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The Income Gap Between Natives and Second Generation Immigrants in Sweden: Is Skill the Explanation?[*]

by

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Abstract

This is the first study to use an achievement test score to analyze whether the income gap between second-generation immigrants and natives is caused by a skill gap rather than ethnic discrimination. Since, in principle, every male Swedish citizen takes the test when turning 18, we are able to bring more evidence to bear on the matter by estimating the income gap for a very large sample of individuals who are of the same age and have the same years of schooling at the test date.

Once the result of the Swedish Military Enlistment Test is controlled for, the income gap almost disappears for second generation immigrants with both parents born in Southern Europe or outside Europe. However, when using a regular set of control variables the income gap becomes overestimated. This difference in results is most likely explained by the fact that schooling is a bad measure of productive skills for these groups of second-generation immigrants. It indicates that they compensate for their lower probability of being employed by investing in (in relation to their skill level) more schooling than otherwise similar natives.

JEL classification: J64, J71

Key words: Productive skills, discrimination, incomes, wages

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1. Introduction

An earlier study by Rooth and Ekberg (2003) sheds light on the labor market outcomes of immigrants' children born in Sweden, i.e. second generation immigrants.[1] The data allows identification of several different ethnic backgrounds as well as the parent composition, i.e. whether one or both parents of the individual are foreign born. The annual incomes of second generation immigrants are found to be lowest, compared to native incomes, for those with a Southern or non-European background. The income difference is smaller if one parent is born in Sweden compared to having both parents foreign born, indicating the importance of "Swedish-specific" human capital being transferred to the child from the Swedish-born parent.

However, with a standard set of control variables, including age, region of residence, the local unemployment rate, marital status and years of schooling, Rooth and Ekberg cannot explain the income gap relative to natives. Explaining this income gap is the main purpose of this paper. It takes the Rooth and Ekberg study one step further by controlling for parental characteristics (including information on fathers'/mothers' income and years of schooling in adolescence) and by introducing a complementary skill measure, the results of the Swedish Military Enlistment Test, which is a mandatory test for almost all male Swedish teenage citizens, into the income equation.

In this respect we mimic the study by Neal and Johnson (1996, henceforth NJ) which shows that the black-white wage gap is foremost caused by a skill gap, using a similar cognitive test score to ours, the Armed Forces Qualification Test (AFQT), as their main predictor in the wage equation. NJ also show that when estimating the wage equation the test score should not be entered into the model on top of all the other independent variables. Instead, they argue that only exogenous variables, i.e. variables determined before labor market entry, should be included in the model specification. Otherwise the influence of ethnic discrimination on incomes might be overestimated. Their cognitive test score, taken before labor market entry and therefore not affected by labor market discrimination, is most suited to explaining differences in wages between whites and blacks compared to using an endogenous variable such as years of schooling or labor market experience.

The group of second generation immigrants in Sweden is growing rapidly. In late 2002 this group consisted of about 858,523 individuals of all ages, approximately ten percent of the

[1] For a detailed picture of the labor market situation of second generation immigrants in other European countries see the special issue of the Journal of Population Economics in 2003, volume 16 (4). See also the early studies by Chiswick (1977), Carliner (1980) and Borjas (1993) for the US.

total Swedish population (see www.scb.se). In about 65 percent of the cases one parent was born in Sweden. The reason for the high proportion with one parent born in Sweden is that many immigrants in the 1950s and 1960s were single when they arrived. Further, according to the 1998 census a growing share of the second generation immigrants had a non-European background. Thirty-three percent of those up to 24 years of age were of non-European origin, while the corresponding figure was only about three percent for those aged 25-55. Hence, it is especially important to find out why the incomes of the non-Europeans lag behind native incomes.

Our data is based on population registers and, hence, includes all individuals living in Sweden in 2003. However, since the number of females who have taken the Swedish Military Enlistment Test is very small (and selective), our study is restricted to males. We follow the strategy by Rooth and Ekberg (2003) in that we divide the second generation immigrants into different groups based on the parents' characteristics and origins, and analyze the income gap between natives and each of the second generation immigrant groups separately. Secondly, we use the cognitive test score as the sole predictor of the income gap between natives and each of the second generation immigrant groups. The share of the income gap explained with the test score will be compared to the share explained with the regular set of control variables; here, special interest will be given to the schooling variable.

Since there has been concern about whether the test score is actually exogenous, a discussion has taken place about whether schooling should be included in the income equation or the test score should be schooling-adjusted before use (Carneiro et al., 2005). Since, in principle, every male Swedish citizen takes the test when turning 18, we are able to bring more evidence to bear on the matter by estimating the income gap for a very large sample of individuals who are of the same age and have the same years of schooling on the test date. We also analyze whether the test might be ethnically biased and which cognitive ability, verbal or technical/mathematical skills, is most important for explaining the income gap between second generation immigrants and natives.

We find that for second generation immigrants with both parents originating from Southern Europe or outside Europe the income gap is almost entirely explained by differences in skills. However, using a regular set of control variables, including schooling, the unexplained income gap is significantly larger for these groups. A sensitivity analysis also shows that the Enlistment test does not have to be schooling adjusted before use, and that the test does not seem to be ethnically biased.

Before continuing it should be noted that the Enlistment test does not seem to play an active role in explaining the employment gap between second generation immigrants and natives, see Table A1 in appendix. Neither the test score nor any other factor explains the employment gap between second generation immigrants and natives. Hence, an analysis of the employment gap between natives and second generation immigrants is not pursued any further in this study and is left for future research. However, we will return to these results in the conclusions.

