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Research Article

Ethnic Disparities in the Graduate Labour Market

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This paper examines ethnic wage differentials for the entire population of workers who enrolled for the first time as students at Dutch universities (WO) and colleges (HBO) in 1996 using unique administrative panel data for the period 1996 to 2005 from the Dutch tertiary education system. The study breaks down wage differentials into two components: a component which can be explained by the observed characteristics and an unexplained component. The analysis provides new evidence for the magnitude and the origin of ethnic wage differentials by gender. In general, ethnic wage gap is larger for migrant women than migrant men and larger for Western and Caribbean migrants than for Mediterranean migrants. Ethnic minority workers appear to have larger wage surpluses which is almost entirely explained by their observed favourable characteristics. Most notably, Mediterranean female graduates have significantly positive wage discrimination, while Western female graduates seem to face a small wage penalty.

1. Introduction

Ethnic disparities in the upper segments of skill distribution have received little attention from scholars, in contrast to the concentration of ethnic minorities in the lower segments of the labour market [1, 2]. However, participation of the largest ethnic minority groups in higher education has increased sharply in the last decade. Between 1995 and 2006, the percentage of Mediterranean (Turkish and Moroccan) students in the Dutch higher education system doubled, from about 16 percent to 37 percent, while the rise in the participation rate of Dutch students has been relatively limited, that is, from 45 to 55 percent. The participation rate of Surinamese students increased from 28 to 49 percent [3].

In contrast to immigrants' position in the lower segments of the labour market, there is little evidence of the performance of ethnic minorities in the highly skilled labour market. Attending higher education implies that ethnic-minority students have acquired many mainstream norms and values transmitted through all levels of education, generally referred to as host-country-specific capital, which acts as an invisible device for the adjustment of migrants in the host-country labour markets [4–6]. Nevertheless, a lower proportion of ethnic minority students complete their study compared to

Dutch students [7–9]. This paper is the first to address ethnic disparities in the upper segment of the Dutch labour market which depends on the enrolment in tertiary education.

Theoretically, a disadvantaged ethnic background does not necessarily generate a new ethnic disadvantage. The earlier study by Belman and Heywood [10] and recent studies by Ferrer and Riddell [11] and Arcidiacono and colleagues [12] provide empirical evidence from the United States and Canada that, compared with the majority, ethnic minorities have greater earning gains associated with completing educational programmes. This relatively large gain has been explained by imperfect signalling model in which minorities receive greater returns to signals for high productivity than natives do. These greater returns would stem from the higher cost of achieving an inaccurately high signal for minorities compared with natives because minorities possess relatively fewer resources [10, 13, 14].

There is another reason to believe that ethnic wage penalties for disadvantaged groups do not need to be present. Since only a small percentage of ethnic minority youth enrol in higher education, it is likely that the most able individuals will be the first to enrol. Kirsten, Reimer and Kogan [15] reported a significant positive selectivity of Turkish students into tertiary education in Germany. Such a positive selectivity

can lead to an underestimation of ethnic disparities or an overestimation of relative wages of ethnic minority students when estimation does not adequately check ability.

This paper contributes to the literature on the performance of ethnic minorities from disadvantaged immigrant groups by examining ethnic disparities in the graduate labour market conditional to enrolment. The study uses unique administrative panel data of the entire 1996 intake cohort in the Dutch tertiary education system, for higher vocational education (HBO) and university education (WO). We follow individuals for ten years after enrolment in registers to assess the labour market performance of graduates and dropouts. The paper applies regression analysis to break down the ethnic wage gap into two components: the first component refers to the explained wage differential which arises from differences in observed characteristics. The second part of ethnic wage differentials is the unexplained component. This component is often interpreted as a measure of discrimination, as in the case in this paper.

The rest of the paper is organized as follows. In Section 2, we briefly describe the Dutch higher education system and ethnic minority groups. In Section 3, we discuss the theoretical framework and derive hypotheses. In Section 4, we introduce the data and provide descriptive results. In Section 5, we examine ethnic wage differentials using a decomposition analysis. Section 6 contains our conclusions.

2. The Dutch Context

2.1. The Dutch Education System. The Dutch higher education system is organized as a binary system into higher vocational education (HBO) and university education (WO). The fundamental difference between these two tracks is the curriculum offered by these institutions. The HBO institutions provide higher professional education in applied subjects, while the WO institutions (universities) conduct research and provide university education. The HBO institutions are practice oriented, not research oriented. In line with the orientation, the entry requirement conditions are different for HBO and WO. In The Netherlands, access to higher education is conditional on the completion of predetermined secondary education, and no entrance examination is needed. Financial constraints hardly play any direct role in enrolment decisions.

Candidates for WO are required to have a leaving certificate from preuniversity education (VWO) or to have completed the first year of an HBO programme, while the minimum requirement for access to HBO programmes is either a leaving certificate from general secondary education (HAVO) or a level-4 diploma from the secondary vocational education programme (MBO). The Dutch education system was different from the Anglo-Saxon Bachelor's-Master's type until the 2002/2003 academic year. The higher education system in The Netherlands was then organized into a Bachelor's-Master's degree structure within the framework of the harmonization of education systems in the European Union, as regulated by the Bologna agreement (1999). The new system has been applied to new entrants since September

2002. Before the introduction of this new structure, both study types formally lasted for four years. A WO graduate received a Master's degree, while HBO students received a degree equivalent to a Bachelor's degree. Since our data only relates to 1996 entrants, the old higher education system applies to this study.

2.2. Ethnic Minorities. This study breaks down ethnic minority students in Dutch higher education into three major groups, taking into account the parental immigration history and these students' socioeconomic position and their own educational attainment. The first group includes students of Turkish and Moroccan origin (*Mediterranean*). The second group comprises students from Suriname and the Dutch Antilles (*Caribbean*). The third group covers students originating from Western countries (*Western*). This last group includes students from European countries (including Central and Eastern Europe but excluding Turkey), North America, Australia, New Zealand, Japan, and Indonesia (This category is a standard definition of Statistics Netherlands. Indonesia is categorised as Western because immigrants from this former colony have a similar socioeconomic and socio-cultural position as other Western immigrants.) The first Turkish and Moroccan immigrants came to The Netherlands as guest workers in the 1960s, while immigration flows from Suriname and The Netherlands Antilles are due to colonial relations. Immigration from Western countries has been linked to economic conditions.

This historical background reflects the socioeconomic position of these groups and their cultural distance from the host society. Caribbean migrants often speak Dutch and adopt cultural norms similar to those of Dutch people thanks to their colonial relations. Their labour-market position is somewhat less favourable than that of native Dutch. By contrast, the predominantly Muslim Mediterranean migrants are frequently less well educated, hardly ever spoke Dutch prior to immigration, and have a greater cultural distance from Dutch people. There is some empirical evidence that these migrants face significant difficulties in the Dutch education system, and labour and housing markets [2, 9]. These students have a high dropout rate, are frequently unemployed, and are concentrated at the bottom of the occupational distribution.

It should be noted that a large portion of ethnic minority students were born in The Netherlands or immigrated at young ages and attended primary and secondary education in the Netherlands. Consequently, in contrast to their parents, these students have been exposed to mainstream norms and values in Dutch society. It may be that only a small proportion of ethnic minority students came to The Netherlands to study. These students also have to satisfy the standard entry requirements of higher education, including language. These nondiscriminatory entry conditions ensure that students do not face basic language problems and they do not lack basic relevant information. However, ethnic minority students may still lack cultural and linguistic capital which the Dutch middle and higher class have in common (see Section 3). Consequently, any differences between the

wages of the groups will reflect ethnic disparities. These can stem from many sources, including motivation, ability, preferences, and the quality of the match between individual and employer.

3. Theoretical Framework and Hypotheses

In Europe, and in The Netherlands in particular, most ethnic minority people from developing countries are concentrated at the lower end of the skill distribution. An increasing number of young people have enrolled in higher education and have entered the labour market with higher qualifications than their parents. The question remains as to whether ethnic minority graduates from disadvantaged communities obtain similar returns on their qualifications as native Dutch graduates do. Traditionally, human capital theory has linked education to labour market performance by regarding education as an investment which enhances productivity [16]. Since all students take similar courses, we can expect their human capital accumulation to be comparable to some degree, although ability differences can still generate wage differences. Beyond this type of productivity differences, ethnicity can play a significant role in explaining ethnic disparities [17]. To understand the role of ethnicity, we can use signalling theory and the sociological theory of social and cultural capital to explain these findings.

