h = a^l = a > 0$ an increase in negative attitudes reduces the fraction of educated immigrants relative to the fraction of educated natives, $(1-\hat{e}_I)/(1-\hat{e}_N)$ falls. In case 2, where negative attitudes exist in the sector employing uneducated workers only, $a^l > a = 0$ then an increase in a^l will increase the fraction of educated immigrants relative to the fraction of educated natives, $(1-\hat{e}_I)/(1-\hat{e}_N)$ increases. The proof follows directly from the description of the equilibrium in Appendix A

4.2 Immigration

In this section, we examine the impact on labour market tightness, wages, education and unemployment from more immigration. We assume that networking for $\lambda_I(I)$ is increasing in the fraction of immigrants, $\lambda_I'(I) > 0$ and networking for natives therefore is decreasing in the fraction of immigrants, $\lambda_N(I)$, $\lambda_N'(I) < 0$. Recall that we have more natives than immigrants and therefore $N > I$ implying that $\lambda_N > \lambda_I$ if networking is of a relative simple form, as for example given in footnote (5). More immigrants

will increase networking for immigrants and reduce it for natives. By inspection of equation (22) and (23) we note that this will increase the number of immigrants acquiring education and reduce the number of natives acquiring education, for given labour market tightness. Therefore $\hat{e}_N/\hat{e}_I$ increases and $(1-\hat{e}_N)/(1-\hat{e}_I)$ falls. This tends to decrease the number of immigrants among the workers in sector l and increase the number of immigrants among workers in sector h but therefore also to increase wages in sector l and to reduce them in sector h. The direct impact on networking will reduce wages for natives and increase wages for immigrants. The direct impact on $\eta_I^m,\ m=h,l$ from a higher I and therefore higher λ_I and lower λ_N is positive which together with the impact from education will tend to increase η_I^h but have an ambiguous impact on η_I^l. If we modify the functional form of λ_i^m, so that $\lambda_i^{m\prime}(i)>0$ and $\lambda_i^{m\prime\prime}(i)<0$ then the impact on natives will be tiny.

Proposition 4. In case 3, that is, when negative attitudes are equal to zero, $a^m=0$, and the fraction of immigrants is lower than the fraction of natives, $N>I$ implying $\lambda_N>\lambda_I$ more immigration increases the fraction of immigrants acquiring education and reduces the fraction of natives acquiring education.

The proof follows directly from the description of the equilibrium in Appendix A.

5 Simulations

In this section we illustrate the change in negative attitudes in case 1 and 2 and a change in immigration in case 3. The discount rate is set to $\rho=0.1$, the separation rate is $s=0.1$ (See Millard and Mortensen 1997), $\alpha=0.5$ (Petrongolo and Pissarides 2001), y_l is normalised to one, and y_h is set equal to 2.7 to obtain a relative large difference between productivity levels in the two sectors and sufficient incentives to acquire education. We consider Denmark as this is the country we analyse in the empirical analyse in the Section below. The fraction of immigrants was around $I=0.1$ in Denmark in 2015 (www.dst.dk). The hiring costs are set equal to $k=0.32$ in order to match an unemployment rate $N\cdot u^h+I\cdot u^l=0.06$ in Denmark in 2015 (www.dst.dk) when $a=0.21$ (votes for anti-immigration parties in Denmark in 2015, see next Section) in case 1 and 2 and equal to $k=0.35$ in case 3.

In case 1, with equal discrimination among uneducated and educated workers, an equal increase in discrimination will directly reduce the profitability of supplying a vacancy and as it will also reduce the fraction of educated immigrants and therefore reduce the profitability of supplying a vacancy in sector l as well as increase the fraction of uneducated immigrants, the reduction of labour market tightness will be larger for sector l than for sector h. The impact on labour market tightness is, however small, as native wages are hardly affected, and immigrant wages for educated workers fall significantly and wages received by uneducated immigrants fall a little less. Concequenly, mainly due to the direct effect and a little through the fall in labour market tightness, unemployment for immigrants increases, whereas the impact on natives' unemployment

is tiny. The result is that the fraction of immigrants among the employed uneducated workers, η_I^h increases, and among the uneducated workers it falls, η_I^l falls.

[Figure 1 about here.]

When there is only discrimination in sector l the impact of a higher a^l on labour market tightness in sector l is similar to in case 1, whereas the impact on education is different. Here, as it becomes less attractive to remain uneducated when negative attitudes towards uneducated immigrants becomes more severe, more immigrants will acquire education. Therefore the fraction of immigrants among the employed uneducated workers fall. Wages for uneducated immigrants fall and therefore the reduction in labour market tightness in the sector hiring uneducated workers decreases so little that unemployment for uneducated native workers is hardly affected and unemployment only increases for uneducated immigrants. Educated workers are not affected.

[Figure 2 about here.]

Regarding case 3, an increase in immigration and thereby networking for immigrants will increase the profitability of supplying a vacancy as immigrants now become more attractive to hire and this increase, for reasonable functional forms, is more important than the reduction in profitability related to natives. Hence $\eta_I^m,\ m = h, l$ and $\theta^m,\ m = h, l$ increase. Networking directly as well as indirectly affects employment and therefore unemployment and this results in that, despite labour market tightness increase for all workers, unemployment decreases the most for educated immigrant workers, a little less for uneducated immigrants and actually increases for natives. Hence, reduced networking for immigrants increases the employment prospects the most for educated immigrant workers and similarly reduced networking for natives is the most important for educated natives and therefore more immigrants acquire education and fewer natives acquire education, $\hat{e}_I$ decreases and $\hat{e}_N$ increases. The impact on wages is small.

[Figure 3 about here.]

To sum up, the theoretical analysis as well as the simulations performed so far, show that in case negative attitudes are equally present in the sector hiring uneducated immigrant workers as well as in the sector hiring educated immigrant workers, case 1, then more severe negative attitudes reduces education for immigrants relative to for natives. In case two, where only uneducated immigrants workers potentially experiences negative attitudes towards them, more severe negative attitudes raise immigrant education. Finally, more immigrants and thereby better networking opportunities for immigrants, tend to raise the education level of immigrants. The following Empirical Section uses Danish register data to examine the impact of negative attitudes and networking on immigrants' educational level.

6 Empirical Analysis

Whether negative attitudes towards immigrants can explain the educational gap between natives and immigrants depends on precisely what types of immigrants are affected by negative attitudes. From our theoretical model, we have two separate predictions with respect to negative attitudes. In the first case, natives acquire more education than immigrants when negative attitudes affect both high and low productivity sectors. In the second case, immigrants acquire more education than natives when negative attitudes affect only low productivity sectors. In the first, negative attitudes should decrease immigrant education while in the second, negative attitudes should increase immigrant education.

We provide evidence on which of these two opposite predictions with respect to negative attitudes is most plausible using detailed Danish data to examine empirically the relationship between negative attitudes and immigrant education during a time of strongly increasing negative attitudes towards immigrants during the European Migrant crisis. We first examine this relationship using aggregated municipality level data in order to capture the overall relationship between negative attitudes and education and exploit the panel nature of municipality data. In addition, we examine the third case from the theoretical model by analysing the correlations between a broad measure of networking and immigrant education. We then turn to examine this relationship at the individual level, where we can more precisely account for individual-specific factors which may impact the decision to attend high school. In addition we consider whether the quantity (measured as the fraction of the municipal population of the same nationality) or quality of a network (measured as the fraction of same nationality individuals who are educated or employed) matters by examining the strength of the associations between these different measures of an individual's potential network and immigrant education.

Lacking a suitable instrument for the endogeneity of negative attitudes at the timing of the high school decision of young immigrants later in life, we assess the importance of omitted unobservable factors to examine how much the associations between negative attitudes and education depend on unobservable factors. We perform a bounding exercise developed in Oster (2016) who builds upon the work of Altonji et al. (2005) which will inform our opposite signed theoretical predictions. By doing so, we document the extent to which the evidence suggests that one of our theoretical cases is more plausible. If we see a relationship between negative attitudes and immigrant education which is bounded away from zero under reasonable assumptions on the importance of unobservables, this would suggest a rejection of the opposite theoretical prediction as unobservables would need to be very important for the opposite effect to be true.

6.1 Data & Institutional Setting

To provide evidence on which of these three theoretical cases is more consistent with empirical findings, we consider data for Denmark in 2015. Denmark is chosen for two reasons. Firstly, there is detailed and rich data available both at the municipality and individual level, where we have information on every resident of Denmark from 1980-2015

for the whole population. Danish Register Data, made available by Statistics Denmark, is a database interlinked across various government and administrative sources by an anonymous personal identification number where we track individuals over time and have detailed data on: education history (information such as where an individual attends school and what qualification they are studying towards and have already achieved); demographic information such as gender, age, and municipality of residence; immigration history including an individual's nationality, exact date of immigration, and whether an individual is a 1st or 2nd generation immigrant; and household characteristics such as family composition and parental information. As individuals are linked to their parents, it is possible to observe factors such as parental education, employment history,[10] and marital status as well.