Previous research on ethnic discrimination and second generation immigrants is further surveyed in section 2. Section 3 contains the data and descriptive statistics are presented. Section 4 reports the econometric specification and the empirical results. Section 5 concludes and summarizes the findings.

2. A testscore of skills versus schooling

When estimating the income or employment gap, earlier studies use (see footnote 1), among other things, schooling as their main control for worker productivity. NJ argue that there are two reasons that make this problematic; firstly, schooling is an endogenous variable and secondly, schooling might be a poor measure of work productivity. Variables used to control for worker productivity, such as occupation, post secondary education, part-time work, marital status, geographical location and labor market experience, are endogenous and the decisions determining them might be contaminated by ethnic discrimination.

Hence, using these variables as controls in a wage equation when explaining the black-white wage gap will lead to the "unexplained" wage gap being overstated, indicating that labor market discrimination is substantial. By using a cognitive test score (the AFQT), taken before labor market entry, as a sole measure of skill, the black-white wage gap disappears. These findings lead NJ to conclude that labor market discrimination is not responsible for the black-white wage gap, which is instead the result of a skill gap between the groups. Furthermore, using schooling and labor market experience as controls for skill in the wage equation means that we "confuse the barriers that black children face in acquiring human capital with the obstacles that black adults face when they enter the labor market" (NJ, p. 871).

Achievement test scores have been used for a long time as a control for ability in wage equations, especially when estimating the causal return to schooling. Contrary to Herrstein and Murray (1994), who argue that the AFQT mostly measures inherent ability, studies have shown that the test score rises with both schooling and age, indicating that it not only

measures inherited ability (Hansen et al., 2004, Neal and Johnson, 1996, Winship and Korenman, 1997).

Carneiro et al. (2005) reexamine the NJ approach. Although supporting the strategy in principle, they claim that, since schooling affects the test score, gaps when taking schooling into account are also relevant. The test score may be contaminated by ethnic discrimination if second generation immigrants decide to invest in less schooling than natives because of an anticipation of future labor market discrimination. Thus, with a schooling-adjusted test score, Carneiro et al. explain half of the black-white male wage gap.

3. Data and descriptive statistics

The empirical analysis is based on a data set constructed by integrating registers from Statistics Sweden (SCB) and the Swedish National Service Administration ("Pliktverket" in Swedish), which identify individuals by their social security numbers, and contain every individual living in Sweden in the year 2003.[2] Second generation immigrants are identified from the registers as being born in Sweden and having at least one parent born abroad. Since we only have information from the Swedish Enlistment Battery for certain age groups, we restrict the sample to only males who were 28-38 years old in 2003. The original data then includes information on 500,965 native men and 77,267 second generation immigrant men.

We then divide the data into ten different groups of second generation immigrants. First, we identify whether one or both parents are foreign-born. Second, following Rooth and Ekberg (2003), we categorize the second generation immigrants according to parental region of birth: Nordic countries, Western Europe, Eastern Europe, Southern Europe and outside Europe (excluding North America and Oceania).[3] This categorization is basically based on differences in labor market outcomes within the first generation, see Rooth and Ekberg (2003) for a thorough discussion. Even though the non-European category constitutes a very heterogeneous population, it is not meaningful to divide the category further since there would be too few cases in each region of origin. Sample sizes for each group of second generation immigrants are found in Table 1.

[2] The individuals also have to live in Sweden for the year 1999 because many important variables, e.g. the Swedish Military Enlistment Test and the family information, are collected from the 1999 population data.

[3] See appendix for what countries are included in each region.

Individuals with a mixed foreign background, i.e. where both parents are born abroad but in different countries, are excluded (they constitute only six percent of the second generation immigrant population in this age group), to ensure a distinctive parental background of the second generation immigrants. This restriction reduces the second generation immigrant population to 71,721 men. The data indicates that a large majority of immigrants have children with a native Swede as their father/mother. In fact, seventy-one percent of the children born in Sweden to immigrant parent(s) in our sample have one native parent.

We continue by showing the key variables for the second generation in Table 1. The income variable is for the year 2003 and measures annual income from work, but does not include self-employed incomes. When estimating the income equation we restrict the sample to individuals who were employed in the third week of November and had an income from work above SEK 50,000 (about EURO 5,500). Using these restrictions, instead of simply using positive earnings, is an attempt to delete shorter employment spells and part-time jobs with low pay. Such a threshold should give an estimate that comes closer to the one expected for (log) hourly wages (if such data was available), since higher incomes are more likely to be based on similar amounts of time worked (hours and weeks). The income sample includes 84 percent of the natives and 78 percent of the second generation immigrants. There is also variation within the group of second generation immigrants. The lowest share in the income sample, 63 percent, is found for those with both parents from outside of Europe and the highest, 83 percent, is found for those with both parents from Western Europe. In section 4.3 we discuss whether the income sample restrictions are selective and thus affect our results.

The Swedish Military Enlistment Test is intended to measure cognitive ability.[4] The individuals in this study have taken the Enlistment Battery 80, which includes four separate tests, Instructions, Synonyms, Metal Folding and Technical Comprehension. The test score variable is on a continuous (stanine) scale ranging from 1 to 9. Information on the result of the Enlistment test is for 11 percent of the natives and 19 percent of the second generation immigrants missing. The lowest participation rate, 49 percent, is found for those with both parents from outside of Europe. The reason why a smaller share of this group has participated in the test is mainly that fewer of them are Swedish citizens. A more detailed examination of the variable is found in the appendix, where the reasons why there is missing information for some individuals are also listed. The measure of years of schooling is constructed from the

[4] The general intelligence factor, G, is the variable actually used in this study. For more information about the G factor, see Caroll (1993).