Signalling theories emphasise the signalling effects of education. If employers are unable to assess the true productivity of a worker, this employer will use easy-to-observe indicators, such as education, that are thought to be correlated with productivity. In traditional signalling models [18, 19], schooling acts as a screening device for worker productivity. This suggests that schooling has a signalling function in addition to its contribution to productivity, as argued by human capital theory. An imperfect signalling model predicts that ethnic minorities are expected to receive greater returns to signals of high productivity than the majority do, because ethnic minorities may have to pay a relatively high cost of achieving an inaccurately high signal, owing to the relatively limited resources they can devote to higher education [10, 14].

The literature on statistical discrimination argues that employers' decisions on hiring and earnings are based on a conditional expectation of productivity, and on the productivity signal. In other words, employers will hire workers who signal expected high productivity through "common" indicators of high productivity such as education. Employers may also use other easy-to-observe indicators for productivity such as ethnicity and race, if productivity is thought to be related to these indicators. In such a context, ethnic minority communities with a less favourable image, may face more likely discrimination in the labour market. Signalling theory provides tools to understand possible ethnic disparities in the postgraduation period, if individual productivity is determined properly. However, it is unlikely that a degree can capture entire productivity. Other determinants of productivity have to be present, such as the quality of courses taken and an IQ score, that are not included in our data. We

test the relevance of unobserved individual heterogeneities and conclude that our estimates do not suffer much from unobserved heterogeneities.

The second line of arguments emphasizes the role of structural and cultural constraints implicit in society that generate disparities for disadvantaged minorities. Students from racial and ethnic minority groups are more likely to come from disadvantaged families and are thought to lack the relevant social and cultural capital necessary for finding a job. Social capital refers to productive relationships or networks that provide access to opportunity or lead to favourable outcomes [20]. Cultural capital refers to high-status linguistic and cultural competences like value, preferences, and tastes that are inherited from parents, peers, and other institutional agents. The acquisition of cultural capital depends heavily on early and imperceptible learning, performed within the family from the earliest days of life [21]. Deficiency in the proficiency of a majority language within a minority group is likely to be an important source of a low level of cultural capital. Students from developing countries, especially Mediterranean students, are potentially just such a minority group which possesses less social and cultural capital due to their less-advantaged position within Dutch society. A low level of social and cultural capital is associated with a greater cultural distance from the host society, which will potentially hamper the establishment of relevant social networks which serve as effective channels of relevant information which can help people get highly valued and scarce jobs [22]. Furthermore, highly skilled jobs are increasingly nonmonotonic and require a high degree of interpersonal interactions, language skills, cultural capital, and social relations. Bearing all these requirements in mind, employers may not prefer graduates from disadvantaged immigrant groups that are perceived not to "fit" in with the profile of a "standard" employee. Alternatively, employers may pay relatively low wages to people from ethnic minorities.

Based on predictions of the imperfect signalling model and considering the deficiency in social and cultural capital and relevant social networks to get good jobs, we can formulate the following hypotheses.

- (H1) Mediterranean graduates who are predominantly of Muslim origin, and whose linguistic and cultural distance from Dutch people is considerable, will have relatively higher wages if predictions of the imperfect signalling model are dominant (H1a), and the least returns if deficiency in social and cultural capital and social networks are dominant (H1b).
- (H2) Caribbean graduates, who have a colonial history with The Netherlands and are more likely to speak Dutch, and who are quite close to Dutch society as regarding religious and cultural characteristics, will experience fewer difficulties compared to Mediterranean graduates. However, they will still face some disadvantages because of the weakness of relevant social networks that may stem from their less favourable socioeconomic position as a group, compared to the Dutch.

- (H3) Western graduates who are quite comparable with Dutch graduates as regarding their social cultural and religious background will experience little or negligible disadvantages in the Dutch labour market.

4. Data

The analysis uses two main longitudinal data sources: the Central Register of Higher Education (CRIHO) and the Social Statistical Database (SSD). The CRIHO includes information about the subject of study, type of education (vocational—HBO, or academic—WO), institution of study, and month and year of graduation. The SSD, which is based on population data, includes basic demographic characteristics such as age, gender, and ethnicity and registers the relevant labour market characteristics of individuals and their parents. Both datasets were derived from individual register data and that ensures high-quality measurements. We selected the entire cohort of students in the CRIHO who started in the Dutch higher education system for the first time in 1996 and followed them until 2006 (see the structure of the data below). Exchange students who are identifiable in the CRIHO were excluded from the analysis, as were individuals who had left the country or died. Only individuals who were in The Netherlands in the period from 1996 to 2005 are included in the analysis. During this whole period, we can track the students in education and identify their enrolment status. From 1999 onwards, we can also track them on the labour market. Once again, students, drop-outs and graduates can be identified at any time between 1996 and 2006, and they have been followed on the labour market between 1999 and 2005. Individuals who left the country before 2005 are not included in the data. Excluding emigrants can potentially bias our estimations if emigrants

are selected on the basis of certain characteristics that affect the performance of individuals in higher education and in the labour market. However, there is little reason to believe that such selectivity has occurred. Most students enrolling in Dutch higher education tend to look for a first job in the Netherlands. It is likely that a small number of students may have left the country to participate in Ph.D. programmes abroad. This approach generates a common career path for all students to identify interethnic differences.

We chose the cohort of first-year undergraduates in 1996 because the earliest formal graduation would then take place in 1999, 3 to 4 years after enrolment, and 1996 is the year in which the SSD started. The CRIHO is the basis for the construction of data. Statistics Netherlands constructed data in a backward direction. First, all individuals are identified within the entire population of The Netherlands (population registers) at the end of 2005, who enrolled for the first time in Dutch higher education in 1996. Then, these individuals were tracked in the CRIHO to reconstruct their enrolment history and educational performance. By definition, the entire cohort of 1996 enrolments are in the registers if they had not left the country or had not died. The same individuals are also in the SSD which in fact covers the entire population between 1999 and 2005. The two databases can be perfectly linked by a unique ID since the population registers are the base for both databases. Only emigration and death are potential “leaks,” as mentioned above. The SSD panel includes information about changes in demographic characteristics and labour market position for the years 1999 to 2006. The merging of these two databases provided us with unique longitudinal data to examine the duration of study and performance of students in the labour market.

The structure of data: the intake cohort from 1996 in higher education is tracked as follows:

1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Educational attainment (CRIHO)									
Labour market (SSD)									
			1999	2000	2001	2002	2003	2004	2005

The combined database includes individual students’ main demographic characteristics such as gender, age, country of birth and origin, household structure, kind of preuniversity education, type of study, and year of graduation. For the analysis of wage differentials, we used daily earnings calculated from the annual earnings reported in the tax registers. The annual earnings were divided by the number of days worked, as taken from social security registers. Unfortunately, no information was available on the number of working hours. This implies that there may still be some measurement errors for daily earnings if individuals did not work a full day in the years 1999 and 2000. From 2001 onwards, however, extra information is available about

whether jobs are full-time, part-time, or flexible, and this helped standardize daily earnings more precisely. We construct daily wages for the years 1999–2005 using the information available on annual earnings, the total number of days worked in a year, and extra information about the full-time and part-time status of jobs.

It should be noted that both databases (CRIHO and SSD) comprise administrative registers and include the entire population of students who started in the Dutch higher education for the first time in 1996 and who were in The Netherlands during the whole analysis period. These students were followed from 1996 to 2005. Our panel data (SSD completed with CRIHO data) covers the period 1999

to 2005 in which each individual appears seven times. We, therefore, had a balanced panel of an entrance cohort.

4.1. Descriptive Statistics. Table 1 shows the covariates used in the analysis and their mean values according to ethnic background. We identified three major ethnic groups besides native Dutch, based on similarities in the socioeconomic position of their parents and their own educational attainment. The ethnic groups differ significantly regarding their characteristics and performance. Most of the ethnic minority students were second generation and were born in The Netherlands or immigrated before they were six years old. The relatively low percentage of second-generation Caribbean students is possibly related to the fact that The Netherlands attracts students from the origin countries. Indeed, about 18 percent of these students immigrated just before starting their study in September 1996. Unfortunately, our data does not provide enough information to establish how many Caribbean people left the country immediately after completing their studies. Interestingly, a majority of the Mediterranean group are male, while other groups are mainly composed of female students. The Mediterranean group is also older than other students.