Using an individual's municipality of residence, we are able to aggregate information from the individual level to the municipality level. For example, using information on nationality, education, and employment we can construct an immigrant's potential network as the fraction of individuals of the same nationality who reside in the same municipality, who are educated beyond the compulsory schooling level, and who are employed. In addition, we are able to not only control for municipality specific factors when analysing an individual's high school education decision, but also examine the relationships between education and negative attitudes both at the municipality level as well as the individual level.

Secondly, the educational structure of Denmark allows us to examine an individual's decision of whether to attend high school, which is non-compulsory, after the completion of compulsory education at a young age. In Denmark, students' first year in high school will be when they are around 16 years old and only the first 9 years of schooling are obligatory for the cohorts examined.[11] As high school starts later in life than, for example, in the USA, students will be more mature and involved in their own education. This is especially true in our case as the child, rather than parent, is heavily involved with the school in the education process at the time of deciding to attend high school—for example it is the child who accesses and completes the application form and not the parent. Additionally, as the prospective high school students are young when this decision is made, they will usually stay at home when attending high school. While high school is optional, most of the students beginning high school will graduate with a high school degree. The high school decision is also of importance when it comes to educational choices later in life: if high school has not been chosen, it will be almost impossible for a student to move onwards into higher education in the Danish education system. Therefore the high school education has more long-reaching implications than simply obtaining a high school degree in itself.

In 2015, the general election campaign had a huge emphasis on immigration following the European migrant crisis which became an issue of increasing political and social

[10] Employment as well as earnings data are presently only available until 2013. 2013 values are used for employment and earnings, and results are robust to dropping such variables from our analysis.

[11] Only recently a grade zero has become obligatory.

importance leading up to the 2015 election. We measure negative attitudes using the fraction of votes in a given municipality for Dansk Folkeparti, due to their emphasis on reducing immigration.[12] From the 2011 to 2015 general election, the fraction of votes for Dansk Folkeparti increased greatly and across all municipalities. One potential concern in using voting data is that immigrants may not vote for parties who emphasise reducing immigration. This would be problematic for our measure of negative attitudes as municipalities with higher concentrations of immigrants could actually have few votes for Dansk Folkeparti. However, the voting behaviour of immigrants is unable to influence our measure of negative attitudes as only natives are permitted to vote in general elections.[13] As such, the voting data is a reasonable measure of the negative attitudes of natives against immigrants. In some specifications, which are described in further detail in section 7.1, we also supplement the 2015 data with similar data from 2011 to examine changes in the fraction of votes for Dansk Folkeparti.

Our sample at the individual level is composed of natives, 1st generation immigrants, and 2nd generation immigrants born in either 1997 or 1998 who will be deciding whether to attend high school in the 2015 school year. In addition, the sample is constrained to those who have previously completed ninth grade.[14] This sample restriction is imposed for two reasons: (1) this restriction ensures individuals are actually deciding whether or not to attend high school and (2) so GPA is observable in compulsory classes in 9th grade which is introduced as a control variable later as a robustness check.

In our final sample, we observe the high school attendance in 2015 of our sample of prospective students who have completed compulsory education and are deciding whether to attend high school. In the municipality level analysis, this information is aggregated to create the fraction of our sample attending high school in 2015 in each municipality. In addition, in order to exploit the panel nature of municipality level data, we supplement our 2015 dataset with comparable data from 2011 with the same sample restrictions for those born 1993 or 1994, who are of the same age when deciding to attend high school in 2011. In our individual level analysis, we use a binary variable indicating whether or not a prospective student is attending high school.

Appendix Figures A1 and A2 show the dispersion of our negative attitudes measure, the fraction of votes for Dansk Folkeparti in 2015, and Appendix Figures A3 and A4 show the fraction of 1st and 2nd generation immigrants residing in the municipality across

[12] Dansk Folkeparti's webpage (http://www.danskfolkeparti.dk/
The_Party_Program_of_the_Danish_Peoples_Party): *Denmark is not an immigrant-country and never has been. Thus we will not accept transformation to a multiethnic society.*

Denmark belongs to the Danes and its citizens must be able to live in a secure community founded on the rule of law, which develops along the lines of Danish culture.

It ought to be possible to absorb foreigners into Danish society provided however, that this does not put security and democratic government at risk. To a limited extent and according to special rules and in conformity with the stipulations of the Constitution, foreign nationals should be able to obtain Danish citizenship.

Other Danish parties may also be interested in limiting immigration but not to such an extent that it is on their official webpage.

[13] Immigrants who have resided in Denmark long enough and gained citizenship are also eligible to vote.

[14] Results not imposing this sample constraint are unchanged from those presented below.

Denmark. Votes for the anti-immigration party are relatively scattered across Denmark, with a high concentration of municipalities with a large fraction of votes for the anti-immigration party near the Danish/German border, in Mid-Jutland, West Zealand and on Mors. Immigrants are also scattered across Denmark, with the exceptions that they tend to reside closer to large cities (Aarhus, Odense, and the greater Copenhagen area).

6.2 Assessing the Importance of Unobservables

Causal estimation of the impact of negative attitudes on an individual's education presents an empirical challenge. Identification of a causal effect is complicated by selection issues, that is the selective location and mobility of immigrants. Immigration as well as where immigrants settle is non-random—selection resulting from location decisions could be driven by parental characteristics, both observable and unobservable, or some other unobservable factor and these are potentially correlated with our negative attitudes and networking measures as well as the child's educational decision. Selective location of immigrants is of concern not only initially at the time of immigration but also in subsequent mobility: parents may move, or indeed may choose to not move, in response to exposure to specific factors in order to place their child in a specific municipality before their child's high school decision is made.

Previous studies have relied on exogenous placement measures of immigrants, in particular of refugees, in order to provide a source of exogenous assignment in an immigrant's location. For previous studies, this source of initial exogeneity resolving the endogeneity problem of initial immigrant location is sufficient, as their research design examines either short run impacts or exposures to environmental factors which take effect immediately. However, for the purposes of this study, an individual's high school decision may come years after initial immigration and it isn't clear that the initial exposure to negative attitudes, which is the randomisation these policies exploit, is relevant. Indeed, even if a randomised placement policy were exploited, it could be subsequent exposure to negative attitudes years after exogenous assignment and closer to the time of an individual's decision to attend high school which impact an immigrant's education decision.

Lacking a suitable instrument to overcome the endogeneity of immigrant location at the time of the decision to attend high school, we test the proportional importance of selection on unobservable characteristics in relation to observables in the descriptive relationship between negative attitudes and education. Such unobservable factors may drive immigrant location, and we assess whether we are able to bound an impact of negative attitudes away from zero using a procedure developed in Oster (2016). As previously explained, this is particularly desirable in relation to our theoretical model: the two theoretical predictions with respect to negative attitudes have opposite impacts on youth education. In the first case, there is a negative impact of negative attitudes on educational attainment while in the second case there is a positive impact. If we are able to bound an effect away from zero, this is both informative and useful—it provides suggestive evidence against one of these two theoretical cases as an effect either negative

or positive suggests unobservables would have to be very important for the opposite theoretical case to be supported.

7 Empirical Analysis - Estimation

In this section, we provide empirical evidence on the model predictions regarding the impact of negative attitudes on education for 1st and 2nd generation immigrants separately during a period of strongly increasing negative attitudes towards immigrants. Specifically, the first case of our theoretical model when negative attitudes impact all types of immigrants would predict a negative coefficient for negative attitudes regressing immigrant education on negative attitudes. However, in the second case of the theoretical model when negative attitudes only impact low-educated immigrants, we would expect a positive coefficient for negative attitudes. We present a host of evidence, first at the municipality and then at the individual level, and conduct a bounding exercise to assess whether the impact of negative attitudes on education can be bounded away from zero which would suggest one of these two theoretical cases regarding negative attitudes, that is either case 1 or 2, is more plausible. Finally, we consider three different measures of networking in order to see whether the quantity of same nationality individuals matters or the quality matters.