Swedish version of the educational attainment variable ISCED97 and is distributed between nine to twenty years of schooling.

Descriptives of the key variables, annual income, years of schooling and the test score, are given for natives and second generation immigrant groups, respectively, see Table 1. Despite the fact that five years have passed since the study by Rooth and Ekberg (2003), the basic picture remains.[5] Male second generation immigrants with both parents born in Southern Europe or outside Europe have an annual income that is lower than the income of natives. Moreover, despite a relatively high education level, these groups also have low scores in the Swedish Military Enlistment Test.

***** Table 1 about here *****

For second generation immigrants with a Western or Eastern European background, the income difference to natives is largely positive. These groups of second generation immigrants have, on average, a high education level and a high score in the Swedish Military Enlistment Test. Second generation immigrants with a Nordic background are the least educated group and have incomes that are lower than natives' ones. In addition, within each ethnic group, individuals with one native parent tend to perform better than individuals with two parents born abroad. Thus, these descriptive results show that there are definitely differences in terms of human capital between the different groups of second generation immigrants as well as compared to natives. In the next section we will explore these differences with a specific focus on those with a Southern European or non-European background.

4. Results

In this section we start by giving a picture of the income differences between natives and the different groups of second generation immigrants. Then, and in line with the NJ approach, we use the Enlistment Battery test score as the sole predictor of the income gap between

[5] The second-generation's young age and the fact that labor market outcomes during younger ages often have a low correlation with lifetime income raise questions about whether the results in Rooth and Ekberg were temporary or not. The findings here indicate that lower incomes for these second generation immigrants are likely to persist into the future.

comparable natives and second generation immigrants, i.e. those of the same age and living in the same labor market area. When explaining differences in incomes between natives and second generation immigrants our test score is likely to capture, besides differences in family background, institutional factors that differ between the groups. For instance, school and neighborhood characteristics might give rise to skill differences between natives and second generation immigrants. We then compare the share of the income gap explained with the test score to the share explained with the regular set of control variables, with special interest given to the schooling variable. Finally, we conduct sensitivity analysis of the results.

4.1 The income gap

A very simple strategy is used to estimate the income gap between natives and second generation immigrants. In a pooled model, including natives and second generation immigrants, the income gaps are arrived at by regressing income on the ten ethnic indicator variables. In column (1) in Table 2 age[6], age squared and labor market region are controlled for.[7] A negative income difference relative to natives is found for those with parent(s) born in the Nordic countries, Southern Europe or outside Europe. This difference tends to be larger, about twice the size, for those with both parents born abroad compared to one parent born in Sweden. Hence, the main picture is that the labor market situation, relative to natives, varies a lot between the different groups of second generation immigrants, and that only relatively few of them tend to be adversely affected. In the following we primarily discuss the results for the second generation groups with a Nordic, Southern European or non-European background, i.e. the groups found to have a significant income difference compared to natives in column (1).

***** Table 2 about here *****

[6] Using yearly age dummies instead of the continuous age variable does not change the results in this study.

[7] Thus, contrary to NJ, we control for labor market region, which is a broad area definition. Because ethnicity is strongly related to residing in an urban region where salaries are higher than outside the urban regions, the income gap will be underestimated if labor market region is not controlled for. We argue that excluding labour market region from the model yields a more serious misspecification compared to including a potentially endogenous labour market variable.

When regressing (log)income on the Military Enlistment Test score and the ethnic dummies, column (2), we find that the income gap is reduced for most of these groups.[8] In fact, using the test score as the sole predictor explains about 70 percent of the income gap for individuals with both parents born in Southern Europe or outside of Europe. Hence, for these groups of second generation immigrants the income gap primarily mirrors a skill gap. Interestingly, after controlling for skill, the income gap to natives is larger for those with one parent born in Southern Europe or outside of Europe than for those with both parents born in these regions. For second generation immigrants with both parents born in a Nordic country or one parent born in Southern Europe, approximately 40 percent of the income gap is explained by a skill gap.

In line with the NJ strategy, parental socioeconomic background[9] is another relevant exogenous variable that should be included in the income equation. Column (3) shows the income gap when including both the test score and parental background in the income equation. The finding that the income gap turns small and insignificant for the second generation immigrants with both parents born in Southern Europe or outside Europe clearly shows that the skills and the socioeconomic family capital, that individuals bring to the market explain the main part of the income differences vis-à-vis natives.

It could be that the skill level of second generation immigrants is foremost related to the parental background. To test this assumption we omit the test score and control only for parental background, i.e. parental income and education level, in the income equation, see column (4). For those with both parents born in Southern Europe or outside of Europe, we find that the socioeconomic position of the parents explains less, around forty percent, of the income gap compared to what is explained by the test score. The test score therefore captures more than merely the socioeconomic background for these groups.

In comparison, column (5) shows the income gap, and the share explained, when again omitting the test score but including years of schooling, occupation (using a total of twenty-four fixed effects for a 2-digit occupation classification), marital status and family background in the model. For second generation immigrants with both parents born in Southern Europe or outside of Europe, these variables only explain around 30-40 percent of the income gap to

[8] The results in the paper do not change if a more flexible specification is used, i.e. using indicator variables instead of a continuous test score variable. The same is true for the years of schooling variable.

[9] We use the parents' years of schooling and annual income, measured in the period 1970 to 1980. The appendix describes these variables in more detail.

natives, i.e. a similar share as is explained with the socioeconomic position of the parents but much less, approximately half, of what is explained with the test score. This finding indicates that the income gap for these groups is overstated when including possibly endogenous variables in the earnings equation.