A comparison of student performance by ethnic group ten years after starting higher education reveals substantial differences. A large share of the students started and graduated at HBO level, while a relatively small share graduated at WO level. Although this pattern holds for all ethnic groups, there are interethnic differences. Mediterranean and Caribbean students are more likely to enrol in HBO courses and are more likely to switch to WO, while Western students are more likely to start a WO course of study. In general, an HBO course of study takes more time than a WO course of study. Remarkably, Mediterranean and Caribbean students seem not to benefit from their choice of a study lasting for a relatively short time. They are also less likely than Dutch students to finish their studies. After ten years, about 40 percent of them had not graduated compared to 22 percent of Dutch students. We refer to these students as dropouts.

4.2. Study Performance. In order to describe the duration pattern of study and degree performance, we first estimated nonparametric survival models (Kaplan-Meier) for the ethnic groups for the separate HBO and WO study types. It should be noted that we use the same scale for the figures of HBO and WO to facilitate easy comparison of both figures. Figure 1 indicates that HBO students graduate more quickly than WO students do. However, after ten years, a larger share of WO students had graduated compared with HBO students. The probability of graduation decreases significantly in time for HBO students, especially after 60 months, while the probability remains relatively high for WO students. In both study types, the performance of Dutch students is the highest. They are followed by Western students and ONW. Caribbean and Mediterranean students are the most likely to drop out and need more time to finish their studies.

5. Returns on Higher Education

In this section, we report on our analyses of the wage growth of graduates and dropouts and identify ethnic differences in diploma effects and wage growth rates. The main questions are how large the impact of obtaining a degree is and how high the growth rate of wages is in the early career of graduates across ethnic groups, that is, whether returns on qualifications differ according to ethnic origin. First, we present descriptive results for male and female graduates and dropouts. Subsequently, we report our estimates of the wage functions of men and women allowing for variations in the impact of regressors across ethnic groups.

We first considered developments in the labour market position of dropouts, and graduates over time. We plotted median wages and unemployment for ethnic groups by gender. Individuals are regarded as unemployed if they do not have labour income. This definition differs from the traditional definition of unemployment. The choice of median wage instead of mean wages is related to sensitivity of mean wages for “outliers” in small samples. Mean wages of Mediterranean and, in particular, Caribbean students fluctuate over time. Consequently, the wage profiles of dropouts and graduates do not follow a monotonous line. The general pattern of median wage profiles is quite similar to the pattern of mean wage profiles. Our definition of unemployment is different to the standard ILO definition of unemployment. In this study, individuals receiving wages are treated as employed while those who have no wage income are treated as unemployed.

Figure 2 shows a sharp increase in wages for men and women but this increase is at a higher rate for graduates than for dropouts. The initial wage rate of dropouts is higher than for graduates. However, the graduates’ wage rate quickly catches up with the dropouts’ wage rate in 2001 for women and in 2002 for men and the gap continues to increase steadily due to a relatively lower growth rate of dropouts’ wages for each subgroup. This pattern is similar for men and women, although for the female sample the wage growth of dropouts is significantly slower than for graduates. If we look closely at the wage profiles of all subgroups, the gap between median wages of dropouts and graduates is largest in 2005 for Dutch women, owing to a relatively low median wage of dropouts, compared to the higher wages of graduates, while the size of the gap is smallest for Caribbean women and Mediterranean men. The sharp increase in wages is probably caused by the nature of our sample, which is composed of relatively young people at the beginning of their careers.

Figure 2 also shows that, as expected, the unemployment rate is persistently higher for dropouts than for graduates for all subgroups. However, the difference in unemployment rates of dropouts and graduates is greatest for Mediterranean men and women. Among Dutch and Western students, this difference is larger for women than for men, while the opposite is true for Caribbean students. These results imply that a degree is more beneficial for Mediterranean (men and women) as well as for Dutch and Western women.

TABLE 1: Descriptive statistics in 2005.

	Dutch	Mediterr.	Caribbean	Western
Daily wage	122.56	119.97	122.96	121.31
Women	0.51	0.45	0.55	0.52
Age	28.17	29.13	28.93	28.56
Second generation		0.79	0.65	0.87
Immigrated between 08/1995–1996	0.01	0.02	0.18	0.05
Immigrated between 08/1993–1995	0.00	0.04	0.08	0.06
Years of education-HBO	5.42	5.91	6.15	5.72
Years of education-WO	6.77	7.10	7.22	7.00
Started at WO level	0.26	0.18	0.22	0.33
Switched from HBO to WO-graduated	0.09	0.10	0.11	0.08
Switched from HBO to WO-not graduated	0.01	0.02	0.02	0.01
Years experience during study-HBO	1.48	1.78	1.93	1.60
Years experience during study-WO	2.75	3.35	3.29	2.72
Years experience during interruption [#]	0.09	0.08	0.08	0.08
Graduated at HBO level	0.53	0.45	0.44	0.43
Graduated at WO level	0.22	0.13	0.14	0.23
Years since HBO graduation	4.83	4.40	4.32	4.52
Years since WO graduation	3.04	2.70	2.48	2.80
Years since HBO dropout	5.73	5.22	4.93	5.67
Years since WO dropout	3.43	2.21	2.50	3.47
Educational studies	0.14	0.11	0.09	0.11
Humanities	0.06	0.02	0.04	0.11
Economics and law	0.27	0.45	0.41	0.28
Natural sciences	0.21	0.15	0.19	0.19
Health	0.18	0.11	0.13	0.16
Social Services	0.08	0.12	0.10	0.08
Cohabiting	0.62	0.62	0.46	0.53
N	65418	1660	2431	5902

[#] Years of experience during interruption measures the experience of those who interrupted their study for a while but eventually graduated.

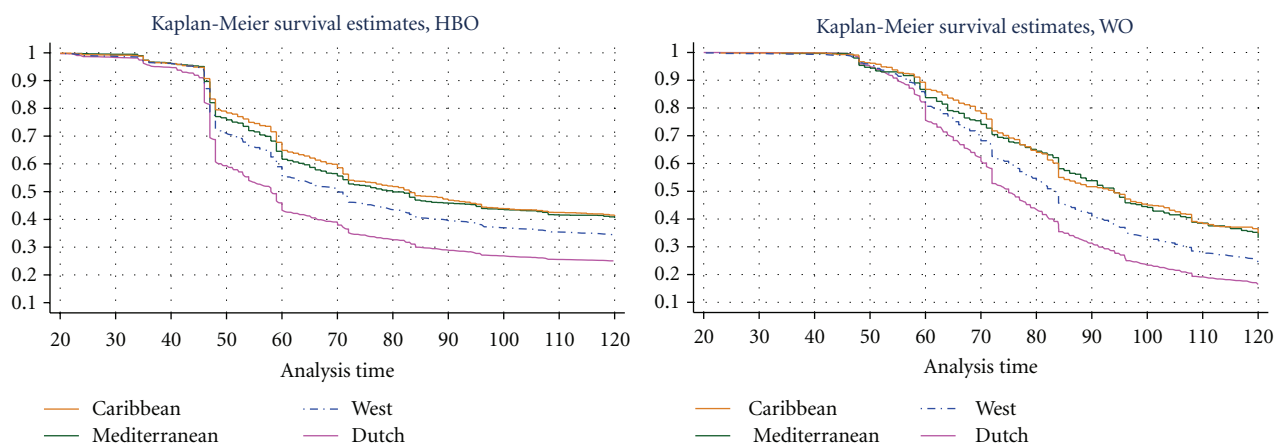


FIGURE 1: Kaplan-Meier survival models for HBO and WO by ethnic group.

