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**Earnings Assimilation of Immigrants in Norway –
A Reappraisal**

By

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Earnings Assimilation of Immigrants in Norway – A Reappraisal

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Abstract

The relative earnings growth for immigrants in Norway is computed using data for all immigrants in Norway, in 1980 and 1990. We find that the earnings of OECD immigrants are comparable to those of natives at the time of entry and remain at the same level. Non-OECD immigrants earn considerably less than natives at the time of entry, but their relative earnings improve gradually over time. Also, we find that earnings of different immigrant cohorts converged from 1980 to 1990 and evidence that the rate of assimilation is non-linear. Assimilation estimates derived from cross-sectional differences between immigrant cohorts exaggerate the speed at which Non-OECD immigrants catch up with the earnings of the Norwegian born population.

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1. Introduction

The labor market performance of immigrants has received increasing attention in recent years along with a growing immigrant population in many Western countries. The assimilation of immigrants into the host country labor market is important for several reasons. Firstly, successful assimilation implies an efficient use of the labor force in the society. Secondly, as large groups of immigrants tend to be located in the bottom end of the income distribution, inequality is reduced if immigrants effectively accumulate human capital and raise their relative earnings. The need for targeted policy measures, like active labor market programs, will depend on the earnings performance of the immigrants. Finally, to the extent that the government takes into account the contribution to future income per capita when it determines the number and composition of immigrants allowed to enter into the country, the optimal policy will depend on how successfully immigrants assimilate in the labor market.

Economic assimilation of immigrants is typically defined as the speed at which immigrant labor improve their earnings as they live and work in the host country. As discussed by Borjas (1999), any sensible definition of assimilation must define a base group that the immigrants are catching up with over time. Previous studies are different in this respect, as some studies compare the immigrant earnings pattern to individuals in the host country of the same ethnicity, while others use statistically similar natives as the comparison group.

The main bulk of the empirical research in this area has been undertaken on U.S. data. However, adapting the approach from the U.S. studies, the analysis has been applied

on data from an increasing number of European countries, see the recent survey in LaLonde and Topel (1997).

The purpose of this paper is to present estimates of the earnings growth among immigrants in Norway from 1980 to 1990. The focus is on the extent to which the earnings of immigrants converge to that of the Norwegian born population. As Hayfron (1998) in this journal (henceforth H98), is the only internationally published analysis of immigrants in Norway, we make an explicit comparison of his and our study. This replicate approach is also motivated by what we see as important shortcomings of the analysis in H98.

Our study improves upon H98 in several respects. Firstly, the sample size is about ten times larger and as we report estimated standard errors, the uncertainty can be addressed. Secondly, we define the individual's immigrant status on the basis of country of birth rather than foreign citizenship. Because persons who immigrate may naturalize, that is to become host country citizens some years after arrival, the results in H98 are subject to bias from non-random acquisition of Norwegian citizenship. Thirdly, while H98 defines the cohort of an immigrant by means of Census appearance, our data contain the exact year of immigration. While census attrition may generate cohort misclassification in H98, this source of measurement error is not present in our data. Finally, H98 utilizes a random sample of the immigrant population at each point in time, hence the estimates are biased in the case of non-random return migration. We, on the other hand, exclude those who later return migrate and hence obtain assimilation estimates for those who stay.

Moreover, we extend the analysis and perform separate studies of immigrants from inside and outside the OECD region. The expected differences in earnings just after immigration between OECD and Non-OECD immigrants, as well as the earnings growth over time, are strongly confirmed by data. In fact, the split between OECD and Non-OECD immigrants reveals that the average figures disguise a distinctly different pattern for the two groups.

The paper is organized as follows. The different estimators are explained in the next section, while the main features of the data are described in section 3. Section 4 reports estimates of the average assimilation process from 1980 to 1990 along with an explicit comparison with H98's results. In section 5 we look at OECD and Non-OECD immigrants separately. Conclusions are drawn in section 6.

2. Assimilation measures

We use the quasi-panel approach suggested by Borjas (1985), widely used since as well as by H98. To fix ideas, log earnings of an immigrant of cohort i (immigrants who arrived in the host country within a given time period), in year t , is given by:

$$[1] \quad y_{i,t} = X_{i,t}\beta_t + c_{i,t} + \varepsilon_t$$

where $X_{i,t}$ refers to a vector of standard human capital controls, β_t refers to a vector of parameters, and ε_t to a white noise error term. The cohort specific constant term $c_{i,t}$ can be decomposed into:

$$[2] \quad c_{i,t} = a_{i,t} + b_{i,t} + u_i$$

where $a_{i,t}$ is the average level of unobserved host-country specific human capital (language proficiency, knowledge of host-country institutions etc.), of which evolvement is associated with earnings assimilation. $b_{i,t}$ is other period effects on earnings (business cycle effects etc.) and u_i is a cohort specific fixed effect. Equation [1] is estimated by OLS separately for each t , with the cohort specific constant terms obtained by cohort specific dummies in the regressions.