However, for the other second generation immigrant groups found to have a significant income gap in column (1), this set of controls explains more of the income gap than is explained with the test score. We have not found an explanation for why this is the case. For male second generation immigrants with a parental background in Western or Eastern Europe, the size of the gap, which is small to begin with, is only marginally affected.

Years of schooling might, for numerous reasons, be a poor measure of productive skills. For example, second generation immigrants might invest in education because they have, or perceive themselves to have, problems obtaining work. The skill level of second generation immigrants might then be lower than the skill level of natives with the same level of education. For second generation immigrants with both parents originating from southern Europe or outside Europe this might be especially true since we see in Table 1 that their test score was low whereas their education level was relatively high. In column (6) in Table 2 years of schooling is used as a single control for productive skill. Whereas the income gap to natives, for second generation immigrants with both parents born in Southern Europe or outside of Europe, may almost entirely be explained by differences in skills as measured by the test score, only around 15 percent of the gap may be explained by differences in years of schooling. Only for those with parent(s) born in a Nordic country does years of schooling explain a share of the income gap similar to that of the test score.

In column (7), where we control for both the test score and years of schooling, we explain less of the income gap for those with both parents born in Southern Europe or outside of Europe compared to when we only control for the test score (column 2). This result indicates that these groups of second generation immigrants, relative to their skill level, invest in more education than natives, and that they do not gain as much as natives from the higher education level.

4.2 What type of skill is most important?

We continue our analysis by finding out what type of skill is most important for explaining the income gap between natives and second generation immigrants. As previously mentioned, the test actually comprises four separate tests: Instructions, Synonyms, Metal Folding and

Technical Comprehension. The aim of the Instruction test is to measure an individual's ability to make inductions. It also, together with the Synonyms test, captures verbal ability. Metal Folding is a spatial test, i.e. it is more related to mathematic skills and the fourth test measures technical comprehension in general.

Table 3 shows the results of estimating the income equation, when including each test score separately in the model, in columns (1) to (4).[10] When adding the Instructions test (column 1), or the Synonyms test (column 2), to the income equation, the income gap between second generation immigrants, with both parents foreign-born (neglecting the categories Western and Eastern Europe), and natives is smaller compared to when the Metal Folding test (column 3) or the Technical Comprehension test (column 4) is added to the equation. On the contrary, we find no difference between the income gaps of the tests when only one parent is foreign born. These results indicate that language proficiency is an especially important part of skills for those with both parents foreign-born but not for those with only one foreign-born parent, where all types of measured skills are equally important.

***** Table 3 about here *****

It is also important to mention that the different skills measured by the tests are found to be highly correlated. The combined test score also explains more of the income difference compared to any of the separate tests used alone (which can be seen from comparing the results in Table 3 with those in column (2) in Table 2).

4.3 Sensitivity analysis

In this section we analyze whether the test score needs to be schooling-adjusted, whether the test might have en ethnic bias and whether the income restriction might change the results.

Does the test score need to be schooling-adjusted?

[10] The relationship between logarithmic income and each of the four test scores differ with respect to linearity. Therefore the squared test score variable is not included in the model, since it makes it hard to interpret and compare the four test score coefficients. The income gaps are hardly affected by excluding the squared variable from the model.

An achievement test score might be related to education and past experience and hence, our skill measure might not be fixed. The Swedish Military Enlistment Test is for a majority[11] of the individuals taken when turning 18, i.e. during the latter part of their upper-secondary schooling. This means that postsecondary schooling and labour market experience should not affect the result on the test. We therefore have a skill measure that has not been contaminated by labour market discrimination after age 18.

However, second generation immigrants might decide to invest in less schooling than natives because of an anticipation of future labour market discrimination. Therefore, if schooling affects the test score results up to age 18, the test scores might also be contaminated by ethnic discrimination. Hence, Carneiro et al. (2005) suggest that an appropriate correction of the NJ strategy is to adjust the test score for schooling at the test date.

Another strategy for tackling the problem is to re-estimate the earnings equation for the sample of individuals with the same level of education when taking the test, i.e. for those who attend upper-secondary school at the test date; see also Nordin (2007) for use of this strategy.[12] If the results do not change when making this restriction we claim that it is not necessary to adjust for upper-secondary schooling in this dataset.

Column (1) of Table 4 shows the age- and labor market-adjusted income gap for those with at least twelve years of schooling. In column (2) the test score is added to the model. In comparison to the results in Table 2 (columns (1) and (2)) the size of the income gap changes somewhat for some of the second generation immigrant groups which has the implication that the relative share explained also changes somewhat (compare the share explained in column (2) in Table 2 with column (3) in Table 4). The changes in the relative share explained are however not in any way (neither in magnitude nor in direction) affecting our overall results. Thus, our conclusion is that the test score does not need to be schooling-adjusted.

***** Table 4 about here *****

[11] Around 17 percent take the test at age 19, and about 3 percent take it when between ages 20 to 27. The relatively large group of nineteen-year-olds is because of random delays and illness at the test date (in most cases this means that the individual enlists in the beginning of the next year, i.e. still during upper-secondary school) (Pliktverket, Guttormsson, 2000). Two other reasons for taking the test at an older age are that the individual is abroad when turning 18 or gets a Swedish citizenship after the age of 18. As these two ievents are, reasonably, more common for second-generation immigrants than natives, the test score result is more likely to be biased upwards than downwards for second-generation immigrants, meaning that we underestimate the share of the income gap explained with the test score.