7.1 Municipality Level Analysis

To first understand the correlation between immigrant high school attendance and the general prevalence of negative attitudes and networking in a municipality, we aggregate our data at the individual level to the municipality level to present estimation results at the municipality level. These impacts may be both direct and indirect, in the sense we may capture something different than if we were to only consider individual level data. Furthermore, the macroeconomic nature of the theoretical model and the fact that both the negative attitude and networking variables are measured at the municipality level make the municipality level analysis a natural starting point. As mentioned, we supplement our 2015 data with data from 2011 of a sample of comparable immigrants and natives born 1993 or 1994 deciding to attend high school to exploit the panel nature of the municipality data.

Table 1 presents descriptive statistics of the results at the municipality level data. While the total number of municipalities in Denmark during this time period is 98, we drop 3 municipalities which have either no 1st or 2nd generation immigrants residing in them in either 2015 or 2011.[15] From Table 1, it is seen that the average share of 1st generation immigrants in high school is about 67% while it is larger for natives, 84%. Interestingly, the high school attendance of 2nd generation immigrants appears to be more similar to that of natives than that of 1st generation immigrants. Our negative attitudes measure has an average value of 18% over 2011 and 2015, and the sudden increase in negative attitudes from 2011 to 2015 can also be seen, where the average increases by almost 10 percentage points.

[15] These municipalities are Ærø, Fanø, and Læsø.

[Table 1 about here.]

We estimate the high school decision at the municipal level using the following fixed effects model :

$$(1 - \hat{e}_{rt}) = \beta_0 + \beta_1 a_{rt} + \sum_{\eta} \beta_{rt\eta} Controls_{rt\eta} + \gamma_t + c_r + \varepsilon_r, \tag{24}$$

$$r = 1, ..., 95 \; t = 2011, 2015.$$

$$(1 - \hat{e}_{rt}) = \beta_0 + \beta_1 \lambda_{rt} + \sum_{\eta} \beta_{rt\eta} Controls_{rt\eta} + \gamma_t + c_r + \varepsilon_r, \tag{25}$$

$$r = 1, ..., 95 \; t = 2011, 2015.$$

We examine whether negative attitudes, a_{rt}, and networking, λ_{rt}, have any impact on the fraction of young immigrants attending high school in equations (24) and (25) respectively. The left hand side variable, $(1 - \hat{e}_{rt})$, is either the fraction of 1st or 2nd generation immigrants attending high school in year t (our main group of interest) or, for comparison purposes, the same fraction for natives in municipality r. We would expect both the negative attitudes and the network variables to be significant for immigrants while being insignificant for natives. For networking, we consider two potential measures for λ_{rt} to assess whether the quantity of individuals or the quality of individuals matters: (1) the fraction of immigrants aged 16-64 residing in a municipality (quantity) and (2) the fraction of immigrants of western origin and non-western origin aged 16-64 residing in a municipality who are employed (quality).[16] For natives, these are the same measures, but using the fraction of natives instead. The inclusion of both year fixed effects (γ_t) and municipality fixed effects (c_r) controls for differences in the fraction of individuals attending high school over time and for municipality specific time-invariant characteristics. As additional control variables, we include median income per capita in the municipality, population density, and the percentage of the population aged 18-64 with short tertiary education (corresponding to short-cycle tertiary education and vocational education), high school education (corresponding to upper secondary education, but not vocational), medium tertiary education (corresponding to the bachelor education level), and long tertiary education (corresponding to the masters and PhD education level).

[Table 2 about here.]

Table 2 presents estimation results of equation 24 in columns (1)-(3) which show the correlation between negative attitudes and the fraction of natives, 1st, and 2nd generation immigrants attending high school respectively. Columns (4)-(6) estimate (25) using the fraction of immigrants residing in a municipality as a measure of λ_{rt} while columns (7)-(9) use the fraction of immigrants employed as a measure of λ_{rt}, for natives, 1st, and 2nd generation immigrants respectively.

[16] Data on employment by western/non-western is extracted from statistikbanken.dk, table RAS201.

Across all specifications, we find no significant correlation between negative attitudes and the school choice for either immigrants or natives. For 1st generation immigrants, these effects are positive, but never significant, while for natives, these effects are close to zero. For 2nd generation immigrants, these associations are negative, but again, never significant. The lack of any correlation between negative attitudes and education is contrary to the expectations of our theoretical model, which predicts a negative impact of negative attitudes on immigrant education in case 1 and a positive impact in case 2.

For networking, the expected result from the theoretical model would be positive, but while there is a marginally significant positive correlation for 2nd generation immigrant education and the fraction of immigrants in a municipality in column (6), little association is seen between the two different networking measures and education. This is then consistent with the third case of the theoretical model for a functional form where $\lambda_i^{m\prime}(i) > 0,\ \lambda_i^{m\prime\prime}(i) < 0$, so that networking effects tend toward zero for very large fractions of an ethnic group. The overall weak correlations found may be due to the fixed effect estimation which uses variation within municipalities. However, as the fixed effect approach is necessary to best control for potential confounding municipality level factors, the results at the macro level fail to provide much insight into the predictions of our theoretical model regarding negative attitudes in case 1 and 2.

The natural next step is therefore to examine in further detail the insignificant correlations between negative attitudes and the fraction of immigrants attending high school using individual level data. Moving to the individual level enables many individual and family level factors to be taken into account which cannot be at the municipality level. We are also able to more precisely measure an individual's potential network using information about their home country. Hence in the next subsection we model the educational choice of the individual young 1st and 2nd generation immigrants, and again natives for comparison, based on information about negative attitudes and networking possibilities in their municipality.

7.2 Individual Level Analysis

Using individual level data on those immigrants and natives born in 1997 or 1998 living in Denmark in 2015, Table 3 presents summary statistics of all relevant variables included in the estimation. As in our municipality level analysis, we see that, on average, 1st generation immigrants attend high school less and perform worse in 9th grade compared to natives and 2nd generation immigrants, who are likely to be more assimilated.[17] Unsurprisingly, immigrant households are generally lower educated, less employed, and have lower incomes compared to native households. Examining the negative attitudes measures, both the level and change in negative attitudes are similar to what was seen in Table 1 and the measure of negative attitudes is similar across natives, 1st, and 2nd generation immigrants. For transparency reasons, we consider first the negative attitude measure and next networking. Our sample is roughly divided evenly between males and females.

[17] The individual sample is conditional on non-missing parental education, resulting in higher fractions of enrolled in any high school.

[Table 3 about here.]

7.2.1 Negative Attitudes

We estimate the following equation separately for our sample of natives, 1st, and 2nd generation immigrants:

$$(1-\hat{e}_i) = \beta_0 + \beta_1 a_r + \beta_2 ParentEdu_p + \sum_{\eta} \beta_{i\eta} HHControls_{i\eta} + \beta_3 Male_i + \sum_{\mu} \beta_{r\mu} MuncControls_{r\mu} + Origin_i + \varepsilon_i, \quad (26)$$

where $(1-\hat{e}_i)$ is the educational decision of individual i represented by a dummy variable if an individual is attending any high school or not, which is determined by: a_r, negative attitudes captured by the fraction of votes for Dansk Folkeparti in municipality r; $ParentEdu_p$, the years of education of parent p where $p = mother, father$; $HHControls_i$, controls for gender as well as additional household controls such as parental employment status in December of the previous year, total household income, and parental marital status; $Male_i$, a dummy variable to control for gender; $MuncControls_r$, municipal controls from equation (24) including population density, median income, and the general education levels in a municipality which may affect an individuals education decision; $Origin_i$, origin country dummies that capture educational differences across specific immigrant home countries; and ε_i, residual unobservables which are clustered at the municipality level. As before, in order to compare the effects for immigrants, we separately estimate equations (26) for natives, 1st, and 2nd generation immigrants.

Table 4 presents results estimating (26) for natives, 1st generation, and 2nd generation immigrants in columns (1), (2), and (3) respectively.[18] Examining 1st generation immigrants reveals those residing in areas of higher negative attitudes are more likely to attend high school, where a 1 percentage point increase in the fraction of votes for Dansk Folkeparti is associated with a 0.9 percentage point increase in the probability of attending high school. From an average of 79.5% of our 1st generation immigrants attending high school, this correlation would translate to about a 1% increase in high school attendance associated with a 1 percentage point increase in negative attitudes. For natives and 2nd generation immigrants, there is no relationship between negative attitudes and education while parental and household control variables are strongly and significantly correlated with both native and immigrant high school attendance.

[Table 4 about here.]

OLS results at the individual level indicate, consistent with case 2 of the theoretical model, there may be a positive relationship between negative attitudes and 1st gen-

[18] We have also split the immigrant samples by whether an immigrant is from an OECD country or not to examine potential differences in immigrant backgrounds. While the results are statistically insignificant as the resulting sample sizes are small and we begin to lose power, positive associations are seen across both OECD and non-OECD backgrounds. Such results are available upon request to the authors.

eration immigrant education, and subsection 7.3 examines how much of this observed relationship is driven by omitted unobservable factors of immigrant families.