Based on data from a single cross section, the effect on immigrant earnings of living k years in the host country, for a given value of X , can be derived as:

$$[3] \quad \hat{y}_{i,t} - \hat{y}_{i+k,t} = \hat{c}_{i,t} - \hat{c}_{i+k,t} = (\hat{a}_{i,t} - \hat{a}_{i+k,t}) + (\hat{b}_{i,t} - \hat{b}_{i+k,t}) + (\hat{u}_i - \hat{u}_{i+k})$$

where $\hat{\cdot}$ indicates estimates. If there is no unobserved cohort heterogeneity, i.e. both level effects (u_i) and period effects (b_i) are equal across cohorts, the cross section estimate provides an unbiased estimate of the assimilation effect associated with k years of living in the host country. However, as highlighted by Borjas (1985) and several others since then, immigration policies, political conflicts and wars, economic development worldwide and economic incentives are likely to alter the composition of immigrant cohorts. The earnings capacity and effects of changing macroeconomic conditions are likely to differ across cohorts, even for immigrants from the same country of origin.

With data from two points in time, we can track the same cohort over time and estimate the assimilation by means of within-cohort changes, holding the observables constant:

$$[4] \quad \hat{y}_{i,t} - \hat{y}_{i,t-k} = \bar{X}_{i,t} (\hat{\beta}_t - \hat{\beta}_{t-k}) + (\hat{a}_{i,t} - \hat{a}_{i,t-k}) + (\hat{b}_{i,t} - \hat{b}_{i,t-k})$$

Equation [4] offers an interpretation of the within-cohort growth as due to price-changes (return to education, skills etc., as measured by the \mathbf{b} 's), pure assimilation effects and time-period effects. When k is large, say 5 or 10 years, we typically have $b_{i,t} \neq b_{i,t-k}$. Thus the within-cohort growth is partly due to a changing macroeconomic environment. This time-effect can be approximated by means of natives, n , for which earnings can be written:

$$[5] \quad y_{n,t} = X_{n,t} \lambda_t + c_{n,t} + \eta_{n,t}$$

$$[6] \quad c_{n,t} = b_{n,t} + u_n$$

where we assume that natives are fully integrated in the host country (the host country specific human capital is constant over time, and incorporated into the time-invariant part of the constant term for natives, u_n) and $\eta_{n,t}$ is a white noise error term. The within-cohort growth *in excess of the growth experienced by natives*, holding the observables constant, is then:

$$[7] \quad (\hat{y}_{i,t} - \hat{y}_{i,t-k}) - (\hat{y}_{n,t} - \hat{y}_{n,t-k}) = \\ \bar{X}_{i,t} [(\hat{\beta}_t - \hat{\beta}_{t-k}) - (\hat{\lambda}_t - \hat{\lambda}_{t-k})] + (\hat{b}_{i,t} - \hat{b}_{i,t-k}) - (\hat{b}_{n,t} - \hat{b}_{n,t-k}) + (\hat{a}_{i,t} - \hat{a}_{i,t-k})$$

Thus, if changing economic environments do not affect relative earnings of immigrant cohort i , i.e. $b_{n,t} - b_{n,t-k} = b_{i,t} - b_{i,t-k}$, we are able to identify the assimilation effect by relative price changes and price-adjusted relative means¹.

As pointed out by Borjas (1985), the cross-sectional estimate of assimilation [3] can be re-expressed as the sum of the within-cohort and the across-cohort growth, both relative to natives:

$$[8] \quad (\hat{y}_{i,t} - \hat{y}_{i+k,t}) = [(\hat{y}_{i,t} - \hat{y}_{i,t-k}) - (\hat{y}_{n,t} - \hat{y}_{n,t-k})] + [(\hat{y}_{i,t-k} - \hat{y}_{i+k,t}) - (\hat{y}_{n,t-k} - \hat{y}_{n,t})]$$

The left-hand side is equal to the cross sectional cohort difference in year t . The right-hand side consists of two parts, the relative within-cohort growth, as given by [7], and the relative across-cohort growth given by:

$$[9] \quad (\hat{y}_{i,t-k} - \hat{y}_{i+k,t}) - (\hat{y}_{n,t-k} - \hat{y}_{n,t}) = \\ \bar{X}_{i,t} [(\hat{\beta}_{t-k} - \hat{\beta}_t) - (\hat{\lambda}_{t-k} - \hat{\lambda}_t)] + (\hat{b}_{i,t-k} - \hat{b}_{i+k,t}) - (\hat{b}_{n,t-k} - \hat{b}_{n,t}) + (\hat{a}_{i,t-k} - \hat{a}_{i+k,t}) + (\hat{u}_i - \hat{u}_{i+k})$$

¹ Note that as dummy variables will be included in the X-vector, we are not able to separately identify the pure assimilation effect (that is an increase in unobserved host-country specific skills) from the price changes. However, as the price changes are measured relative to natives, these could be considered part of the assimilation effect. For instance, an increase in language proficiency could easily result in higher returns to education.

that is, the earnings differential between cohorts with the same years in the host country, observed at two different points in time. Equation [9] shows that the across-cohort growth is due to price changes and fixed cohort differences, as well as period effects and the level of country-specific human capital.