[12] However, we only have information about completed years of schooling in 2003 and not completed years of schooling at test date. So also in this sample, individuals who complete upper-secondary education at an older age than what is common have received less schooling at the test date.

Does the test have an ethnic bias?

If the performance on the achievement tests is ethnically biased this might explain the low test score result for second generation immigrants with both parents born in Southern Europe or outside Europe. The true ability level of these second generation immigrants might then be higher than their measured ability level. If this is the case the income gap when controlling for ability level may be biased and indicate less discrimination than is actually the case.

Carneiro et al. (2005) suggest that if the market return to skill is the same for blacks and whites the test score is not likely to be ethnically biased.[13] The intuition is that if there is an ethnic bias individual skills are measured with error for blacks but not for whites, which in turn will create a bias in the estimate of the return to skills for blacks. Therefore, a simple test of ethnic bias is to analyze whether the return to skill differs for second generation immigrants and natives.[14] This is done by including an interaction between the test result (and the test result squared) and a second generation immigrant dummy in the model.

In Table 5 (column 1) the result when estimating this model is reported. By examining the interaction variables we can decide whether the return to skill differs between natives and second generation immigrants. Since the estimates of the interaction terms are small and insignificant the return to skill does not seem to differ for second generation immigrants compared to natives.

Also, including a separate interaction variable for the second generation immigrants with both parents from southern Europe and outside Europe gives the same result as an interaction variable for all second generation immigrants. This indicates that the test score is not ethnically biased.

***** Table 5 about here *****

Are the results affected by the income restriction?

[13] However, they discuss a related, but not identical, problem, namely whether a "stereotype threat" causes the black-white test score gap. A stereotype threat implies that a negative stereotype about the particular ethnic group is being internalized by the individual, and thereby affecting the performance on achievement tests.

[14] Another possible explanation for a same return to skill estimate for natives and second generation immigrant might be that discrimination, biasing the estimate of the return to skills downward, exactly cancels out the ethnic bias, biasing the estimate of the return to skills upward.

As mentioned our choice of using SEK 50,000 is somewhat arbitrary and one might wonder how sensitive the results are to this choice? Table 6, column (1), shows that instead using SEK 100,000 as the income restriction changes the size of the baseline income gap (compared to column (1) in table 2) and makes it smaller. When we include the test score in the income equation (column (2) in table 6) the change in the size of the income gap is as large as found when using SEK 50,000, and the qualitative results remain.

Also, if there are group differences in labor force participation then these selection effects could contaminate the estimates of ethnic differences in annual earnings. By attributing an income of 50,000 SEK to everyone without income as well as those with incomes below 50,000 SEK and then estimate median regressions we test whether selective participation affects the results. Kolla rooth Ekberg) alt. tidig version inget instrument därför detta

The income differences toward natives are then somewhat larger but the test score still explains the same absolute number, i.e. log points, of the gap. Hence, the qualitative results remain. These results are available upon request.

***** Table 6 about here *****

5. Conclusions

The income gap between native and second generation immigrant men varies a great deal with family origin and with whether one or both of the parents is born abroad. The income gap is especially large, varying between 6 to 12 percent, for male second generation immigrants with one or both parents born in Southern Europe or outside Europe. Since previous research has shown that this income difference does not disappear when age, region of residence and years of schooling are controlled for the conclusion has been that ethnic discrimination might be the explanation. However, instead we find that the income gap depends strongly on a skill gap. Once the result on the Swedish Military Enlistment Test is controlled for, the income gap almost disappears for these groups of second generation immigrants.

This difference in results is most likely explained by the fact that years of schooling is a bad measure of productive skills. When only controlling for the socioeconomic background, as measured by the parents' incomes and level of schooling, and for the test score, the income gap in fact becomes insignificant for these second generation immigrants. When using the regular set of control variables, or just years of schooling, the income gap becomes overestimated, i.e. large and significant, for second generation immigrants with both parents

born in southern Europe or outside of Europe. This result also indicates that these groups try to compensate for problems of becoming employed and therefore invest (in relation to their skill level) in more schooling than natives. This result is in line with the result for blacks in the US found in the Neal and Johnson study.

It is important to emphasize that the skill gap for second generation immigrants with a background in Southern Europe or outside Europe is not a reflection of the socioeconomic position of the parents, i.e. intergenerational transmission is not the only explanation of why these groups have lower skills than natives. Although the second generation generally succeeds better on the Swedish labor market than the corresponding first generation immigrants something affects their skill level, and therefore also their labor market outcome, negatively. Further research should try to find out what that *something* is.

By separating the test score into different measures of skills, such as verbal, technical and mathematical skills, our results indicate that it is foremost verbal skills that are inferior. We agree with Neal and Johnson that a first place to look is for differences in neighborhood and school characteristics. Such institutional factors might create obstacles to acquiring productive skills, and especially verbal skills, for these second generation immigrants. In this respect not only children born in Sweden to foreign-born parents should be considered but also first-generation immigrants arriving to Sweden during childhood.

However, our skill measure does not explain the income gap towards natives for all groups of second generation immigrants. For male second generation immigrants with one Swedish-born parent and the other born in Southern Europe or outside Europe and for male second generation immigrants with both parents born in the Nordic countries a small unexplained income gap remains. The reasons for this difference is unclear.