7.2.2 Networking

Appendix Table A1 examines the correlation between networking and the decision to attend high school measuring networking as: (i) the fraction of individuals aged 18-64 residing in a municipality of the same nationality in columns (1)-(3), (ii) the fraction of same nationality aged 18-64 educated beyond the compulsory schooling level in columns (4)-(6), and (iii) the fraction of same nationality aged 18-64 employed in columns (7)-(9), all for the samples of natives, 1st generation immigrants, and 2nd generation immigrants respectively. We use three different measures of networking in order to see whether the quantity of same nationality individuals matters or the quality matters and estimate the following equation:

$$(1-\hat{e}_i) = \beta_0 + \beta_1\lambda_r + \beta_2 ParentEdu_p + \sum_{\eta}\beta_{i\eta} HHControls_{i\eta} + \beta_3 Male_i + \sum_{\mu}\beta_{r\mu} MuncControls_{r\mu} + Origin_i + \varepsilon_i, \quad (27)$$

which is identical to equation (26) but replaces our negative attitudes measure with one of the three relevant measures of networking λ_r. From our theoretical model we have in case three, that is, in the absence of negative attitudes but including networking, that an increase in networking will imply an increase in education.

In general, the results from the three Tables do not show much evidence of a strong correlation with networking measures and immigrant education. This correlation is strongest and statistically significant when measuring networking as the fraction of same nationality educated, where there is a stronger correlation for 1st generation immigrants compared to 2nd generation. However, the magnitude of these correlations is small, where a 1 percentage point increase in the fraction of same nationality individuals educated is associated with a 0.18 percentage point increase in the probability of attending high school, an order of magnitude much smaller than the correlation seen for negative attitudes. Similar to what was seen in the municipality level analysis, the results examining the potential importance of networking at best reveal small correlations between networking and immigrant high school attendance. This correlation is strongest for a higher fraction of individuals educated residing in the same municipality and for 1st generation compared to 2nd generation immigrants, suggesting the quality of ones network may matter.

While our theoretical model treats negative attitudes and networking separately, Table A2 in Appendix D presents results including both negative attitudes and networking measures in one table. Omitting the networking measure may bias the correlations seen between negative attitudes and high school attendance, but as the results on negative attitudes are unchanged from those not including the networking measures, we

continue to separate the impacts of negative attitudes and networking in line with our theoretical model.[19]

7.3 The Importance of Unobservables in Negative Attitudes

While our results show a strong positive association between negative attitudes and 1st generation immigrant education, to what extent this relationship reflects the importance of unobservable characteristics remains unclear; indeed the entire observed relationship could be attributable to the presence of correlated unobservables. Oster (2016) formalises a relationship between the association between selection on observables and unobservables and R-squared values to explain the potential importance of omitted variable bias. In the method, which builds upon the work of Altonji et al. (2005), movements in the coefficients and R-squared values identify the bias resulting from omitted variables. Formally, this assumes (i) a relationship between the covariance of the variable of interest, X, and observables and the covariance of X and unobservables (proportional selection, δ) and (ii) an R-squared from a hypothetical regression of the outcome of interest, Y, on X, observables, and unobservables (R_{max}) in order to quantify the ratio in the movements of the R-squared from a regression of Y on X ($\mathring{R}$), to a regression of Y on X and observables ($\tilde{R}$), to this R_{max} value. Under these two assumptions, the resulting omitted variable bias is a function of δ and R_{max}. When $\delta = 1$, unobservables and observables are equally important. When $\delta = 2$, selection on unobservables is twice as important as selection on observables. Both Altonji et al. (2005) and Oster (2016) suggest equal selection, when $\delta = 1$, as a reasonable bound. When $R_{max} = 1$, Y is fully explained by X and both observable and unobservable controls. As this may not be reasonable to assume,[20] Oster suggests a reasonable choice of $R_{max} = 1.3\tilde{R}$.

Two types of statements on the importance of unobservables result from these assumptions: (i) the degree of selection on unobservables compared to observables, δ, required to completely explain away the estimated effect of X on Y for a given R_{max} and (ii) statements of bounds of the estimated effect of X on Y for a given level of δ and R_{max}. We examine the sensitivity of the positive and significant effect of negative attitudes on high school attendance seen previously for males to unobservables in Table 5. Column (1) reports the raw effect of negative attitudes on immigrant's high school decision from a regression of Y on X controlling for municipality and gender controls. Column (2) is the controlled effect, including the complete set of control variables in equation (26), and acts as an upper bound for the estimated effect of negative attitudes on high school attendance. The reported R-squared value corresponds to $\tilde{R}$.

[Table 5 about here.]

Column (3) reports the bounded set taking the value from column (2) and the lower

[19] We have additionally interacted the networking measures with negative attitudes, which produces similar results, where the interaction terms are generally insignificant. Such results are available upon request to the authors.

[20] For example, this may overstate the total explanatory power of these potential variables. If $R_{max} = 1$, high school attendance can be completely explained, implying no optimization errors in an individual's optimal schooling and zero measurement error in data.

bound estimate assuming $\delta = 1$ and $R_{max} = 2 * \tilde{R}$ using the procedure developed by Oster (2016). The resulting bound suggests that, using reasonable values for the necessary assumptions, we could exclude the possibility that negative attitudes decrease high school attendance for male immigrants, suggesting that case 2 of the theoretical model is indeed supported by empirical evidence. Despite these relatively tight bounds, we can further investigate what properties, in terms of unobservables, would have to hold in order to explain away the entire positive effect of negative attitudes on education. This is crucial to examine in further detail as unobservables may have a major role in explaining the effects of negative attitudes on high school attendance seen previously. Column (4) reports the level of δ required for the effect of negative attitudes on high school attendance to be zero, and indicates that selection on unobservables would have to be more than 6 times greater than selection on observables in order for $\beta = 0$. Column (5) presents the value of R_{max} under which a positive coefficient remains assuming $\delta = 1$, and is particularly informative given the low R-squared values from our regressions. Assuming equal selection, $\beta > 0$ for all values of R_{max} less than 0.752.

Figures 4 and 5 demonstrate graphically the effects of increasing δ and R_{max} respectively measuring negative attitudes. The figures reveal that even with large values of δ, the relative importance of unobservables in relation to observables, the effect of negative attitudes on education remains positive. The figures also reveal that as R_{max} increases, we become increasingly less confident in excluding a negative effect of negative attitudes on education.

Accepting the limitations of this bounding exercise and acknowledging while we cannot rule out that there are other factors which may explain the positive correlations seen in Sections 7.1 and 7.2, our empirical findings suggest that negative attitudes do not decrease immigrant education. When accounting for the importance of unobservables, the bounding exercises conducted above seem to suggest unobservables would have to be very important or a large amount of an individual's high school attendance would be explained by observable and unobservable factors for the positive correlations seen previously for 1st generation immigrants to represent an opposite signed effect. These findings are consistent with rejecting the first case of our theoretical model, when both high- and low-productivity sectors are impacted by negative attitudes and negative attitudes decrease immigrant education.

[Figure 4 about here.]

[Figure 5 about here.]

8 Robustness of Micro-econometric Results

The results presented in Sections 7.2 and 7.3 provide suggestive evidence rejecting the first case of the theoretical model. However, it remains possible our previous estimation fails to isolate a relationship between negative attitudes and high school attendance. Subsection 8.1 examines how the results on negative attitudes and immigrant education change if negative attitudes are measured not as the level of votes for Dansk Folkeparti in

2015 but instead as the change in the fraction of votes from 2011 to 2015. In addition, we focus on the educational decision of young immigrants whose parents may either selectively locate to certain municipalities or move as a reaction to negative attitudes. While the results in Section 7.3 provide a detailed investigation into the importance of unobservables driving these location decisions, subsection 8.2 examines how our results change excluding those who have recently moved, for whom mobility may be a concern. Academic achievement prior to the decision to attend high school is also likely to be a strong determinant of subsequent high school attendance, and subsection 8.3 examines how our results change when taking into account compulsory schooling GPA. Subsection 8.4 separates our sample of 1st generation immigrants by gender to examine whether the results are similar across genders or if either gender is driving the relationship between negative attitudes and education.

8.1 Using the Change in Negative Attitudes

Table A3 in Appendix E presents results estimating (26) but using the change in the fraction of votes for Dansk Folkeparti from 2011 to 2015 instead of the level of votes in 2015. As there was a sharp increase in voting for Dansk Folkeparti during the European migrant crisis, it is informative to also examine how immigrant education is related to changes in our negative attitudes measure. In particular, if using the change in votes instead revealed drastically different results, we could be concerned that our measure of negative attitudes fails to adequately measure negative attitudes.