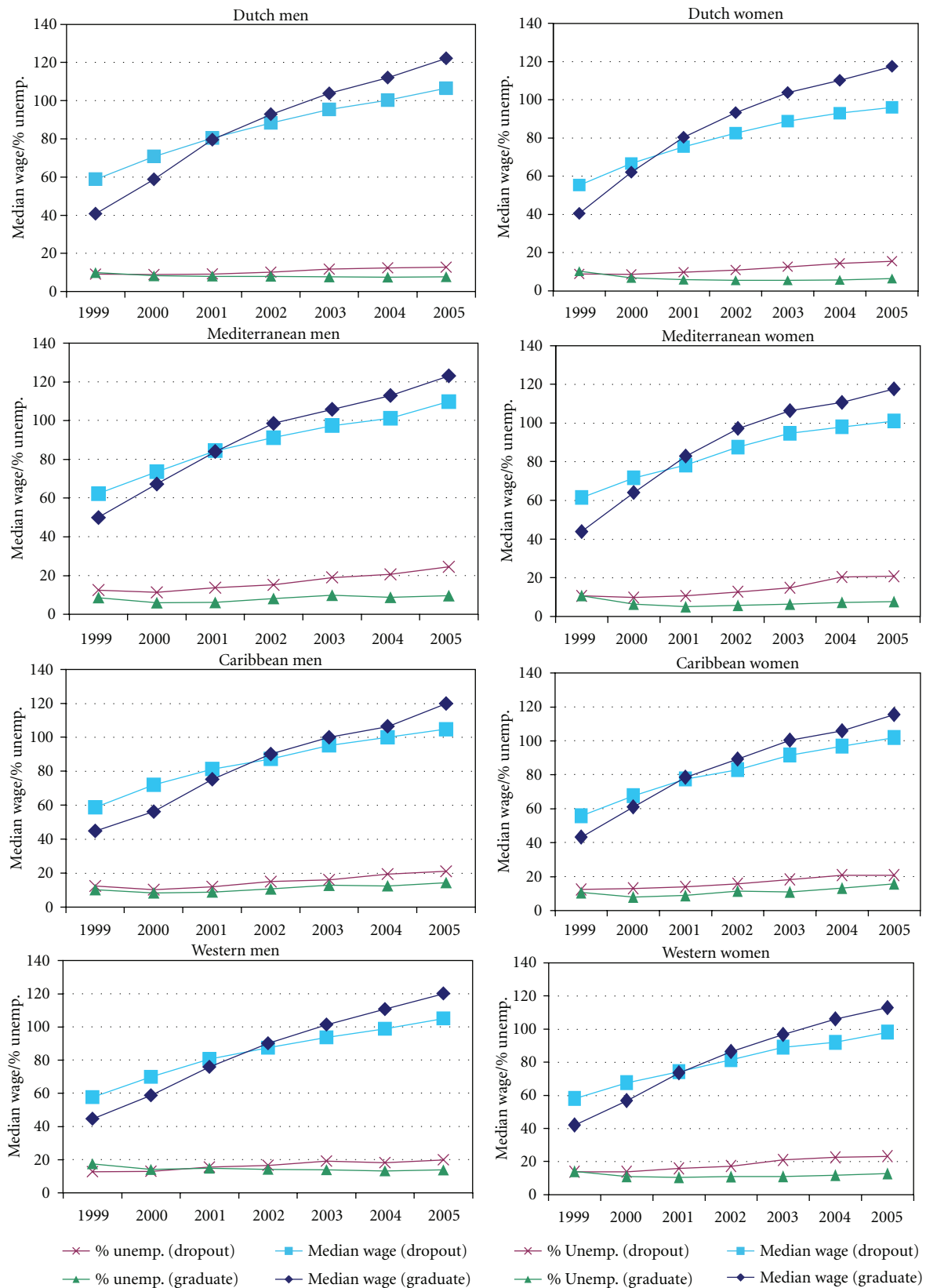


FIGURE 2: Wage growth and unemployment among dropouts and graduates according to gender and ethnic background.

5.1. Method. Enrolment in higher education is a selective process. First, an aspirant student has to satisfy the main admission requirements in the form of a certain level of preparatory schooling. Candidates are then free to choose a subject and enrol. This procedure suggests student selectivity. All students enrolled for the first time in 1996 remain in the data for the following ten years. Since some students had not (yet) graduated in the period of the analysis, returns on higher education were assessed using the population of graduates and nongraduates. Those returns may be an overestimation of the true returns owing to the initial selectivity. The perceived returns on the completion of a degree can be seen as the cost of a student dropping out in our data.

We examine ethnic wage disparities by using the conventional earnings function and the Oaxaca linear decomposition technique [23]. This technique is widely used to break down wage differentials between various ethnic groups, or between men and women, into two components: differentials attributed to differences in endowments or observed characteristics, and an unexplained component, which may be supposed to capture labour market discrimination [23–27].

The basic specification is

$$\begin{aligned} \ln W_{it} = & \beta_1 Age_{it} + \beta_2 YoE_{it}^m + \beta_3 YEdS_{it}^m + \beta_4 YEdI_{it} \\ & + \beta_5 GRAD_{it}^m + \beta_6 YsG_{it}^m + \beta_7 YsDO_{it}^m \\ & + \beta_8 Coh_{it} + \varepsilon_{it}, \end{aligned} \quad (1)$$

where the subscript i indicates individual i , t indicates time and the superscript m indicates whether the higher education type is HBO or WO.

In W is the logarithm of the daily wage of interest, YoE is years of education at HBO or WO level, $YEdS$ is years of experience during study if the student has a job, $YEdI$ is years of experience during interruption if the student interrupts her/his study for a while and completes it later, $GRAD$ is a dummy variable indicating a degree at HBO or WO level, YsG is years since graduation at HBO or WO level, $YsDO$ is years since dropout at HBO or WO level, Coh is a dummy variable indicating married or cohabiting, and the ε_{it} are the idiosyncratic errors. Years of experience refers to the number of years for which an individual has earned wages.

In order to capture relevant activities of students, graduates, and dropouts, the model includes variables indicating these groups and measures actual experience for these groups. The model includes an additional control variable for those who interrupted their study. In addition, the model includes age and age-squared and specify labour market variables in detail during and after the completion of the study. To account for ethnic differences in track changes between HBO and WO institutions, we include dummy control variables indicating that the student started a WO study, dummy variables indicating the shift from HBO to WO study with or without a degree, and a series of dummy variables indicating the subject of study. The ε_{it} are normally distributed errors. (Ordinary least square estimation may yield biased coefficients if there is unobserved heterogeneity in the data; that is, wages may be correlated with unobserved effects in the estimating equations. In this case, using the

random and fixed effects panel data estimators can be a way of dealing with the problem of unobserved heterogeneities [3, 17]. However, the panel data estimators may not be able to deal with this problem because they rely on individual wage changes which are likely to be a weak base for identifying unobserved heterogeneities. Student jobs are fundamentally different to “regular” jobs. In addition, individuals enter the labour market at different points in time depending on their connection with their study, meaning that they have different wage change profiles in the turbulent posteducation period. Nevertheless, we still estimated wage functions using these panel data estimators (not reported here but available on request). The estimations indicate, in general, comparable results to those presented in this paper and we have only presented the OLS results here.)

We estimated this wage regression for the male and female subpopulations of Dutch, Mediterranean, Caribbean, and Western students by means of the ordinary least square (OLS) estimator using the pooled data for the years 1999–2005. That means that each individual occurs a maximum of seven times in this pooled data depending on the presence of wages. During this period, the individual may be either a student or a graduate or a dropout. Thus, we use information from all individuals irrespective of their status to assess ethnic wage differentials. However, we refine our results by focussing on separate populations of students, graduates, or dropouts in Section 5.3. It is important to note that we treat no wage as *missing* rather than *zero* wages. Observations with missing wages were excluded from the analysis. This approach can lead to biased estimates, if individuals select themselves into employment.

The estimates of the OLS models in Tables 2 and 3 show that there are significant differences in the estimated parameters across ethnic groups. Significant differences in the age distribution, study performance, academic tracks, and socioeconomic characteristics of natives and immigrant groups explain some of the ethnic wage differentials, but much of the differentials remain unexplained by the factors observed. In order to uncover the explained and unexplained parts of wage differences between natives and separate ethnic groups, we adopted the Oaxaca linear decomposition technique [23] using the separate regression models for each group. This technique actually breaks down the mean differences in wages of natives and immigrants into explained and unexplained components. The idea is that some part of wage differentials between natives and ethnic groups can be explained by the differences in the observed characteristics of natives and ethnic groups that are included in the models estimated. This part is designated as the explained component of ethnic wage differentials, while the remaining part of the differentials refers to the unexplained component.

According to the Oaxaca technique, the observed mean differential of wages, $\overline{W}_n - \overline{W}_m$, is broken down into two components by the following equation:

$$\overline{W}_n - \overline{W}_m = \hat{\beta}_n (\overline{X}_n - \overline{X}_m) + \overline{X}_m (\hat{\beta}_n - \hat{\beta}_m), \quad (2)$$

where the subscripts n and m denote natives and migrants, clustered into three groups as Mediterranean, Caribbean,

TABLE 2: OLS estimations of log daily wages, men.