To conclude, our results suggest that employers focus primarily on skills when deciding upon wages for the employed. Actually, we find no indications that ethnic discrimination creates lower wages for men born in Sweden with a foreign background compared to native Swedish men, given equal skills. However, in this study we have primarily focused on only one part of the picture. The gap in the probability to become employed between native and second generation immigrant men is not explained by a corresponding skill gap. And since no other observed factor seems to explain the employment gap between natives and second generation immigrants, ethnic discrimination might be a factor that determines employment. In fact, the field experimental study by Carlsson and Rooth (2006) finds that ethnic discrimination in hiring exists in the Swedish labor market. Taken together, the findings indicate that ethnic discrimination might affect the probability to become employed, but ones

employed the labour market income of second generation immigrants is not affected by discrimination. Thus, to gain a complete perspective concerning ethnic discrimination future research needs to further examine the probability to become employed.

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Appendix:

The Swedish Military Enlistment Battery test

The score on the four separate tests (Instructions, Synonyms, Metal Folding and Technical Comprehension) is summed up, in accordance with the method of factor analysis, and transformed into a normalized scale (a so called stanine scale) going from one to nine. The method for calculating the test score has changed during the time period. But because our data contains the results of the separate tests we are able to construct a test result that is time consistent. When there is information missing for one, two or three of the separate test score results we use the average of the other test score results as a proxy for the missing test score result. The time consistent test score is a continuous variable (3,993 values from 1.01 to 9.11). The original G variable is a discrete variable going from 1 to 9.

Five percent of the second generation immigrants are lost because they do not enlist into the military because of a foreign citizenship (conditional on being included in the income sample). However, for some individuals the separate test scores are missing (which are used when constructing the time consistent test score variable) which means that we lose seven percent of the second generation immigrants and six percent of the natives from the sample. For another seven percent of the second generation immigrants and for four percent of the natives enlistment data is entirely missing. Most of these individuals probably have legitimate health reasons for not enlisting into the military. In 2000 (the latest year for which this information is available), 7 percent of the cohort did not have to enlist because of health reasons.

Table A1. Results from estimating the employment gap between second generation immigrant and native men. 2003. Percentage points.

	(1)	*(2)*	*(3)*	*(4)*	*(5)*
Two parents born abroad:					
The Nordic countries	-.054 (.00)***	-.046 (.00)***	-.045 (.00)***	-.049 (.00)***	-.046 (.00)***
% explained		15	17	10	15
Western Europe	-.034 (.02)**	-.035 (.02)**	-.032 (.02)**	-.034 (.02)**	-.032 (.02)**
% explained		-3	6	0	5
Eastern Europe	-.041 (.01)***	-.043 (.01)***	-.033 (.01)***	-.046 (.01)***	-.034 (.01)***
% explained		-5	21	-11	18
Southern Europe	-.096 (.01)***	-.080 (.01)***	-.080 (.01)***	-.093 (.01)***	-.097 (.01)***
% explained		17	17	3	-1
Outside Europe	-.117 (.02)***	-.097 (.02)***	-.089 (.02)***	-.115 (.02)***	-.122 (.02)***
% explained		17	24	2	-4
One parent born abroad:					
The Nordic countries	-.031 (.00)***	-.029 (.00)***	-.028 (.00)***	-.029 (.00)***	-.026 (.00)***
% explained		8	12	7	17
Western Europe	-.038 (.00)***	-.039 (.00)***	-.034 (.00)***	-.039 (.00)***	-.033 (.00)***
% explained		-5	10	-3	13
Eastern Europe	-.040 (.01)***	-.041 (.01)***	-.036 (.01)***	-.042 (.01)***	-.036 (.01)***
% explained		-2	10	-5	12
Southern Europe	-.082 (.01)***	-.077 (.01)***	-.070 (.01)***	-.080 (.01)***	-.072 (.01)***
% explained		6	14	3	12
Outside Europe	-.114 (.01)***	-.113 (.01)***	-.100 (.01)***	-.115 (.01)***	-.101 (.01)***
% explained		1	13	-1	11
Test score		.062 (.00)***	.060 (.00)***		
Test score^2		.005 (.00)***	.004 (.00)***		
Schooling				.008 (.00)***	.001 (.00)***
Married	no	no	no	no	yes
Family Background	no	no	yes	no	yes
R^2	.013	.020	.023	.015	.028
N	498,033	498,033	498,033	498,033	498,033

Notes: The dependent variable is being employed, as measured by Statistics Sweden, for at least one hour in the third week of November 2003. In the baseline model, column (1), we control for age, age squared and labor market region. In column (2) the test score is added, and in column (3) we also add family background to the baseline model. In column (4) only years of schooling is added to the baseline model, while in column (5) schooling, married and family background are added to the baseline model. The reported coefficients are the effects when estimating a linear probability model.

Table A2. Variable List

Variable	Definition of the variable
"Income sample"	To be employed, and have an annual income from work above 50,000 SEK.
The Nordic countries	Originating from Denmark, Finland, Iceland or Norway.
Western Europe	Originating from Austria, Britain, Belgium, France, Germany, Holland, Ireland, Luxemburg, Monaco, or Switzerland.
Eastern Europe	Originating from Bulgaria, Czechoslovakia, DDR, Estonia, Hungaria, Latvia, Lithuania, Poland or Rumania.
Southern Europe	Albania, exYugoslavia, Cyprus, Greece, Italy, Portugal, Spain.
Outside Europe	Originating from any other part of the world (when excluding those originating from Oceania and North America from the sample).
Native	Swedish born individuals with two Swedish born parents.
Schooling	Years of schooling.
Age	A continuous age variable from 28 to 38
Labour market region	81 different labour market regions (Nutek's basis of division).
Married	Married or registered partnership.
Occupation	24 indicator variables have been created according to the two-digit scale of SSYK (Standard för svensk yrkesklassificering). This is the main basis of division. One of the variables indicates "missing" occupation.
Test Score	The time consistent test score is a continuous variable (ranging from 1.01 to 9.11).
The separate test scores	The score on the four separate tests goes from 0 to 40.
Mother's and father's income	An average income for the years 1970, 1975 and 1980 (for the positive incomes). In 1980-prices.
Mother's and father's education	Highest education attained by the parent (in 1999). Five dummy variables (compulsory, upper secondary, short university, long university or Ph. D. degree) are constructed. The reference group has missing values for the father's and the mother's education level. Missing values for the father's and the mother's education level are reported in 13.6 percent respectively 5.4 percent of the cases.