Following the established path, our strategy is to calculate the cross sectional earnings growth along with the decomposition into relative within-cohort growth and relative across-cohort growth.

3. Our data

Our sources are the 1980 and the 1990 Norwegian Census, supplemented by administrative data for 1990. The underlying data cover the entire population in both years. To facilitate comparability with H98, we adapt his sample restrictions as closely as possible. Firstly, we include only men aged 17-55 in the 1980, and men aged 27-65 in 1990, who had positive earnings and who worked weekly hours above a given threshold in each of the years². We exclude from the sample those registered as students or self-employed³, and those without registered educational attainment⁴. Country of birth and year of immigration are only available in our data for individuals registered as residents in Norway from 1992 on. Our data is therefore restricted to individuals who were still

² 1980: worked 30 hours or more in the Census week, 1990: registered with annual hours of work corresponding to 6 months or more of full-time work (information supplied by the employer on weekly hours and length of job-relationship).

³ From our data 1980 only. Unfortunately we do not observe whether an individual is a student or a self-employed in our 1990 sample.

⁴ Among the immigrants this selection criteria excludes 22 and 20 percent of the sample in 1980 and 1990 respectively. The number of natives excluded is negligible.

living in Norway after 12 and 2 years, for the 1980 and 1990 sample respectively.

Finally, immigrant status is defined by country of origin.⁵ A random 8.3 percent sample of non-immigrants in each year constitutes the sample of natives. This generates four separate cross sectional samples, 11 171 immigrants and 47 773 natives in 1980, and 19 746 immigrants and 52 013 natives in 1990.

Compared to H98, our data differ both with respect to the information contained, and the implemented sample restrictions. First and foremost, the individual's immigrant status is defined on the basis of country of origin rather than foreign citizenship. As persons who immigrate may naturalize, e.g. become host country citizens some year after arrival⁶, we may find that those who keep their foreign citizenship constitute a selected group of a given immigrant cohort. For example, in H98 an individual born abroad with a foreign citizenship in 1980 who obtained a Norwegian citizenship before 1990 is counted as an immigrant in 1980 and a native in 1990, whereas in our analysis he/she is counted as an immigrant in both years. Unlike H98, our data is not subject to the criticism of non-random naturalization. Second, while H98 defines the cohort of an immigrant by means of the immigrants appearance in the 1960, 1970, 1980 and 1990 Censuses, our data contain the exact year of immigration. Census attrition could generate misclassification in H98. This source of measurement error is not present in our data. Thirdly, return migration affects the samples differently. Persons who leave Norway on a permanent basis before 1992, are not included in our data, while H98 employ strictly random samples from each year. In the presence of non-random return migration, the rate of assimilation is not precisely defined as it differs between those who stay and those who

⁵ Foreign born with a Norwegian born mother or father is *not* defined as immigrant.

leave. Ideally we should measure some sort of expected earnings assimilation at the time of entry, but it is impossible to assess these expectations without real longitudinal data. Hence, it is not clear whether the inclusion of the return migrants in H98 would bias the assimilation estimates up or down. In contrast, our study yields estimates for a subgroup of the immigrant population, namely those who stay. Further, other studies have documented that the tendency to return migrate differs dramatically within the immigrant population⁷. Recognizing the potentially very important differences in labor market behavior between those who stay and those who leave, separate analyses for subgroups of the immigrant population, based on a measure which captures differences in return probability, is called for. We undertake such a separation in the second part of our analysis. Finally, we employ slightly different selection rules regarding educational attainment, student- and self-employment status, we do not believe however that this by itself would yield significantly different samples compared to H98.

The main features of the data are described in **Table A1/A2** in the appendix. We note the huge differences in the share of immigrants from Non-OECD countries across cohorts. In the pre-1965 cohort only seventeen percent of the immigrant sample originated outside the OECD region. In contrast, among those who arrived in 1980-89 roughly half were from outside the OECD. Also, the educational attainment is on average higher among immigrants than among natives, and there is no tendency, as for instance

⁶ Immigrants may naturalize and become a Norwegian citizen after seven years of residence.

⁷ Tysse and Keilman (1997) find that only 25 percent of OECD immigrants were still living in Norway after a period of 6 to 10 years, compared to more than 80 percent of the immigrants from Asia, Africa and Latin-America.

found in most studies based on U.S. data, of declining observable skills in the immigrant population over time.⁸

Our measure of earnings includes, as in H98, taxable income from work, sickness pay, unemployment benefits and income when in labor market programs. The unadjusted earnings differentials between immigrants and natives are presented in **Table 1** along with the results published in H98, Table 1. While H98 report that the average 1970-79 immigrant earned approximately 9.9 per cent more than the average native in 1980 and 5.6 percent less in 1990, our corresponding figures are 1.9 percent and 2.3 percent.