Similar patterns emerge as in Table 4: 1st generation immigrant education is positively associated with an increase in negative attitudes from 2011 to 2015 while there are positive associations for both natives and 2nd generation immigrants, where the association for natives is marginally significant.

Table A4 and Figures A5 and A7 present the bounding exercise from Section 7.3 using the change in the fraction of votes from 2011 to 2015 as a measure of negative attitudes. The results suggest similar findings to those using levels, although on the whole are less confidently able to bound the positive correlation away from zero and exclude the theoretical case where negative attitudes decrease immigrant education.

8.2 Examining Mobility of Immigrants

Tables A5 and A6 in Appendix E examine whether the suggestive evidence against case 1 of theoretical model is driven by those who have recently moved, a group for whom mobility may be a particular concern. If the results are similar, this indicates that movers are not driving our results while if the results are changed, this indicates that recent mobility among immigrants may be driving prior empirical analysis. Tables A5 and A6 replicate the results in Tables 4 and A3 for a sample of individuals who have resided in the same house for 3 or more years.[21]

On the whole, the results presented in Appendix E are unchanged compared to the main results. A positive and significant relationship between negative attitudes, both

[21] In the interest of brevity, only results restricting the sample of 3 or more years are reported. Results increasing this restriction to even more years, 6 or more years for example, are unchanged and are available upon request to the authors.

in levels and in changes, and high school attendance of a similar magnitude is seen for 1st generation immigrants, while the patterns observed previously for natives and 2nd generation immigrants are also similar. While not an indication of a positive causal relationship between negative attitudes and high school attendance, the results in Tables A5 and A6 support the suggestive evidence against the first case of our theoretical model, when negative attitudes decrease immigrant education, and it is reassuring to see similar results excluding those who have recently moved within Denmark.

8.3 Controlling for Ninth Grade Academic Performance

As each immigrant and native in our sample has completed compulsory schooling, 9thgrade at the time, we can also control for data on GPA in compulsory schooling. Performance in compulsory schooling before high school should be a fundamental determinant of how likely one is to attend high school and as such, controlling for GPA may be important. For example, it could be the results seen previously are attributable to the absence of controls important for high school attendance. However, academic performance in compulsory schooling may be directly impacted by negative attitudes—for instance, immigrants may be more or less motivated in response to negative attitudes to obtain education which could impact performance directly. Bearing this in mind, it remains informative to examine how the associations between negative attitudes and education change if we can control for student performance prior to deciding to attend high school.

Tables A7 and A8 control for GPA in compulsory schooling as well as the household and municipality controls included in Tables 4 and A3. To have a comparable subject between immigrants and natives, only GPA in math courses is used to measure GPA. Academic performance is assessed on a 7 point scale, where 12 corresponds to excellent performance, 10 very good, 7 good, 4 fair, 02 adequate, 00 inadequate, and -3 unacceptable, where any grade from 02 and above is passing. GPA is aggregate into 3 bins, a GPA from 10-12, a GPA from 4 to below 10, and a GPA from 2 to below 4, where the excluded category is a GPA below 2.

Tables A7 and A8 reveal, unsurprisingly, that math GPA is strongly positively associated with high school attendance, a relationship which is increasing with GPA. The relationship between negative attitudes and high school attendance remains positive and significant for 1st generation immigrants and relatively unchanged for natives and 2nd generation immigrants when controlling for GPA and reassuringly, results are robust to controlling for GPA, further supporting the evidence seen previously against the first case of our theoretical model.

8.4 1st Generation Immigrants By Gender

The results in Section 7.2 suggest evidence rejecting the first case of our theoretical model where negative attitudes decrease immigrant education, and it seems for 1st generation immigrants, negative attitudes do not decrease education. Table A9 separates the sample of 1st generation immigrants by gender to examine whether there are differences in the relationship between negative attitudes and education between males and females.

Columns (1) and (2) replicate column (2) of Table 4 using the level of negative attitudes for male and female 1st generation immigrants respectively while columns (3) and (4) replicate column (2) of Table A3 using the change in negative attitudes for males and females respectively. The results of Table A9 suggest the prior results on negative attitudes for 1st generation immigrants are mostly attributable to male immigrants and also suggest that we can more confidently exclude the first case of our theoretical model for male 1st generation immigrants rather than females.

9 Conclusion

We considered the impact of negative attitudes and immigration on educational choice of immigrants and natives. We did this theoretically and empirically.

Theoretically, we formulated a Becker-style taste discrimination model within a search and wage bargaining setting. We assumed that potential negative tastes towards immigrants implied that their transition rate was lower than the transition rate of a native worker. Furthermore, we allowed for networking effects, which increased the probability of obtaining employment. We included endogenous education, where a higher expected income as educated in terms of both employment chances and wages relative to the expected income as uneducated, increases the number of educated workers. We considered three different cases. In the first case, discrimination existed for all immigrants, while it was only present in the sector employing uneducated workers in the second case. In the third case, the impact of immigration on networking were important. We found that an increase in negative attitudes reduced education for immigrants relative to education for natives in the first case and increased education for immigrants relative to education for natives in the second case. Finally, in case three, we found that more immigration improved employment prospects for immigrants, and more so for educated than for uneducated workers, and thereby increased the fraction of educated immigrants due to increased networking.

Empirically, we considered an immigrant's high school attendance as a function of the variables in the theoretical model. Exploiting the panel nature of the data at the municipality level, we found little evidence of any correlation between negative attitudes and the fraction of immigrants attending high school. We also found little evidence of correlations for networking variables, and turned to estimation at the individual level in order to more precisely measure an individual's potential network but also to account for important household level controls. At the individual level, we found a positive correlation between negative attitudes, measured both in levels and changes, and 1st generation immigrant's high school attendance. We estimated a weak positive correlation between networking and high school attendance for immigrants, where the quality of networks seems to matter more for immigrants than the quantity of individuals in a potential network. Overall, our baseline empirical findings are inconsistent with the first case of the theoretical model, where negative attitudes are prevalent in all sectors hiring workers and more severe negative attitudes decrease the incentives of immigrants to acquire education as well as consistent with case two and three.

In order to say whether the positive associations between negative attitudes and high school attendance could be bounded away from zero, we conducted additional analysis accounting for the role of unobservable factors in biasing our estimates. Using a procedure developed in Oster (2016), we quantified how our estimates change depending on the degree of omitted variable bias due to unobservables. Doing so, we found that, under reasonable assumptions of the importance of unobservables, we were able to bound the estimated effect of negative attitudes on education for males away from zero. Thus, we find suggestive evidence rejecting the first case of our theoretical model which predicts that negative attitudes decrease immigrant education.

When negative attitudes are most prevalent in the uneducated sector, that is when the second case of the model is the most realistic one, then negative attitudes cannot explain the lower fraction of immigrants compared to natives attending high school. Rather, negative attitudes towards immigrants may actually induce more immigrants to continue school beyond the 9th grade and thus improve their employment chances, wages, and expected lifetime income significantly. However, it is important to remember that while negative attitudes may increase the probability of continuing education for those individuals at the margin of attending high school, those immigrants with high costs of obtaining education will suffer worse employment prospects and wages as a result of negative attitudes. Furthermore, better networking opportunities for natives than for immigrants may explain part of the educational gap between natives and immigrants. While we cannot exclude that variables other than negative attitudes and networking can explain the high school educational gap between immigrant and natives, the main empirical finding of this paper is that, at least for 1^{st} generation immigrants, discrimination towards immigrants cannot explain the educational gap between male immigrants and male natives, as male immigrants tend to avoid discrimination by acquiring further education.

References

[1] Andersson, F., Burgess, S. and Lane, J., 2014: Do as the Neighbors Do: The Impact of Social Networks on Immigrant Employment, Journal of Labor Research.

[2] Altonji, J., Elder, T., and Taber, C., 2005: Selection on Observed and Unobserved Variables: Assessing the Effectiveness of Catholic Schools, Journal of Political Economy, vol 113(1), 2005, 151-184, February.

[3] Bowlus, A. and Eckstein, Z., 2002: Discrimination and skill Differences in an Equilibrium Search Model, International Economic Review, vol 43(4), 2002, 1309-1345, November.

[4] Calvo-Armengol, A. and Jackson, M. O. 2004: The Effect of Social Networks on Employment and Inequality. American Economic Review 94(3), pp. 426-454.

[5] Damm, A. P., 2014: Neighborhood quality and labor market outcomes: Evidence from quasi-random neighborhood assignment of immigrants, Journal of Urban Economics 79, 139–166.