Tables:

Table 1. Descriptive statistics of native and second generation immigrant men (income sample). 2003

	Log Annual Income	Years of Schooling	Test Score	N	N (test score)
Natives	12.48 (.41)	12.4	5.2	419,768 (.84)	374,258 (.89)
Two parents born abroad:					
Nordic countries	12.43 (.39)	11.7	4.7	10,375 (.78)	7,718 (.74)
Western Europe	12.56 (.44)	12.6	5.3	558 (.83)	319 (57)
Eastern Europe	12.53 (.48)	13.2	5.5	819 (.75)	726 (.89)
Southern Europe	12.42 (.45)	12.3	4.4	3,227 (.70)	2,182 (.68)
Outside Europe	12.40 (.52)	12.7	4.2	481 (.63)	236 (.49)
One parent born abroad:					
Nordic countries	12.45 (.42)	12.1	5.1	23,537 (.80)	20,145 (.86)
Western Europe	12.51 (.44)	12.7	5.4	7,942 (.80)	6,357 (.80)
Eastern Europe	12.52 (.45)	12.8	5.4	3,603 (.80)	3,181 (.88)
Southern Europe	12.45 (.46)	12.4	5.0	3,363 (.75)	2,850 (.85)
Outside Europe	12.46 (.52)	13.0	5.5	2,136 (.72)	1,814 (.85)

Notes: The descriptive statistics are for individuals belonging to the income sample, i.e. who are employed and have an income above SEK 50,000 in 2003. The average test score is calculated for the sample who has taken the Enlistment Test. In parenthesis the standard deviation of log annual income, the share belonging to the income sample, and the share who has taken the Enlistment test (conditional on being included in the income sample), respectively, are given.

Table 2. Results from estimating the income gap between second generation immigrant and native men. 2003. Log points.

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*
Two parents born abroad:							
The Nordic countries	-.072 (.01)***	-.039 (.00)***	-.023 (.00)***	-.035 (.01)***	-.022 (.00)***	-.039 (.00)***	-.030 (.00)***
% explained		45	68	51	69	45	58
Western Europe	.021 (.02)	.019 (.02)	.014 (.02)	.012 (.02)	.014 (.02)	.011 (.02)	.013 (.02)
% explained		-	-	-	-	-	-
Eastern Europe	.009 (.02)	.004 (.01)	-.000 (.01)	-.010 (.02)	-.014 (.01)	-.020 (.01)	-.014 (.01)
% explained		-	-	-	-	-	-
Southern Europe	-.075 (.01)***	-.020 (.01)**	-.012 (.01)	-.046 (.01)***	-.043 (.01)***	-.063 (.01)***	-.032 (.01)***
% explained		73	85	39	43	17	57
Outside Europe	-.113 (.03)***	-.039 (.03)	-.014 (.03)	-.062 (.03)**	-.077 (.02)***	-.103 (.03)***	-.060 (.03)**
% explained		66	88	45	32	9	47
One parent born abroad:							
The Nordic countries	-.043 (.00)***	-.034 (.00)***	-.028 (.00)***	-.032 (.00)***	-.021 (.00)***	-.031 (.00)***	-.029 (.00)***
% explained		22	35	25	51	28	33
Western Europe	-.000 (.01)	-.008 (.01)	-.010 (.01)**	-.010 (.01)**	-.010 (.01)**	-.010 (.01)*	-.011 (.01)**
% explained		-	-	-	-	-	-
Eastern Europe	.000 (.01)	-.006 (.01)	-.011 (.01)	-.013 (.01)*	-.011 (.01)*	-.011 (.01)	-.011 (.01)
% explained		-	-	-	-	-	-
Southern Europe	-.061 (.01)***	-.038 (.01)***	-.022 (.01)***	-.035 (.01)***	-.025 (.01)***	-.049 (.01)***	-.039 (.01)***
% explained		38	15	9	58	19	26
Outside Europe	-.058 (.01)***	-.062 (.01)***	-.049 (.01)***	-.053 (.01)***	-.048 (.01)***	-.076 (.01)***	-.072 (.01)***
% explained		-7	15	9	17	-33	-27
Test score		.044 (.00)***	.041 (.00)***				.041 (.00)***
Test score^2		.002 (.00)***	.001 (.00)***				-.000 (.00)
Schooling					.023 (.00)***	.050 (.00)***	.034 (.00)***
Married	no	no	no	no	yes	no	no
Profession	no	no	no	no	yes	no	no
Family Background	no	no	yes	yes	yes	no	no
R^2	.064	.117	.126	.088	.260	.063	.136
N	419,786	419,786	419,786	419,786	419,786	419,786	419,786

Notes: The dependent variable is logarithmic annual income. In the baseline model, column (1), we control for age, age squared and labor market region. In column (2) the test score is added, and in column (3) we also add family background to the baseline model, while we omit the test score in column (4) but keep family background. In column (5) schooling, married, occupation and family background are added to the baseline model, while only years of schooling is added to the baseline model in column (6). In the last column only the test score and years of schooling are added to the baseline model. Because the income gap is very small and insignificant for the second generation immigrants with a Western and Eastern European background computing the explained share has not been computed.