Return migration is one possible explanation of the huge earnings advantage for 1970-79 immigrants in 1980 reported by H98. Highly paid, short term guest workers, mostly from western countries, typically stay in Norway for considerably less than ten years. By our selection rule, these groups are excluded from our sample. Misclassification may also explain the high earnings of the 1970-79 cohort in 1980 reported by H98, if those who did not appear in the 1980 Census due to attrition, are interpreted as members of the 1980-89 cohort. We would not expect attrition to be independent of earnings.

In sum, we employ a sample of immigrants ten times as large as H98, with superior information on year of immigration and immigrant status. The data offer an opportunity to carefully replicate and improve upon the study by H98 and check the robustness of his conclusions.

⁸ Observable skills are here measured by educational attainment only, assuming that the quality and transferability of schooling do not differ between cohorts.

4. Average assimilation - A replication of Hayfron (1998)

Table 2 presents the results of the earnings growth decomposition described in section 2 for the 1970-79 cohort of immigrants. The results from H98's study are given in column I, while our comparable figures are listed in column III. The cross sectional earnings assimilation estimates (row A) are of the same magnitude in both studies and the average earnings of the 1970-79 cohort was about 10 per cent higher than for the 1980-89 cohort in 1990.

The estimates of relative within-cohort growth (row D) are also very similar across the two studies. In both studies the relative earnings growth of the 1970-79 cohort from 1980 to 1990 is considerably lower than the cross sectional difference between the 1970-79 and the 1980-89 cohorts in 1990. Apparently, the two studies contain the same message namely that assimilation estimates based on cross-sectional comparisons of cohorts exaggerate the accumulation of human capital within a given cohort. However, a closer look at the figures behind the relative within-cohort growth reveals that the apparently similar figures are due to very different processes.

Note first that both the within-cohort growth and the within-native growth is highly negative in H98, see row B and C, Table 2. It is implausible that natives, other things equal, actually experienced a fall in real income between 1980 and 1990 of this magnitude. Secondly, H98 does not document statistical significant earnings differentials between immigrant cohorts. The large standard errors reported for the estimated cohort dummies in H98 (Table A3, page 303), indicate that statistically insignificant differences between the estimated cohort dummies cannot be ruled out. Unless cross sectional

earnings differentials between cohorts are found to be statistically significant, the decomposition strategy described in section 2, is of limited interest.

In order to investigate these disparities further and to shed some light on why immigrant earnings improved, we have decomposed the within-growth numbers. We focus on the contribution of change in the return to education and of change in minority penalty, of which both can easily be separated out.⁹ From the decomposition of the within-cohort-growth (Table 2, row B1-B3, column III) we see that the change in returns to education contributed about five percent to the income growth for the 1970-79 cohort between 1980 and 1990. Some studies suggest that the returns to education increased in Norway between 1980 and 1990, Kahn (1998) and Barth and Røed (1999), while others indicate a stable return, see Hægeland, Klette and Salvanes (1999). Because our estimates include 17-26 year old employees in 1980, but not in 1990, we would also expect the return to be higher in 1990. In contrast, H98 obtains a contribution from changes in the return to educational attainment of *minus* 3.8 percent to the income growth, which can be traced to an extremely low estimate of the return to education among immigrants in 1990. We find it hard to believe that the immigrants in Norway received only a 1.9 percent increase in income per additional year of education, compared to 6.9 percent among natives (H98, table A3, column 3). Our estimate of the contribution of the change in the minority penalty over the decade seems more in line with the figures obtained by H98.

From the decomposition of the within-native growth (row C1-C2, column II) we see that H98's abnormally low estimate of the overall growth in native earnings is not explained by changes in the return to education, as H98 estimate a large increase in the

⁹ The constant term depends on the set of excluded (reference) dummy variables, hence the contribution of this term alone has no meaningful interpretation.

return over the decade. The explanation could possibly be found in the obtained age-earnings profiles in 1980 and 1990, which differ dramatically (see H98, table A3), probably as a consequence of the different sampling criteria regarding age in 1980 and 1990. On the other hand, we find a moderate within-native growth of about 1 per cent using the same age groups as H98, so this cannot be the only explanation.

Finally, H98 obtains a pure aging effect for immigrants of almost seven per cent. That is, the excess return to experience among immigrants in 1990 compared to natives yields a rather large gain in predicted income when accumulated over ten years. The rather high estimate on the pure aging effect leads to an estimated total assimilation of about 11 percent for the 1970-79 cohort, compared to about 6 percent in our study. Our study of the average assimilation among the 1970-79 cohort of immigrants shows that (i) a cross-section estimate based on the difference between 1980-89 and 1970-79 cohorts in 1990 exaggerates the earnings convergence, indicating a lower earnings capacity of recent immigrant cohorts, and (ii) the total assimilation is considerably weaker than suggested by H98.