[6] Damm, A. P., and Dustmann, C., 2014: Does Growing Up in a High Crime Neighborhood Affect Youth Criminal Behavior?, American Economic Review, 104(6), pp. 1806-32.

[7] Dansk Data Arkiv, Survey 21174. For year 2002.

[8] http://www.danskfolkeparti.dk/The_Party_Program_of_the_Danish_Peoples_Party

[9] Edin, P., Frederiksson, P., and Åslund, O., 2003: Ethnic Enclaves and the Economic Success of Immigrants—Evidence from a Natural Experiment, The Quarterly Journal of Economics (2003) 118(1), pp. 329-357.

[10] Fontaine, F., 2007: A Simple Matching Model with Social Networks. Economic Letters, 94 (3).

[11] Flabbi, L., 2010: Gender Discrimination Estimation In A Search Model With Matching And Bargaining, International Economic Review, vol. 51(3), 745-783, 08.

[12] Galenianos, M., 2014: Hiring through referrals, Journal of Economic Theory, 152, 304-323.

[13] http://www.fremskridtspartiet.dk/page9.html

[14] Harmon, N., 2015: Immigration, Ethnic Diversity and Political Outcomes: Evidence from Denmark. Mimeo. Forthcoming in Scandinavian Journal of Economics.

[15] Hellerstein, J., McInerney, M. and Neumark, D., 2009. Spatial Influences on the Employment of U.S. Hispanics: Spatial Mismatch, Discrimination, or Immigrant Networks?, Working Papers 09-03. Center for Economic Studies, U.S. Census Bureau.

[16] Nielsen, H. S. and Rangvid, B.S., 2012: The impact of parents' years since migration on children's academic achievement. IZA Journal of Migration1:6.

[17] Kofi Charles, K. and Guryan, J., 2008: Prejudice and Wages: An Empirical Assessment of Becker's The Economics of Discrimination. Journal of Political Economy. Vol. 116, No. 5 (October 2008), 773-809.

[18] Kramarz, F. and Skans, O. N., 2014: When Strong Ties are Strong: Networks and Youth Labour Market Entry, Review of Economic Studies, 81, 1174-1200.

[19] Mailath, G. J., Samuelson, L. and Shaked, A., 2000: Endogenous Inequality in Integrated Labor Markets with Two-Sided Search. American Economic Review, vol. 90(1), 46-72, March.

[20] Millard S.P. and D. T. Mortensen. The Unemployment and Welfare Effects of Labour Market Policy: A Comparison of the USA and UK. In: Snower D. and G. de la Dehesa, eds., Unemployment Policy: Government Options for the Labour Market. Oxford University Press, Oxford, (1997).

[21] Lang, K., Manove, M. and Dickens, W. T., 2005: Racial Discrimination in Labor Markets with Posted Wage Offers. American Economic Review, vol. 95(4), 1327-1340, September.

[22] Larsen, B. and Waisman, G., 2016: Labor Market Performance Effects of Discrimination and Loss of Skill I: Economic Inquiry, Vol. 54, Nr. 3 p. 1574-1595.

[23] OECD 2006: Where immigrant students succeed - A comparative review of performance and engagement in Pisa 2003.

[24] Oster, E., 2016: Unobservable Selection and Coefficient Stability: Theory and Evidence. Journal of Business & Economic Statistics, forthcoming.

[25] Petrongolo, B and Pissarides, C.A. 2001, Looking into the black box: A survey of the matching function, J. Econ. Lit. 39 (2), 390–431.

[26] Solignac, M. and Tô, M., 2013: Neighbourhood Effect and Transitions from school to work. Mimeo.

[27] Steinmayr, A. 2016: Exposure to Refugees and Voting for the Far-Right: (Unexpected) Results from Austria, IZA Discussion Papers 9790, Institute for the Study of Labor (IZA).

[28] Waisman, G. and Larsen, B., 2016: Income, Amenities and Negative Attitudes. Income, Amenities and Negative Attitudes I: IZA : Journal of Migration, Vol. 5.

Figure 1: Case 1, Equal Discrimination in Both Sectors, $a^h = a^l = a$
$s = 0.1$, $k = 0.32$, $\rho = 0.1$, $I = 0.1$, $y^l = 1$, $y^h = 2.7$

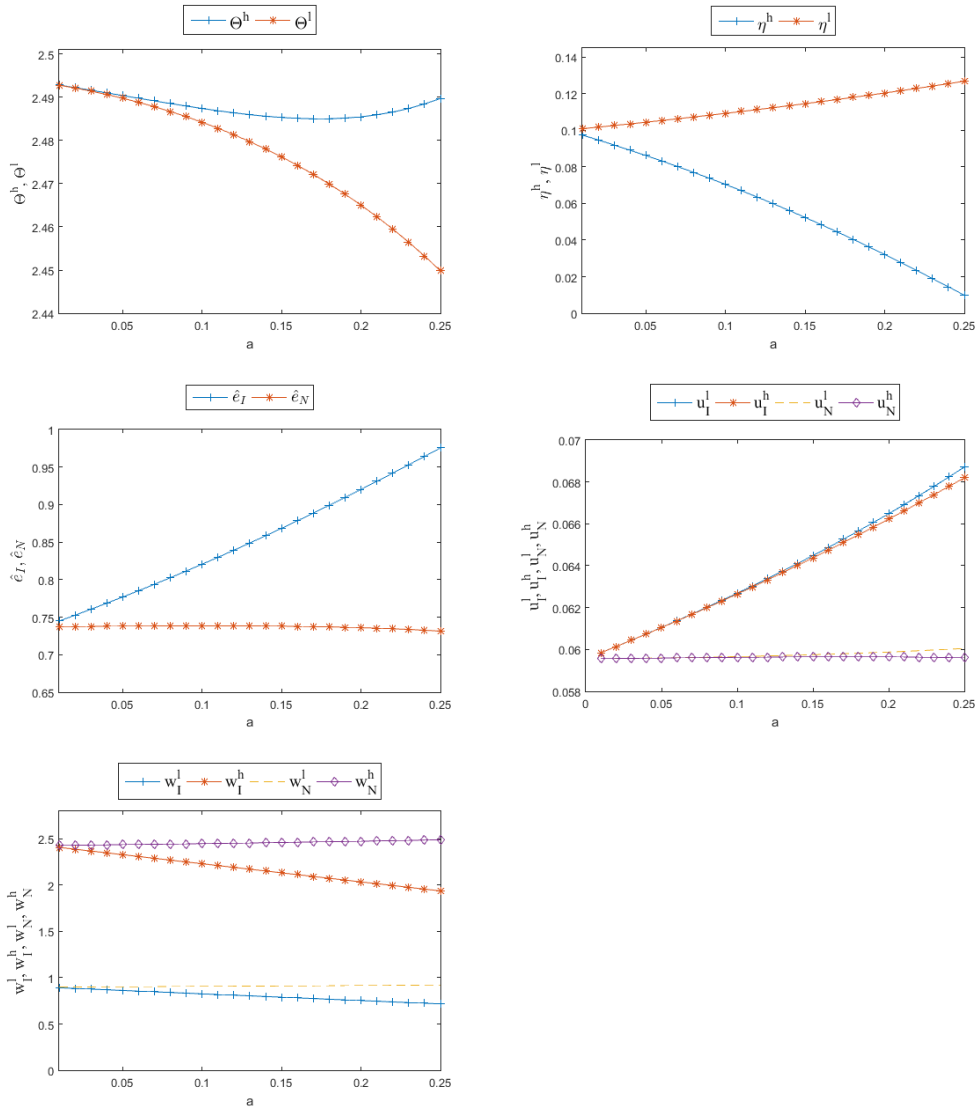


Figure 2: Case 2, Discrimination in Sector l only, $a^l > a^h = 0$.
$s = 0.1$, $k = 0.32$, $\rho = 0.1$, $I = 0.1$, $y^l = 1$, $y^h = 2.7$