	Dutch	Mediterranean	Caribbean	Western
Age	0.379***	0.317***	0.291***	0.368***
Age-squared	-0.006***	-0.005***	-0.005***	-0.006***
Years of education-HBO	-0.003	0.003	-0.004	0.011
Years of education-WO	-0.021***	-0.023	-0.031	-0.004
Started in WO	0.115***	0.184	0.063	0.042
Switched from HBO to WO-graduated	-0.13***	-0.134**	-0.128**	-0.147***
Switched from HBO to WO-dropout	0.026	-0.062	0.004	0.042
Years experience during study-HBO	0.067***	0.051**	0.076***	0.040***
Years experience during study-WO	0.043***	0.033	0.086***	0.036**
Years since graduation-HBO	0.305***	0.265***	0.255***	0.314***
Years since graduation-HBO-squared	-0.029***	-0.026***	-0.021***	-0.032***
Years since graduation-WO	0.412***	0.251**	0.402***	0.429***
Years since graduation-WO-squared	-0.050***	-0.024	-0.033*	-0.055***
Years experience during interruption	0.073***	0.034	0.079*	0.138***
Years experience after dropping out-HBO	0.074**	0.380	0.103	0.053
Years experience after dropping out-WO	0.179***	0.220***	0.172***	0.189***
Drop-out	0.356***	0.323***	0.308***	0.330***
Years since dropout-HBO	-0.005	0.010	0.004	-0.075
Years since dropout-WO	-0.005	-0.363	-0.007	0.021
Graduated at HBO level	0.062***	0.032	0.061	0.019
Graduated at WO level	0.041**	0.111	0.008	0.015
Educational studies	0.052***	0.090	0.050	0.030
Humanities	-0.007	-0.002	0.067	-0.076
Economics and law	0.092***	0.112	0.083	0.056
Natural sciences	0.021*	0.024	0.034	-0.012
Health	0.076***	0.016	0.088	0.021
Social services	0.013	0.122	0.114	-0.068
Cohabiting	0.033***	0.032	0.043*	0.042***
Constant	-1.738***	-0.944	-0.396	-1.506**
N	204457	5598	6731	16923
R-squared	0.321	0.235	0.24	0.267

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

Note that nongraduated, noncohabiting and year 1999 are the associated reference groups for graduates, cohabiting and years.

and Western in view of the similarities between the groups. \bar{X}_n and \bar{X}_m are the mean values for the observed characteristics; $\hat{\beta}_n$ and $\hat{\beta}_m$ are the associated coefficients. The first term on the right-hand side, $\hat{\beta}_n(\bar{X}_n - \bar{X}_m)$, is a differential owing to the characteristics (referring to the measured productivity differential) and the second term $\bar{X}_m(\beta^* - \hat{\beta}_m)$ represents unexplained differentials. This unexplained part may be attributed to three main groups of factors. First, employers can pay relatively low wages to various ethnic minority groups, irrespective of their observed productive capacity. Second, there may be significant differences in unobserved productivity across ethnic minority groups, such as motivation and other unobserved abilities. Third, ethnic minority groups may have preferences for some study subjects that are associated with lower or higher earnings. These three components of unexplained differentials are hard to distinguish in the administrative data without additional

information about attitudes and abilities. Nevertheless, the entire unexplained component is conventionally interpreted as the discriminatory differential. However, this is an indirect measure of discrimination and not necessarily an ideal measure. One problem with this interpretation is that migrant and Dutch workers may have different mean characteristics as a result of discriminatory practices. For instance, the distribution of migrant workers across sectors, occupations, employers, and geographical locations may be due to discrimination. A second problem is that the observed explanatory variables in data explain only some of the wages. The omission of some important variables, such as motivation, future career expectations, and other unobserved ability measures, can bias the results.

In the original form of the decomposition, Oaxaca [23] proposes either a male or female wage structure as the nondiscriminatory wage structure. Later studies suggest a

TABLE 3: OLS estimations of log daily wages, women.

	Dutch	Mediterre	Caribbean	Western
Age	0.385***	0.470***	0.251***	0.283***
Age-squared	-0.007***	-0.009***	-0.004***	-0.005***
Years of education-HBO	0.000	0.006	0.000	-0.003
Years of education-WO	0.005	0.039	0.048*	-0.011
Started in WO	-0.056***	-0.064	-0.095	0.006
Switched from HBO to WO-graduated	-0.093***	-0.014	-0.109***	-0.088***
Switched from HBO to WO-dropout	0.018	0.078	0.054	0.089
Years experience during study-HBO	0.049***	0.055**	0.064***	0.045***
Years experience during study-WO	0.041***	0.028	0.001	0.041**
Years since graduation-HBO	0.222***	0.175***	0.201***	0.215***
Years since graduation-HBO-squared	-0.021***	-0.013**	-0.016***	-0.021***
Years since graduation-WO	0.337***	0.283***	0.334***	0.370***
Years since graduation-WO-squared	-0.036***	-0.027	-0.036***	-0.043***
Years experience during interruption	0.150***	0.174**	0.158***	0.132***
Years experience after dropping out-HBO	0.101**	0.756***	0.182	0.133
Years experience after dropping out-WO	0.162***	0.186***	0.158***	0.158***
Drop-out	0.255***	0.277***	0.226***	0.271***
Years since dropout-HBO	-0.087***	-0.094	-0.078	-0.074*
Years since dropout-WO	-0.017	-0.702**	-0.117	-0.050
Graduated at HBO level	0.168***	0.222***	0.156***	0.154***
Graduated at WO level	0.098***	0.076	0.079	0.046
Educational studies	0.062***	0.062	0.073	0.009
Humanities	-0.067***	-0.003	-0.041	-0.063*
Economics and law	0.068***	0.033	0.115**	0.064**
Natural sciences	-0.046***	-0.060	0.052	-0.020
Health	0.054***	-0.004	0.031	0.014
Social services	0.019*	0.020	0.091*	0.018
Cohabiting	0.027***	-0.008	0.052**	0.025*
Constant	-1.604***	-2.590**	0.087	-0.320
N	216276	4766	8072	18489
R-squared	0.306	0.25	0.233	0.258

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

Note that nongraduated, noncohabiting and year 1999 are the associated reference groups for graduates, cohabiting and years. Standard errors are corrected for multiple observations for each individual.

nondiscriminatory wage structure β^* be estimated, so that (2) becomes

$$\begin{aligned} \bar{W}_n - \bar{W}_m &= \hat{\beta}_n (\bar{X}_n - \bar{X}_m) \\ &+ [\bar{X}_n (\hat{\beta}_n - \beta^*) + \bar{X}_m (\beta^* - \hat{\beta}_m)], \end{aligned} \quad (3)$$

where the estimated nondiscriminatory structure is given as

$$\beta^* = \Omega \hat{\beta}_n + (I - \Omega) \hat{\beta}_m. \quad (4)$$

Catton [24] suggests a weighting matrix (Ω) reflecting the share of the majority group in the sample (I_n), $\Omega = I_n I$. Neumark [25] proposes a least-squares criterion to estimate a weighting matrix from the pooled sample of all the groups distinguished, $\beta^* = (X'X)^{-1}(X'P) = \hat{\beta}$, where X is the observation matrix, P is the observation vector of the

response variable, and $\hat{\beta}$ is the OLS estimate obtained from the pooled sample.

Neumark [25] and Oaxaca and Ransom [27] show that the extent of the unexplained part is affected by the choice of a nondiscriminatory wage structure. There is, however, no unambiguous criterion to define a nondiscriminatory wage structure. We, therefore, calculated decompositions using a weighting matrix proposed by Neumark [25]. This weighting matrix represents a common nondiscriminatory wage structure derived from the pooled sample of natives and immigrants. This implies that natives and ethnic minorities contribute to a nondiscriminatory wage structure according to their weighted share in the population.

5.2. Results. We first estimate ethnic wage differentials for the entire population of workers irrespective of whether they

completed their study and check whether they graduated with a degree at HBO or WO level and whether there were any interruptions. This approach takes account of the entire population with the same starting point and generates a general picture of ethnic wage differentials. Since graduation, drop-out and starting can take place any point of time, and study and labour market efforts are potentially interrelated, a decomposition exercise involving only graduates will ignore the complexity of interrelations between the education system and the labour market. Therefore, we first estimate wage functions based on the whole population, along with the necessary checks. Subsequently, we also provide separate decomposition exercises for students, graduates, and dropouts in the next section.