5. Assimilation by country of origin and cohort

The amount of human capital that immigrants bring with them, and its transferability, vary enormously within the immigrant population. While some immigrants arrive as labor migrants with only a short-term stay in mind, others arrive as refugees or asylum seekers. We expect a substantial heterogeneity within the immigrant population, both with respect to earnings level just after immigration and to the growth over time.

However, the motivation behind the entry into the host country and pre-immigration

history is not observed directly in the data. Most likely, however, these characteristics are correlated with the country of origin and cohort. We therefore study the earnings of immigrants from inside and outside the OECD region separately. Thereby we allow for differences in wage structure and return migration across immigrant groups.¹⁰ More importantly, we uncover what turns out to be a distinctly different story for OECD and Non-OECD immigrants. Column IV and V, Table 2, reveal important differences between the two groups. First, there is no predicted earnings growth for the OECD immigrants when we compare cohorts in 1990. On the other hand, the predicted cross sectional earnings growth for the Non-OECD group is above twenty percent.

The relative within-cohort growth, however, is fairly similar, i.e. 0.037 and 0.0598 for the OECD and Non-OECD group respectively. This pattern is explained by the large difference in across-cohort differences, see row E. When we compare the relative earnings of the most recent cohort in 1980 and 1990, we find that the 1970-79 OECD cohort earned less in 1980 than the 1980-89 OECD cohort did in 1990. Thus, for OECD immigrants the cohort earnings potential seems to be increasing over time. This can be explained by return migration if the most successful OECD immigrants return after a period of highly paid employment. The across cohort differential is distinctly different for Non-OECD immigrants. The 1970-79 cohort is estimated to earn about 15

¹⁰ H98 includes a dummy for visible-minority among the covariates in his regressions. This approach assumes that the wage structure is equal between groups of immigrants, for instance H98 implicitly assumes that the return to experience is the same for a short-term labor migrant from Scandinavia, and an asylum seeker from Africa. Secondly, as stated before, the propensity to return migrate differs dramatically across country-of-origin-groups. Hence the obtained within-cohort growth are to a degree based on the difference in earnings between the full cohort in 1980 and the much smaller group consisting of those who are still in the country ten years later. In H98's immigrant sample, 73 percent are not "visible minority", which hints at a potentially large return migration bias in the results.

per cent more in 1980 than the 1980-89 cohort did in 1990. Therefore, the earnings capacity of the Non-OECD immigrant cohorts seems to be falling over time. This is reasonable given the implementation of the immigrant stop in Norway in 1975, which drastically reduced the flow of economically motivated immigrants from third world countries. Table 2 does also show that the pure aging effect for immigrants is limited to OECD-immigrants only. There is no indication that Non-OECD immigrants have a steeper earnings profile as a function of age than natives.

In light of the presented results for the 1970-79 cohort, we proceed to see if the same structures can be found for other cohorts. Moreover, we investigate whether there are any important intra cohort differences in assimilation. The cohort approach implicitly assumes that immigration is equally distributed within the range of immigration years. However we know that this is not the case as the flow of immigrants vary substantially from year to year. By studying a shorter range than 10 years we reduce this bias. Also, by the cohort approach we obtain the earnings growth on average within the cohort. There are reasons to believe that such a measure varies substantially on a year by year basis, especially during the initial years. A shorter cohort range could also shed some light on this issue. Hence we have chosen to present the main figures separately for Non-OECD and OECD immigrants using 5-year cohorts.

The earnings effect of ten years of living in Norway differs considerably between Non-OECD cohorts, i.e. groups with different periods since immigration in 1980, see **Table 3a**. The cross section estimates show that only the recent cohorts, i.e. 1970-74 and 1975-79, improved their earnings. The relative within-cohort growth is insignificantly negative for the pre-1970 cohorts. The 1970-74 cohort experienced a small positive

change while the most recent cohort in 1980, the 1975-79 cohort, saw a large increase in their earnings over the decade. One interpretation is that the growth in relative earnings is fairly strong during the initial years of the stay, but slows down thereafter. In other words, we find clear indications of non-linearity in the earnings assimilation. However, by such an interpretation we implicitly assume that we can use the earnings growth of earlier cohorts to predict the future growth in earnings for more recent ones. It should also be emphasized that we do not know when the early cohorts reached the high earnings they are observed to receive in 1980. Finally, when we combine the within cohort growth in relative earnings from 1980 to 1990 and the mean earnings in 1980 (last column)¹¹, we find a distinct tendency of earnings to convergence among immigrants. That is, cohorts with low mean earnings in 1980 experienced high growth during the following decade, and vice versa. Apart from being an important fact in itself this finding supports the non-linearity interpretation of the difference in relative earnings growth between cohorts.