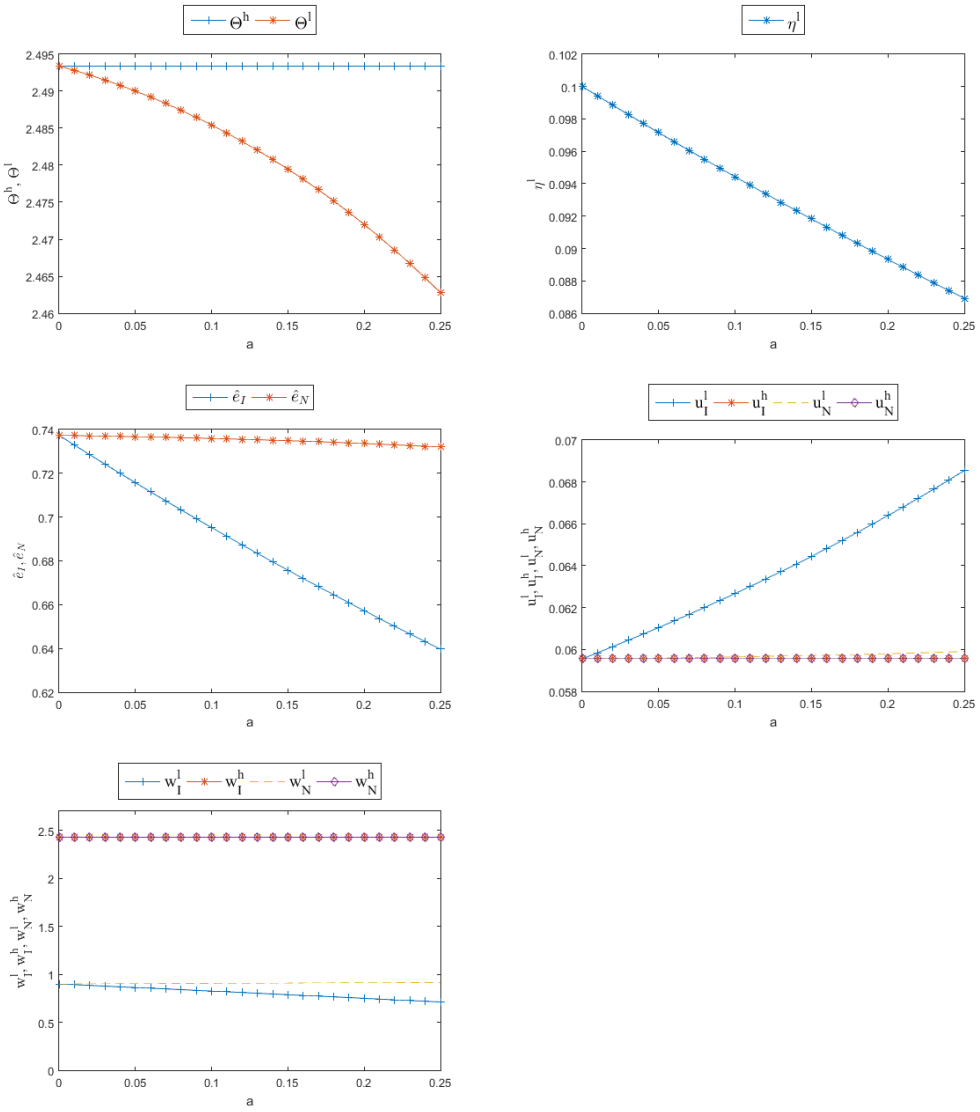


Figure 3: Case 3, networking for natives is higher than for immigrants, $\lambda_N > \lambda_I$ $s = 0.1$, $k = 0.35$, $\rho = 0.1$, $I = 0.1$, $y^l = 1$, $y^h = 2.7$ $t = 0.1$

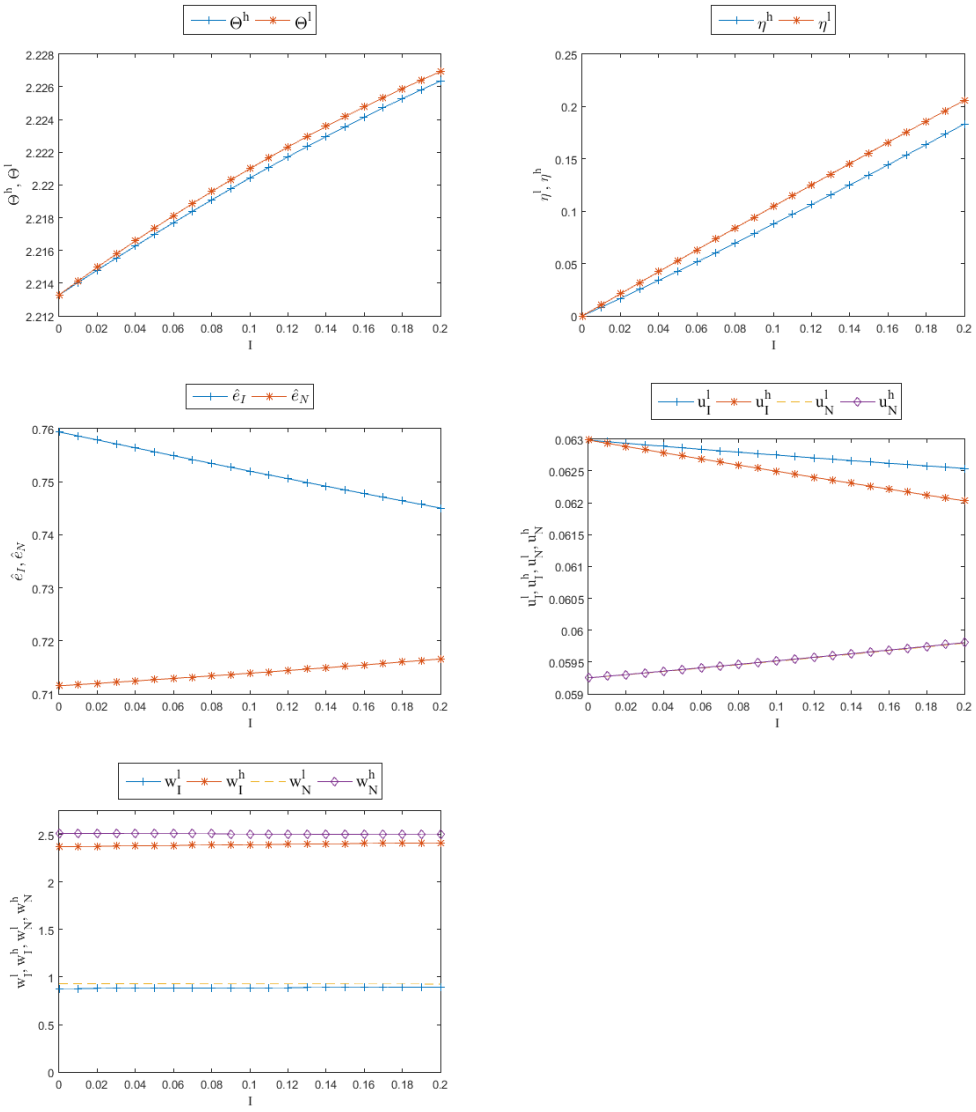
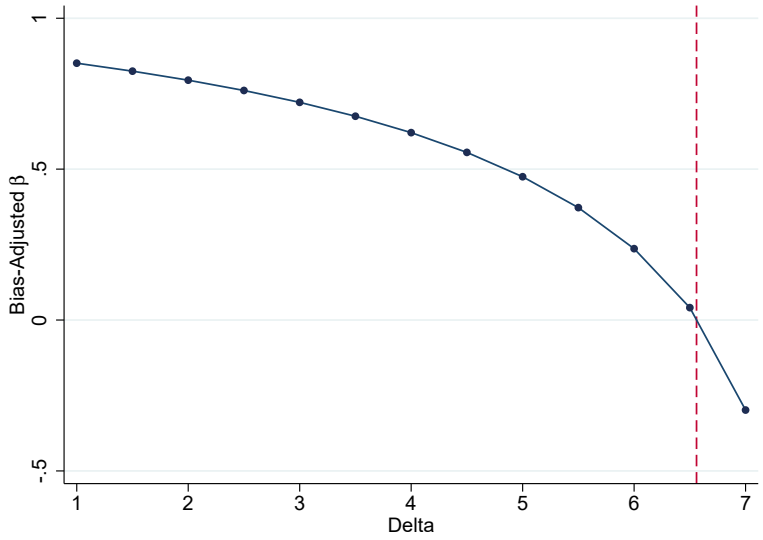
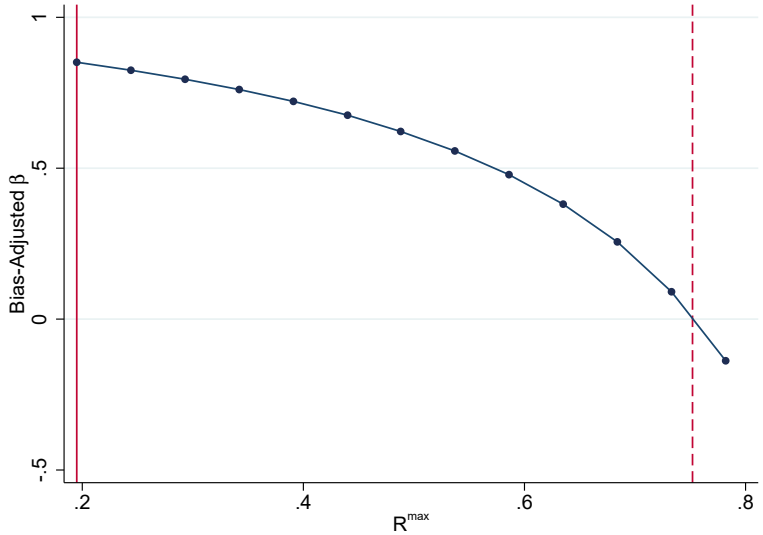


Figure 4: Bias-Adjusted β Varying Level of δ



Bias-adjusted β plotted increasing level of δ by 1. Dashed line corresponds to level of δ when $\beta = 0$. Assumes $R_{max} = 2\tilde{R}$.