Table 3. Results from estimating the income gap between second generation immigrant and native men when controlling for different types of tests. 2003. Log points.

	(1)	(2)	(3)	(4)
Two parents born abroad:				
Nordic countries	-.037 (.01)***	-.046 (.01)***	-.060 (.01)***	-.058 (.01)***
Western Europe	.027 (.02)	.012 (.02)	.006 (.02)	.014 (.02)
Eastern Europe	.009 (.02)	.003 (.02)	.001 (.02)	.009 (.02)
Southern Europe	-.021 (.01)**	-.035 (.01)***	-.052 (.01)***	-.041 (.01)***
Outside Europe	-.051 (.03)**	-.055 (.03)**	-.072 (.03)***	-.069 (.03)***
One parent born abroad:				
Nordic countries	-.033 (.00)***	-.037 (.00)***	-.040 (.00)***	-.040 (.00)***
Western Europe	-.019 (.01)	-.008 (.01)*	-.006 (.01)	-.003 (.01)
Eastern Europe	-.001 (.01)	-.004 (.01)	-.005 (.01)	-.001 (.01)
Southern Europe	-.040 (.01)***	-.048 (.01)***	-.047 (.01)***	-.044 (.01)***
Outside Europe	-.057 (.01)***	-.065 (.01)***	-.058 (.01)***	-.051 (.01)***
Instructions	.013 (.00)***			
Synonyms		.012 (.00)***		
Metal Folding			.009 (.00)***	
Technical Comprehension				.011 (.00)***
R^2	.113	.097	.092	.092
N	416,051	415,238	415,242	415,439

Notes: The dependent variable is logarithmic annual income. In all models we control for age, age squared and labour market region. In column (1) the Instructions test is controlled for, in column (2) the Synonyms test is controlled for, in column (3) the Metal Folding test is controlled for and in column (4) the Technical Comprehension test is controlled for. The number of cases varies across the columns since some individuals did not take all four tests.

Table 4. Results from estimating the income gap between second generation immigrant and native men for those with at least twelve years of schooling at the test date. 2003. Log points.

	(1)	(2)	% explained
Two parents born abroad:			
Nordic countries	-.072 (.01)***	-.049 (.01)***	32
Western Europe	-.011 (.03)	-.001 (.03)	-
Eastern Europe	-.017 (.02)	-.007 (.02)	-
Southern Europe	-.091 (.01)***	-.033 (.01)***	64
Outside Europe	-.068 (.03)**	-.009 (.01)***	87
One parent born abroad:			
Nordic countries	-.047 (.00)***	-.041 (.01)**	13
Western Europe	-.013 (.01)*	-.013 (.01)**	-
Eastern Europe	-.019 (.01)**	-.019 (.01)**	-
Southern Europe	-.070 (.01)***	-.047 (.01)***	33
Outside Europe	-.080 (.01)***	-.074 (.01)***	8
Test score		.075 (.00)***	
Test score^2		-.002 (.00)***	
R^2	.097	.127	
N	232,142	232,142	

Notes: The dependent variable is logarithmic annual income. In both models we control for age, age squared and labour market region. In column (2) the test score is added to the model. Because the income gap is very small for second generation immigrants with a Western and Eastern European background the explained share has not been computed.

Table 5. Estimation results when testing whether the return to test score differs for native and second generation immigrant men. 2003. Log points.

	(1)
Two parents born abroad:	
Nordic countries	-.045 (.02)***
Western Europe	.015 (.03)
Eastern Europe	.000 (.02)
Southern Europe	-.026 (.02)
Outside Europe	-.045 (.03)
One parent born abroad:	
Nordic countries	-.039 (.02)**
Western Europe	-.013 (.02)
Eastern Europe	-.011 (.02)
Southern Europe	-.043 (.02)**
Outside Europe	-.067 (.02)***
Test score	.044 (.00)***
Test score^2	.002 (.00)***
Test score*Second generation Immigrant	.004 (.01)
Test score^2*Second generation Immigrant	.000 (.00)
R^2	.117
N	419,786

Notes: The dependent variable is logarithmic annual income. We control for age, age squared and labour market region.

Table 6. Results from estimating the income gap between second generation immigrant and native men when using 100,000 SEK as the income restriction. 2003. Log points.

	>SEK 100,000	
	(1)	(2)
Two parents born abroad:		
Nordic countries	-.067 (.00)***	-.036 (.00)***
% explained		46
Western Europe	.026 (.02)	.024 (.02)
% explained		8
Eastern Europe	.030 (.01)**	.026 (.01)**
% explained		13
Southern Europe	-.052 (.01)***	.001 (.01)
% explained		102
Outside Europe	-.063 (.02)***	.006 (.02)
% explained		110
One parent born abroad:		
Nordic countries	-.037 (.00)***	-.028 (.00)***
% explained		24
Western Europe	.006 (.00)	-.002 (.00)
% explained		-

Eastern Europe	.003 (.01)	-.003 (.01)
% explained		-
Southern Europe	-.041 (.01)***	-.019 (.01)***
% explained		54
Outside Europe	-.019 (.01)**	-.025 (.01)***
% explained		-28
Test score		.039 (.00)***
Test score^2		.002 (.00)***
R^2	0.081	.151
N	406,144	406,144

Notes: The dependent variable is logarithmic annual income. We control for age, age squared and labour market region. In column (2) the test score is added to the model.