In this study, we clustered the immigrants into three groups: Mediterranean, Caribbean, and Western and we applied the Oaxaca decomposition technique to assess the native-immigrant wage differentials. While taking account of differences in wage structures, we estimated (1) for separate ethnic groups by gender. The parameter estimates of OLS models are presented in Tables 2 and 3. The results indicate significant variations in the estimated coefficients for some relevant variables across ethnic groups. Most interestingly, the return to each additional year of experience for Mediterranean HBO and WO graduates seems to be relatively low. However, the estimated coefficients across the separate models for ethnic subpopulations are not directly comparable, although they do provide an indication of the direction of wage differentials. Consequently, we do not discuss OLS estimates in detail. Instead, we focus on the results of the Oaxaca breakdown which forms the basis of the underlying OLS estimates. This technique has the advantage of revealing both positive and negative contributions of separate covariates to the total wage differential, so that ethnic differences in effects of all variables become visible.

Tables 4 and 5 show the logarithmic decomposition of the native-migrant wage differential into the total explained differential and the unexplained differential for men and women. The upper row of these tables lists the contribution of characteristics to the measured productivity differential while the lower row lists the contribution of characteristics to the unexplained differential.

5.2.1. Decomposition Results for Men. First, we examine the breakdown results for men in Table 4 and discuss the extent of separate components and relatively large parameter estimates that are statistically significant at conventional levels. The total Dutch-Mediterranean male wage differential is 3.6% and is surprisingly in favour of Mediterranean men. In other words, an average Mediterranean man earns 3.6% higher wages than a Dutch man. An overwhelmingly large proportion of this advantage (2.7%) comes from the measured productivity differential. In particular, this higher productivity is caused by the older age structure of Mediterranean men, a higher return for Mediterranean male dropouts, especially HBO dropouts, their experience during their HBO studies, and their concentration in study fields like economics and law that generate relatively high wages

(negative coefficients for these variables). However, these favourable characteristics mask significant disadvantages for the return to years since graduation from HBO and WO. Mediterranean male HBO and WO graduates have an 8% and 4.1% lower return for years since graduation than their Dutch counterparts. The unexplained part of the Dutch-Mediterranean male wage differential is very small (0.9%) and not statistically significant. This might suggest an absence of a discriminatory wage differential, and a rejection of the first hypothesis which predicts either an ethnic wage gap due to discrimination (H1a) or an ethnic wage surplus as predicted by imperfect signalling model. However, the parameter estimate for years since graduation at WO level in the lower panel of Table 2 is positive (2.2%) and significant at almost 5%. This indicates that Mediterranean male WO graduates have a 2.2% lower return to each year since graduation than their Dutch counterparts due to discrimination. This relatively low return may be attributed to wage discrimination for the Mediterranean male, and it is worth noting that the disadvantage seems to decline over time, as indicated by a negative coefficient for the square of years since graduation at WO level (-0.012).

The total wage differential between Dutch and Caribbean men is 1.9% and statistically not significant. This total differential is reduced by a negative unexplained component (-1.4%) although the measured productivity differential is 3.3% and significant at conventional level. The lower productivity of Caribbean men with respect to Dutch men is largely caused by a significant low return to years since graduation for Caribbean HBO and WO graduates while their older age compensates for a part of the disadvantage. The unexplained component of Dutch-Caribbean wage differential is small (1.4%) and not significant at conventional significance levels. This result indicates that Caribbean men do not face wage discrimination although the second hypothesis (H2) predicted some wage disadvantage for Caribbean migrants.

The total Dutch Western male wage differential is 1.7% which consists of a significant productivity differential (2.1%) and an insignificant unexplained differential (0.3%). The low productivity differential is largely caused by a significant low return to years of experience for western HBO graduates while their older age structure partly compensate this disadvantage. Also for Western males, the discriminatory component of the wage differential is small and insignificant. The estimated negligible unexplained component of wage differential for Western migrants confirms their similarities to Dutch men, as suggested by the third hypothesis (H3).

5.2.2. Decomposition Results for Women. Table 5 shows the decomposition estimates for women. The total Dutch-Mediterranean wage differential is -2% and, this differential is statistically insignificant. However, if we look at the major components of this differential, both the explained and unexplained parts are statistically significant and these estimates reveal very interesting results. The total explained disadvantage for Mediterranean women is 1.9%. The total unexplained wage differential is -3.9% which indicates a favourable treatment of Mediterranean women with respect

TABLE 4: Decomposition estimates of ethnic wage differentials, men.

	Dutch-Mediterranean		Dutch-Caribbean		Dutch-Western	
	Coef.	z	Coef.	z	Coef.	z
Total difference	-0.036	-2.79	0.019	1.57	0.017	2.16
explained						
Age	-0.349	-13.47	-0.224	-9.46	-0.121	-8.68
Age-squared	0.312	13.02	0.203	9.35	0.109	8.62
Years of education-HBO	0.001	1.26	0.001	1.34	-0.001	-0.92
Years of education-WO	-0.010	-4.26	-0.004	-2.36	0.007	4.18
Started in WO	0.011	5.37	0.005	2.98	-0.007	-5.17
Switched from HBO to WO-graduated	0.002	1.49	0.001	0.67	-0.002	-3.10
Switched from HBO to WO-dropout	0.000	-0.78	0.000	-0.64	0.000	-0.98
Years experience during study-HBO	-0.013	-4.57	-0.018	-6.06	0.004	2.33
Years experience during study-WO	0.009	4.88	0.001	0.41	-0.006	-5.10
Years since graduation-HBO	0.080	6.2	0.113	10.09	0.107	13.76
Years since graduation-HBO-squared	-0.035	-6.26	-0.050	-10.23	-0.045	-13.09
Years since graduation-WO	0.041	5.62	0.055	10.47	0.004	0.91
Years since graduation-WO-squared	-0.013	-3.65	-0.021	-9.22	-0.002	-1.01
Years experience during interruption	0.000	0.19	0.003	1.69	0.001	1.30
Years experience after dropping out-HBO	-0.025	-4.33	-0.016	-3.66	-0.013	-4.01
Years experience after dropping out-WO	0.001	0.93	0.001	0.85	-0.004	-2.50
Drop-out	-0.039	-7.39	-0.027	-5.81	-0.022	-7.47
Years since dropout-HBO	0.002	0.36	0.001	0.37	0.002	1.02
Years since dropout-WO	0.000	-0.22	0.000	-0.10	0.000	0.07
Graduated at HBO level	0.004	4.29	0.006	5.28	0.006	5.83
Graduated at WO level	0.002	2.66	0.002	2.63	0.000	0.68
Educational studies	0.001	1.33	0.001	2.96	0.001	2.59
Humanities	0.000	-0.53	0.000	-0.32	0.000	1.07
Economics and law	-0.013	-6.4	-0.008	-4.81	0.000	-0.26
Natural sciences	0.002	2.14	0.000	0.26	0.001	1.80
Health	0.002	2.33	0.002	3.14	0.000	-0.79
Social services	-0.001	-1.33	0.000	-0.79	0.000	-0.37
Cohabiting	0.001	2.83	0.005	7.89	0.003	7.38
Total explained	-0.027	-4.23	0.033	5.21	0.021	5.13
unexplained						
Age	1.610	1.06	2.252	1.57	0.285	0.29
Age-squared	-0.887	-1.19	-0.935	-1.34	-0.104	-0.21
Years of education-HBO	-0.022	-0.52	0.003	0.06	-0.039	-1.56
Years of education-WO	0.002	0.08	0.012	0.43	-0.028	-1.42
Started in WO	-0.012	-0.71	0.011	0.64	0.023	1.53
Switched from HBO to WO-graduated	0.000	-0.11	-0.001	-0.24	0.001	0.27
Switched from HBO to WO-dropout	0.001	0.83	0.000	0.30	0.000	-0.20
Years experience during study-HBO	0.018	0.93	-0.011	-0.55	0.025	2.15
Years experience during study-WO	0.004	0.29	-0.026	-1.61	0.006	0.59
Years since graduation-HBO	0.034	1.05	0.038	1.52	-0.008	-0.41
Years since graduation-HBO-squared	-0.013	-0.74	-0.025	-1.83	0.007	0.65
Years since graduation-WO	0.022	1.94	0.001	0.13	-0.004	-0.39
Years since graduation-WO-squared	-0.012	-1.93	-0.005	-1.20	0.003	0.57
Years experience during interruption	-0.002	-1.03	0.000	0.22	0.000	-0.37
Years experience after dropping out-HBO	0.038	1.01	-0.004	-0.14	-0.051	-1.51
Years experience after dropping out-WO	-0.019	-1.2	-0.002	-0.37	0.003	0.44
Drop-out	0.010	0.81	0.013	1.22	0.007	1.00

TABLE 4: Continued.