Figure 5: Bias-Adjusted β Varying Levels of R_{max}



Bias-adjusted β plotted increasing the level of R_{max} by increasing the constant term from $R_{max} = 2\tilde{R}$ by increments of 0.5 to 8. Dashed line corresponds to level of R_{max} when $R_{max} = 2\tilde{R}$. Assumes $\delta = 1$.

Table 1: Summary Statistics at the Municipality Level

	(1)
1st Gen. Immigrant in Any HS (%)	67.3
	(13.7)
2nd Gen. Immigrant in Any HS (%)	82.8
	(11.7)
Natives in Any HS (%)	84.4
	(3.3)
Votes Dansk Folkeparti (%)	18.2
	(6.4)
Votes Dansk Folkeparti 2015 (%)	23.1
	(5.1)
Votes Dansk Folkeparti 2011 (%)	13.3
	(2.9)
Immigrants (%)	9.2
	(5.6)
Native (%)	90.8
	(5.6)
Western Imm Employed (%)	67.5
	(6.0)
Non-Western Imm Employed (%)	50.0
	(6.3)
Natives Employed (%)	74.9
	(3.7)
Population Density/1000	0.61
	(1.56)
Median Income/100000	2.17
	(0.29)
Short Tertiary Education (%)	41.2
	(6.5)
HS Education (%)	8.6
	(2.5)
Medium Tertiary Education (%)	15.3
	(2.7)
Long Tertiary Education (%)	6.6
	(5.4)
N	190
N municipalities	95

Table 2: High School Participation for Immigrants and Natives at Municipal Level

	(1) Native	(2) 1st Gen. Immigrant	(3) 2nd Gen. Immigrant	(4) Native	(5) 1st Gen. Immigrant	(6) 2nd Gen. Immigrant	Native	1st Gen. Immigrant	2nd Gen. Immigrant
	Outcome: Fraction of Group Enrolled in HS								
Fraction Votes Dansk Folkeparti	0.065	0.886	-1.031						
	(0.117)	(0.802)	(1.095)						
Frac. Native				-0.306					
				(0.464)					
Frac. Immigrants					-2.894	6.543			
					(3.380)	(3.729)			
Frac. Natives Employed							0.219		
							(0.341)		
Frac. Western Imm Employed								-0.170	-0.148
								(0.530)	(0.541)
Frac. Non-Western Imm Employed								-0.380	-0.332
								(0.623)	(0.606)
Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipality Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.222	0.164	0.097	0.223	0.161	0.123	0.222	0.160	0.086
N	190	190	190	190	190	190	190	190	190
N municipalities	95	95	95	95	95	95	95	95	95

Robust standard errors in parentheses. Any High School Ongoing corresponds to either enrolment in regular high school, business high school, or vocational training programs (apprenticeships). Controls are median income per capita in the municipality, population density, and the percentage of the population aged 18-64 with short tertiary education, high school education, medium tertiary education, and long tertiary education.

Table 3: Summary Statistics at the Individual Level

	(1)	(2)	(3)	(4)
		Immigrant		
	Natives	1st Gen.	2nd Gen.	Total
Enrolled in Any HS (%)	85.39	79.45	81.18	85.04
	(35.32)	(40.42)	(39.09)	(35.67)
Fraction Votes Dansk Folkeparti 2015	0.22	0.21	0.20	0.22
	(0.06)	(0.07)	(0.07)	(0.06)
Fraction Votes Dansk Folkeparti 2011	0.09	0.09	0.08	0.09
	(0.03)	(0.04)	(0.04)	(0.03)
Change Fraction Votes Dansk Folkeparti	0.09	0.09	0.08	0.09
	(0.03)	(0.04)	(0.04)	(0.03)
Male (%)	50.94	51.25	49.10	50.83
	(49.99)	(50.00)	(50.00)	(49.99)
Mother's Education	14.57	11.26	11.99	14.36
	(2.34)	(5.25)	(3.86)	(2.64)
Father's Education	14.45	13.01	12.88	14.33
	(2.47)	(4.18)	(3.45)	(2.61)
Parents Married (%)	68.08	87.04	78.22	69.01
	(46.62)	(33.60)	(41.28)	(46.25)
Father Employed (%)	89.45	44.98	56.64	86.70
	(30.72)	(49.76)	(49.56)	(33.96)
Mother Employed (%)	86.20	35.07	46.04	82.89
	(34.49)	(47.73)	(49.85)	(37.66)
Household Income/100000	8.88	5.56	5.41	8.61
	(8.31)	(3.76)	(5.13)	(8.14)
Math GPA 10-12	0.19	0.07	0.09	0.18
	(0.39)	(0.26)	(0.29)	(0.38)
Math GPA 4-10	0.64	0.59	0.58	0.63
	(0.48)	(0.49)	(0.49)	(0.48)
Math GPA 2-4	0.13	0.25	0.22	0.14
	(0.34)	(0.43)	(0.42)	(0.35)
Observations	106104	1674	7374	115152
%	92.1	1.5	6.4	-

Mean values shown for those born 1997 or 1998 residing in Denmark in 2015 unless otherwise indicated. Standard deviations in parentheses.

Table 4: Negative Attitudes and High School Participation for Males and Females Born 1997 and 1998 by Immigrant Status

	(1) Native	(2) 1st Gen. Immigrant	(3) 2nd Gen. Immigrant
	Outcome: Any High School Ongoing		
Fraction Votes Dansk Folkeparti	-0.102	0.896	-0.066
	(0.104)	(0.387)	(0.201)
Mother's Education	0.013	0.004	0.004
	(0.001)	(0.002)	(0.002)
Father's Education	0.011	0.008	0.006
	(0.001)	(0.003)	(0.001)
Parents Married	0.041	0.072	0.054
	(0.003)	(0.028)	(0.010)
Father Employed	0.070	0.022	0.036
	(0.004)	(0.021)	(0.013)
Mother Employed	0.089	0.058	0.064
	(0.004)	(0.025)	(0.010)
Household Income/100000	0.001	0.003	0.001
	(0.000)	(0.005)	(0.001)
Male	-0.047	-0.035	-0.055
	(0.002)	(0.021)	(0.008)
Municipality Controls?	Yes	Yes	Yes
Origin Country Dummies?	No	Yes	Yes
R^2	0.058	0.098	0.064
N	106104	1674	7374

Standard errors reported in parentheses clustered at municipality level. Any High School Ongoing corresponds to either enrolment in regular high school, business high school, or vocational training programs (apprenticeships). Municipality controls are those additional controls included in municipality-level regressions.

Table 5: Importance of Unobservables and Omitted Variable Bias for Male Immigrants

	(1) Baseline Effect	(2) Controlled Effect	(3) Identified Set	(4) δ for $\beta = 0$	(5) Maximum R_{max} when $\beta > 0$
	Outcome: Any High School Ongoing				
Fraction Votes Dansk Folkeparti	0.929	0.896	[0.851,0.896]	6.58	0.752
	(0.383)	(0.387)			
R^2	0.007	0.098	0.195		
N	1674				

Standard errors reported in parentheses clustered at municipality level. R^2 reported in columns (1) and (2) correspond to $\mathring{R}$ and $\tilde{R}$ respectively in Oster (2016). Column (1) includes municipality and gender controls, column (2) includes full set of controls. Column (3) presents bounded set for effect of negative attitudes on high school attendance accounting for role of unobservables assuming $\delta = 1$ and $R_{max} = 2\tilde{R}$. Column (4) presents the level of selection on unobservables relative to observables required for estimated effect in column (2) to be zero. Column (5) presents the maximum value of R_{max} for which $\beta > 0$ when $\delta = 1$. Calculations done using psacalc developed in Oster (2016).