For OECD immigrants a more mixed picture emerges. There are no significant earnings differentials between the cohorts in 1990, see **Table 3b**. In sharp contrast to the results for the Non-OECD immigrants, the 1975-79 cohort did not see a higher within cohort earnings growth than the 1970-74 cohort. Interestingly, the 1970-74 cohort actually earned less in 1980 than the 1975-79 cohort, supporting the hypothesis of declining earnings potential among OECD immigrants. The relative within-cohort growth is also modest for all cohorts. In fact the pre-1965 cohort experienced a decline, from a level above natives in 1980. Overall, OECD immigrants perform quite differently in the labor market compared to Non-OECD immigrants. We do not find any systematic pattern

¹¹ Cohort-specific mean earnings, measured relative to natives, adjusted for differences in observables.

of earnings assimilation relative to natives, but this may simply reflect that OECD immigrants enjoy earnings at the same level as natives from their first year(s) in Norway. This strengthens our interpretation of OECD immigrants as mainly labor migrants with highly transferable human capital. Lack of Norwegian language proficiency does not seem to be an important obstacle to immigrants from the OECD countries.

6. Concluding remarks

The earnings assimilation of immigrants in Norway from 1980 to 1990 is shown to differ considerably between cohorts and by country of origin. On average, earnings of the 1970-79 cohort improved by almost 6 per cent over the decade, measured by the sum of the relative within cohort growth and the pure aging effect. The estimate is considerably lower than the 11 per cent H98 reports on comparable Norwegian data. The reliability of our estimate is by far better as we define immigrants by country of origin rather than citizenship, observe exact year of arrival, avoid return-migration and explicitly report standard errors of the estimates. While the positive assimilation in Hayfron appears because the predicted native earnings fall by nearly 20 per cent from 1980 to 1990, our estimate is due to a modest within-cohort growth for immigrants.

In line with H98 we find that cross-sectional estimates exaggerate the assimilation of immigrants. Unlike H98, we conclude that earnings of different immigrant cohorts converged from 1980 to 1990. The difference in assimilation rate between cohorts, found in both studies, is interpreted by H98 as evidence of divergence, but this interpretation fails to take into account that the growth from 1980 to 1990 is negatively related to the earnings level in 1980.

We are able to disaggregate by country of origin and cohort. Since the level and transferability of human capital, as well as the frequency of return migration, differ considerably between immigrants from inside and outside the OECD region, the earnings level at the time of arrival, and growth as years since immigration increases, are expected to differ between groups. Our split between OECD and Non-OECD immigrants reveals that the average assimilation rate actually disguises a distinctly different pattern for the two groups. Roughly speaking, earnings of OECD immigrants are comparable to those of natives at the time of entry and remain at the same level. Non-OECD immigrants, however, earn considerably less than natives when they arrive, but improve gradually over time. The earnings assimilation of Non-OECD immigrants who arrived in the 1970's is far too low to create parity with natives however, and we find some evidence of non-linear assimilation rates. The modest earnings growth of Non-OECD immigrants from 1980 to 1990 can have different explanations. The immigrants may have been over-represented in sectors and jobs with low productivity growth. Also, business cycles may have affected immigrants stronger than natives, i.e. different period effects of the high unemployment in 1990, reducing the relative within-growth of immigrants, see Longva and Raaum (1998).

References

Barth, E. and M. Røed (1999) "The Return to Human Capital in Norway: A Review of the Literature", in Asplund, R. and P. T. Pereira (eds): *Returns to Human Capital in Europe. A Literature Review*. ETLA, The Research Institute of the Finnish Economy, Taloustieto Oy, Helsinki.

Borjas (1985): "Assimilation, Changes in Cohort Quality, and the Earnings of Immigrants", *Journal of Labor Economics* 3: 463-289.

Borjas (1999): "The Economic Analysis of Immigration", in Card D. and O. Ashenfelter (eds.): *Handbook of Labor Economics*. vol. 3, North-Holland, Amsterdam.

Hayfron, J. E. (1998): "The Performance of Immigrants in the Norwegian Labor Market", *Journal of Population Economics* 11: 293-303.

Hægeland, T., T. J. Klette and K. G. Salvanes (1999): "Declining Returns to Education in Norway? Comparing Estimates Across Cohorts, Sectors and Over Time", *Scandinavian Journal of Economics* 101: 1-22.

Kahn, L. (1998): "Against the wind: Bargaining Centralization and Wage Inequality in Norway 1987-91", *Economic Journal* 108: 603-645.

LaLonde, R. J. and Topel, R. H. (1997): "Economic Impact of International Migration and the Economic Performance of Migrants" in M. R. Rosenzweig and O. Stark (eds.): *Handbook of Population and Family Economics*. Amsterdam: North-Holland.