	Dutch-Mediterranean		Dutch-Caribbean		Dutch-Western	
	Coef.	<i>z</i>	Coef.	<i>z</i>	Coef.	<i>z</i>
Years since dropout-HBO	-0.015	-0.39	-0.007	-0.23	0.056	1.61
Years since dropout-WO	0.023	1.40	0.000	0.03	-0.003	-0.57
Graduated at HBO level	0.009	0.48	0.000	0.01	0.011	1.12
Graduated at WO level	-0.004	-0.67	0.002	0.34	0.003	0.47
Educational studies	-0.002	-0.45	0.000	0.03	0.001	0.54
Humanities	0.000	-0.04	-0.002	-0.86	0.005	1.58
Economics and law	-0.009	-0.27	0.004	0.14	0.013	1.13
Natural sciences	-0.001	-0.04	-0.004	-0.18	0.010	0.99
Health	0.005	0.75	-0.001	-0.15	0.007	1.50
Social services	-0.006	-1.23	-0.003	-1.09	0.003	1.65
Cohabiting	0.000	0.04	-0.004	-0.49	-0.005	-0.67
Constant	-0.781	-1.00	-1.320	-1.81	-0.229	-0.45
Total unexplained	-0.009	-0.76	-0.014	-1.34	-0.003	-0.47

Note that the coefficient is significant at 5% if $z > 1.96$ and significant at 1% if $z > 2.575$. Significant coefficients are in bold.

to Dutch women. This differential may be interpreted as positive discrimination for Mediterranean women. The opposite effects of explained and unexplained parts obviously lead to a relatively small total wage differential which is insignificant. The wage differential due to the measured characteristics (explained) is increased mainly by disadvantages in years since graduation at HBO and WO level, and lowered by favourable age structure and years of experience after dropping out at HBO level. The favourable unexplained wage differential is caused by advantages in the variables of age and years of WO education, and lowered by years since graduation at HBO level and years since drop out in WO. The estimated unexplained advantage for Mediterranean women contradicts the second part of the first hypothesis (H1a) which suggests a large disadvantage for Mediterranean migrants who differ significantly from their Dutch counterparts with regard to their social and cultural background. This result may be a confirmation of the first part of the first hypothesis (H1a) which suggests a dominance of signalling effects.

The total Dutch-Caribbean wage differential is 3.8% and consists of a significant 4.5% differential due to the measured characteristics and an insignificant 0.7% unexplained differential. The magnitude of the explained differential is due to the positive contribution of variables such as years since graduation at HBO and WO level, years since drop out at HBO level and, graduation at HBO level, lowered by a favourable age structure and years of experience after drop out at HBO level. The small and insignificant unexplained wage differential for Caribbean women, who share cultural norms with Dutch people because of the colonial history, indicates the unimportance of a wage differential due to discrimination.

The total Dutch-Western wage differential is 5.2% and this is statistically significant. 77% of this differential (4%) is explained by the observed characteristics and the rest (1.2%) is unexplained. Both components are statistically

significant. The estimated largest wage disadvantage for Western migrants clearly contradicts the third Hypothesis (H3) which suggests a negligible wage disadvantage for Western migrants because they are socially and culturally quite similar to Dutch counterparts.

The relatively small explained wage differential for Mediterranean men and women, compared to Caribbean and Western counterparts, may indicate a positive selectivity of Mediterranean students: Mediterranean students who have most favourable characteristics enrol first in higher education. The measured characteristics of Mediterranean students are even more favourable than characteristics of other migrant groups although Mediterranean migrants are in a clearly disadvantaged position in Dutch society.

5.3. Wage Differentials for Students, Graduates, and Dropouts.

The results as regarding ethnic wage differentials discussed above rely on the entire cohort irrespective of their position. However, the labour market behaviour of students, graduates, and dropouts is potentially different due to the degree of their market orientation. Students are likely to devote less effort to paid employment, while graduates focus fully on their labour market career. As mentioned in Section 4.2, ethnic minority students are less likely to graduate and they need more time to complete their degree. A varying distribution of ethnic minority students across these three statuses can affect ethnic wage differentials. We, therefore, repeated the decomposition exercise for the separate populations of graduates, graduates before graduation (students) and dropouts.

Table 6 shows a summary of the decomposition results for graduates, graduates before graduation, and dropouts by gender. These exercises indicate the validity of the earlier estimated wage differentials for graduates and show interesting results for students. Most notably, the unexplained wage surplus for Mediterranean women and the wage gap for Western

TABLE 5: Decomposition estimates of ethnic wage differentials, women.

	Dutch-Mediterranean		Dutch-Caribbean		Dutch-Western	
	Coef.	z	Coef.	z	Coef.	z
Total difference	-0.020	-1.48	0.038	3.65	0.052	7.56
unexplained						
Age	-0.331	-12.59	-0.292	-13.43	-0.133	-10.42
Age-squared	0.303	12.23	0.270	13.08	0.123	10.31
Years of education-HBO	0.000	-0.13	0.000	-0.17	0.000	-0.03
Years of education-WO	0.001	1.21	0.001	1.16	-0.001	-0.82
Started in WO	-0.003	-2.54	-0.002	-1.97	0.003	3.14
Switched from HBO to WO-graduated	0.002	1.53	0.004	3.71	-0.001	-1.33
Switched from HBO to WO-dropout	0.000	-0.77	0.000	-0.96	0.000	-0.95
Years experience during study-HBO	-0.015	-6.08	-0.014	-7.19	-0.001	-0.53
Years experience during study-WO	0.000	0.25	0.000	-0.15	-0.006	-5.61
Years since graduation-HBO	0.070	6.16	0.106	12.18	0.085	13.73
Years since graduation-HBO-squared	-0.032	-6.58	-0.048	-12.19	-0.038	-13.65
Years since graduation-WO	0.052	8.36	0.048	8.97	0.000	-0.07
Years since graduation-WO-squared	-0.019	-7.90	-0.017	-7.66	-0.001	-0.38
Years experience during interruption	0.004	2.31	0.002	1.42	0.002	2.34
Years experience after dropping out-HBO	-0.023	-2.88	-0.034	-5.00	-0.011	-2.78
Years experience after dropping out-WO	0.000	-0.03	-0.003	-1.83	-0.005	-2.75
Drop-out	-0.014	-3.78	-0.022	-7.36	-0.011	-5.65
Years since dropout-HBO	0.014	2.83	0.020	4.35	0.007	2.79
Years since dropout-WO	0.000	0.00	0.001	0.68	0.001	0.67
Graduated at HBO level	0.013	5.07	0.020	9.77	0.017	10.96
Graduated at WO level	0.005	5.17	0.005	5.65	-0.001	-1.26
Educational studies	0.002	2.22	0.005	6.06	0.003	5.15
Humanities	-0.002	-4.18	-0.002	-4.17	0.004	5.83
Economics and law	-0.012	-7.01	-0.012	-8.10	-0.001	-2.29
Natural sciences	-0.001	-3.39	0.000	0.01	0.001	2.39
Health	0.006	5.68	0.004	5.59	0.003	5.06
Social services	-0.001	-2.30	0.000	-1.61	0.000	1.34
Cohabiting	0.000	0.21	0.004	7.74	0.002	6.60
Total explained	0.019	2.97	0.045	8.91	0.040	12.19
unexplained						
Age	-2.137	-1.21	3.345	2.59	2.550	2.81
Age-squared	1.167	1.34	-1.643	-2.56	-1.324	-2.99
Years of education-HBO	-0.019	-0.39	0.001	0.03	0.010	0.44
Years of education-WO	-0.032	-1.10	-0.045	-2.19	0.024	1.32
Started in WO	0.001	0.08	0.008	0.56	-0.018	-1.33
Switched from HBO to WO-graduated	-0.009	-1.72	0.002	0.49	0.000	-0.18
Switched from HBO to WO-dropout	-0.001	-0.61	-0.001	-0.53	-0.001	-1.00
Years experience during study-HBO	-0.007	-0.34	-0.017	-1.01	0.003	0.33
Years experience during study-WO	0.006	0.36	0.019	1.67	0.000	0.01
Years since graduation-HBO	0.055	1.42	0.021	0.74	0.007	0.35
Years since graduation-HBO-squared	-0.042	-2.01	-0.019	-1.29	-0.001	-0.09
Years since graduation-WO	0.008	0.64	0.000	0.05	-0.010	-1.02
Years since graduation-WO-squared	-0.004	-0.52	0.000	0.02	0.007	1.27
Years experience during interruption	-0.002	-0.72	0.000	0.13	0.000	0.19
Years experience after dropping out-HBO	-0.015	-0.44	-0.005	-0.17	0.010	0.50
Years experience after dropping out-WO	-0.028	-2.14	-0.006	-0.75	-0.003	-0.40
Drop-out	-0.004	-0.42	0.006	0.73	-0.003	-0.56

TABLE 5: Continued.