Longva, P. and O. Raaum (1998): “Unemployment and Relative Earnings of Immigrants”, Memo 2/98, Department of Economics, University of Oslo, revised July 9, 1998.

Tysse, T. and N. Keilman (1997): “Return migration among immigrants: Refugees stay and Western immigrants go home” (In Norwegian: “Utvandring blant innvandrere: Flyktninger forblir, nordboere reiser hjem”), *Samfunnspeilet* 4/97, Statistics Norway.

Appendix

Table A1. Means, 1980, immigrants by cohort, and natives.

Table A2. Means, 1990, immigrants by cohort, and natives.

Table A3. Earnings, OLS, 1980 and 1990, all immigrants and natives.

Table A4. Earnings, OLS, 1980 and 1990, OECD- and Non-OECD immigrants separately.

Table 1 Immigrant log earnings by year of immigration, relative to natives, unadjusted.

Cohort	New Estimates		Hayfron (1998)	
	1980	1990	1980	1990
All	.111 (.005)	-.073 (.003)	.076	-.174
1980-89		-.173 (.005)		-.246
1970-79	.019 (.008)	-.023 (.006)	.099	-.056
1965-69	.141 (.012)	-.001 (.010)	.043*	-.144*
pre 1965	.185 (.008)	.029 (.006)	.045**	-.054**
Immigrants	11 171	19 746	963	1 764
Natives	47 774	52 013	2 102	2 482

Notes.

* 1960-69 cohort

** pre 1960

Standard deviations in parentheses

Table 2 Replication and decomposition of Hayfron (1998), 1970-79 cohort.

Measure	I. Pub-H98	II. Calc-H98	III. All	IV. OECD	V. Non-OECD
A. Cross section	.1204	.1204	.1008 (.0086)	-.0155 (.0114)	.2116 (.0128)
B. Within-cohort	-.1520	-.1193	.0454 (.0097)	.0503 (.0128)	.0618 (.0148)
B1. Education		-.0378	.0498 (.0193)	.0316 (.0251)	.1009 (.0313)
B2. Minority pen.		-.1128	-.0810 (.0050)		
B3. Other + const.		.0314	.0766 (.0222)	.0186 (.0277)	-.0391 (.0336)
C. Within-native	-.1910	-.1949	.0105 (.0035)	.0175 (.0039)	.0021 (.0032)
C1. Education		.2693	.1848 (.0118)	.1955 (.0125)	.1720 (.0110)
C2. Other + const.		-.4642	-.1743 (.0108)	-.1780 (.0108)	-.1700 (.0109)
D. Rel. WCG (B-C)	.0390	.0756	.0349 (.0103)	.0327 (.0134)	.0598 (.0151)
E. Rel. ACG (A-D)	.0815	.0448	.0659 (.0101)	-.0482 (.0134)	.1518 (.0145)
F. Pure aging eff.	.0697	.0464	.0245 (.0075)	.0430 (.0090)	-.0039 (.0118)
G. Tot. ass. (D+F)	.1087	.1220	.0594 (.0129)	.0757 (.0162)	.0559 (.0192)

Notes.

Numbers for H98 are based on published estimates. Column I refers to the figures in table 2, H98. The calculations in column II are based on the reported estimates in table A3, H98. Column III-V are based on the regressions reported in table A3/A4. Standard deviations in parentheses.

Table 3a Non-OECD immigrants. Effects of ten years of living in Norway.

Cohort	Cr.sec. 1990	Within-cohort	Native growth	RWC growth	mean 1980*
Pre. 1965		.0823 (.0274)	.1212 (.0068)	-.0389 (.0282)	.0129 (.0230)
1965-69	.0136 (.0265)	-.0316 (.0299)	.0204 (.0042)	-.0519 (.0302)	-.1062 (.0217)
1970-74	.0864 (.0186)	.0211 (.0193)	-.0186 (.0034)	.0397 (.0196)	-.2260 (.0140)
1975-79	.3119 (.0163)	.1427 (.0205)	.0214 (.0032)	.1212 (.0207)	-.2979 (.0159)

Notes.

The regressions of which the figures are based on are available from the author. The following variables were included: age, age-squared, education, married, west, north, dummies for Asia, Africa, South-America, East-Europe as reference group. Standard errors in parentheses.

* Relative to natives, adjusted for differences in observables.

Table 3b OECD immigrants. Effects of ten years of living in Norway.

Cohort	Cr. sec. 1990	Within-cohort	Native growth	RWC growth	mean 1980*
Pre. 1965		.0502 (.0139)	.0969 (.0061)	-.0467 (.0152)	.0518 (.0134)
1965-69	-.0134 (.0167)	.0280 (.0176)	.0248 (.0042)	.0032 (.0181)	-.0227 (.0136)
1970-74	-.0238 (.0150)	.0548 (.0174)	.0153 (.0039)	.0395 (.0179)	-.0815 (.0137)
1975-79	.0199 (.0154)	.0443 (.0170)	.0196 (.0040)	.0247 (.0174)	-.0474 (.0133)

Notes.