	Dutch-Mediterranean		Dutch-Caribbean		Dutch-Western	
	Coef.	z	Coef.	z	Coef.	z
Years since dropout-HBO	0.004	0.12	-0.006	-0.18	-0.007	-0.36
Years since dropout-WO	0.030	2.21	0.008	0.92	0.003	0.42
Graduated in HBO	-0.020	-0.96	0.004	0.26	0.005	0.50
Graduated in WO	0.002	0.20	0.001	0.24	0.007	1.15
Educational studies	0.000	0.00	-0.001	-0.24	0.008	2.05
Humanities	-0.002	-0.71	-0.001	-0.42	0.000	-0.15
Economics and law	0.013	0.50	-0.017	-1.14	0.001	0.16
Natural sciences	0.001	0.16	-0.007	-1.87	-0.002	-0.88
Health	0.008	0.77	0.003	0.50	0.007	1.62
Social services	0.000	-0.01	-0.011	-1.57	0.000	0.02
Cohabiting	0.021	1.63	-0.011	-1.46	0.001	0.17
Constant	0.968	1.09	-1.635	-2.50	-1.263	-2.75
Total unexplained	-0.039	-3.22	-0.007	-0.74	0.012	1.94

Note that the coefficient is significant at 5% if $z > 1.96$ and significant at 1% if $z > 2.575$. Significant coefficients are in bold.

TABLE 6: Decomposition Estimates of ethnic wage differentials for graduates, students, and dropouts by gender.

	MEN		WOMEN	
	Coef.	z	Coef.	z
Graduates				
Dutch-Mediterranean difference	-0.012	-0.68	-0.043	-2.78
explained	-0.003	-0.42	0.000	-0.10
unexplained	-0.009	-0.55	-0.043	-2.80
Dutch-Caribbean difference	0.026	1.51	0.003	0.26
explained	0.026	3.74	0.017	3.97
unexplained	0.000	-0.02	-0.014	-1.10
Dutch-Western difference	-0.005	-0.49	0.041	5.09
explained	0.011	2.86	0.014	5.51
unexplained	-0.016	-1.76	0.028	3.58
Graduates before graduation				
Dutch-Mediterranean difference	-0.176	-5.83	-0.110	-3.97
explained	-0.093	-7.36	-0.093	-7.23
unexplained	-0.083	-3.04	-0.013	-0.53
Dutch-Caribbean difference	-0.084	-3.53	-0.046	-2.18
explained	-0.064	-5.64	-0.072	-6.94
unexplained	-0.020	-0.86	0.026	1.31
Dutch-Western difference	-0.052	-3.33	-0.020	-1.50
explained	-0.050	-8.37	-0.027	-4.65
unexplained	-0.002	-0.14	0.007	0.56
Drop-outs				
Dutch-Mediterranean difference	0.013	0.64	-0.030	-1.21
explained	-0.031	-3.87	-0.013	-1.48
unexplained	0.044	2.39	-0.018	-0.75
Dutch-Caribbean difference	0.021	1.19	0.009	0.52
explained	0.014	1.83	0.001	0.16
unexplained	0.007	0.42	0.008	0.49
Dutch-Western difference	0.019	1.44	0.011	0.78
explained	0.005	1.01	0.120	2.22
unexplained	0.013	1.10	-0.001	-0.07

Note that the coefficient is significant at 5% if $z > 1.96$ and significant at 1% if $z > 2.575$. Significant coefficients are in bold.

women that we reported above also reoccur in a very similar percentage (4% and 2.8%) for the graduated Mediterranean and Western women. As before, no unexplained ethnic wage gap was found for ethnic minority men. A focus on wage differentials among graduates before graduation enabled a significant wage surplus to be estimated for students from almost all ethnic groups. However, this surplus is the highest for Mediterranean men (17.6%) who earn 9.3% higher wages due to favourable characteristics plus 8.3% higher wages due to positive discrimination. The estimated wage surplus is 8.4% and 5.2% for Caribbean and Western men and these differentials can be almost completely explained by the observed characteristics. What is more, the estimated wage surpluses (4.6% and 5.2%) for Caribbean and Western women are largely due to favourable characteristics. These wage surpluses confirm the supposition that ethnic minority students spend more time in paid work during their study compared to Dutch students. The order of wage surpluses across ethnic groups indicates that students from families with a disadvantaged socioeconomic background have a higher wage surplus: Mediterranean, Caribbean, and the lowest for Western students.

Among dropouts, the estimated total wage differential is statistically insignificant. However, Mediterranean men face a 3.1% wage surplus and a 4.4% unexplained wage penalty. Obviously, these opposite effects lead to a very small and insignificant total wage differential. Finally, Western female dropouts have a significant and large wage gap due to less favourable characteristics.

6. Conclusions

This paper used unique individual panel data on the 1996 intake cohort in Dutch higher education to examine performance in Dutch higher education and the labour market. Using panel information covering ten years, the paper provides new evidence of ethnic wage disparities stemming from different sources. The analysis reveals that ethnic minority groups from non-Western countries have a significantly lower probability of completing a degree than do native Dutch students. In particular, Mediterranean and Caribbean students are less likely to complete their study in the ten-year period. Our results confirm the relatively high-performance level of female students in higher education, which also holds for ethnic minority women. The higher performance in higher education seems to be weakly correlated to the development of wage profile after graduation across ethnic groups.

The paper applied a decomposition method to assess two components of ethnic wage differentials: a component due to observed characteristics and a residual component which cannot be explained by observed characteristics and is often interpreted as a measure of discrimination. The decomposition exercise reveals striking results for ethnic wage differentials. The most important finding is that graduated Mediterranean women earn about 4% higher wages than their Dutch counterparts due to positive discrimination while Western women have a 2% wage penalty due to

discrimination. This result is unexpected, given the general drastically disadvantaged position of Mediterranean women in The Netherlands and similarities in the socioeconomic position of Western migrants with the Dutch as described by the first and third hypothesis (H1 and H3). The estimated wage surplus for Mediterranean women implies the relevance of the signalling effect of a degree (H1a). Such a favourable position for Mediterranean women may also be an outcome of a greater demand for these women, which could stem from shortages of highly skilled ethnic minority women in specific jobs, or from recent policies that aim to strengthen the position of women and ethnic minorities.

In contrast to women, Mediterranean men with a degree do not face any wage gap. They even have 3.6% higher wages than Dutch men. This wage surplus for Mediterranean men stems from their more favourable observed characteristics of students and dropouts among them. Caribbean and Western men have a 2-3% wage gap due to less favourable characteristics. The absence of ethnic wages penalty for Caribbean graduates confirms the hypothesis H2 which refers to cultural and linguistic similarities with Dutch and their socioeconomic disadvantages.

The analyses also show that ethnic minority students have substantially higher wages than Dutch students during their studies (before graduation). Relatively high wages for ethnic minority students confirms the common notion that ethnic minority students from disadvantaged families would spend more time in paid work than Dutch students during their study since they receive potentially less support from their parents.

The analysis also shows that the relative position of dropouts deteriorates with time, while recent graduates have experienced a substantial improvement in the first years of their labour market careers, as predicted by the human capital model. This implies a further deterioration of the position of ethnic minority youth since ethnic minority students are more likely to drop out. Among ethnic minority dropouts, only Mediterranean men face an ethnic wage penalty of 4.4% which cannot be explained by their measured characteristic.

The absence of an ethnic wage gap for graduates from disadvantaged ethnic minority groups (Mediterranean and Caribbean) implies either a positive selection of these students or the existence of greater demand for graduates from these groups. A deficiency in social and cultural capital obviously plays a negligible role in determining wages of ethnic minority graduates. If students in our data are positively selected, our estimates would generate an underestimation of ethnic wage penalties. Our results also suggest that favourable characteristics of ethnic minority students, Mediterranean male students, in particular, prevent a large ethnic wage gap by having a relatively low return to experience after they have completed their degrees.

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