The regressions of which the figures are based on are available from the author. The following variables were included: age, age-squared, education, married, west, north, dummies for West-Europe, North-America, Nordic as reference group. Standard deviations in parentheses.

* Relative to natives, adjusted for differences in observables.

Table A1 Means 1980, immigrants by cohort, and natives.

	Pre 65	1965-69	1970-79	All	Natives
Education	10.84 (3.21)	10.91 (3.22)	12.00 (3.25)	11.32 (3.28)	10.53 (2.70)
Age	43.38 (7.74)	38.55 (6.24)	32.62 (7.10)	38.27 (8.78)	34.90 (10.26)
Married	.84 (.36)	.81 (.40)	.75 (.44)	.80 (.40)	.68 (.47)
Non-OECD	.17 (.38)	.29 (.45)	.47 (.50)	.31 (.46)	
West	.15 (.35)	.15 (.35)	.18 (.38)	.16 (.37)	.25 (.44)
North	.06 (.23)	.05 (.21)	.05 (.21)	.05 (.22)	.14 (.34)
N	4 893	1 764	4 514	11 171	47 774

Table A2 Means 1990, immigrants by cohort, and natives.

	Pre 65	1965-69	1970-79	1980-89	All	Natives
Education	12.20 (2.95)	12.16 (2.92)	12.70 (3.14)	13.29 (3.52)	12.79 (3.28)	11.93 (2.64)
Age	52.21 (7.81)	47.67 (6.53)	41.23 (7.07)	35.69 (7.00)	42.00 (9.78)	42.57 (10.27)
Married	.80 (.40)	.76 (.42)	.77 (.42)	.66 (.48)	.73 (.44)	.71 (.45)
Non-OECD	.17 (.38)	.27 (.45)	.46 (.50)	.53 (.50)	.41 (.49)	
West	.15 (.36)	.16 (.37)	.19 (.39)	.23 (.42)	.19 (.40)	.25 (.44)
North	.05 (.22)	.05 (.21)	.05 (.21)	.07 (.25)	.06 (.23)	.12 (.33)
N	4 599	1 731	5 038	8 378	19 746	52 013

Table A3 Regression coefficients, all immigrants and natives.

	1980 I	1980 N	1990 I	1990 N
Intercept		9.29855 (.02610)		10.66109 (.02876)
Age	.06006 (.00351)	.11888 (.00151)	.05312 (.00294)	.04547 (.00132)
Age-squared	-.00069 (.00005)	-.00138 (.00002)	-.00058 (.00003)	-.00051 (.00002)
Education	.03860 (.00116)	.03697 (.00073)	.04252 (.00099)	.05151 (.00058)
Married	.08940 (.00962)	.13927 (.00505)	.07456 (.00730)	.08920 (.00359)
West	.02711 (.01021)	-.01272 (.00457)	.04881 (.00810)	-.00442 (.00359)
North	-.05742 (.01705)	-.07158 (.00581)	-.10731 (.01395)	-.10255 (.00475)
Non-OECD	-.05725 (.00851)		-.23417 (.00691)	
Pre 65	10.52237 (.06620)		10.61534 (.06418)	
1965-69	10.48856 (.06772)		10.58128 (.06628)	
1970-79	10.41386 (.06485)		10.59386 (.06501)	
1980-89			10.49306 (.06252)	
Adj. R-sq.	.188	.339	.212	.180
N	11 171	47 774	19 746	52 013

Table A4 Regression coefficients, OECD and Non-OECD immigrants separately.

	1980 OECD	1980 N-OECD	1990 OECD	1990 N-OECD
Age	.08081 (.0048)	.04630 (.0055)	.06064 (.0038)	.04556 (.0051)
Age-squared	-.00092 (.00006)	-.00057 (.00008)	-.00065 (.00004)	-.00051 (.00006)
Education	.04431 (.00141)	.02419 (.00210)	.04666 (.00123)	.03272 (.00162)
Married	.08432 (.01152)	.10495 (.01699)	.09308 (.00895)	.05062 (.01204)
West	.07339 (.01164)	-.11859 (.02058)	.08084 (.00974)	-.00355 (.01372)
North	-.05426 (.01799)	.00316 (.05032)	-.11712 (.01555)	-.06661 (.02774)
Pre 65	10.00536 (.09303)	11.03471 (.09678)	10.32079 (.08566)	10.92494 (.10181)
1965-69	9.96458 (.09440)	10.96394 (.10024)	10.29524 (.08764)	10.76820 (.10666)
1970-79	9.92291 (.09115)	10.81565 (.09481)	10.29668 (.08616)	10.73999 (.10457)
1980-89			10.31218 (.08247)	10.52840 (.10158)
Adj. R-sq.	.186	.178	.161	.148
N	7 701	3 470	11 704	8 042