

Educational Differentiation and Inequality

The Netherlands in Comparative Perspective

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EDUCATIONAL DIFFERENTIATION AND INEQUALITY. THE NETHERLANDS IN COMPARATIVE PERSPECTIVE

Abstract

In this paper, the international comparative literature on the effects of educational differentiation (early selection and vocational orientation) on inequality is reviewed. Inequality is conceptualized in two manners: inequality as dispersion of educational performance and inequality of educational opportunity by family background, sex, and immigrant status. First, an institutional perspective is offered through which to see the Netherlands in international comparison. The institutional perspective rests on four main characteristics of educational systems: stratification, standardization, vocational orientation, and track mobility. Second, the most promising theoretical and empirical insights in the international literature are analyzed. Third, our theoretical assumptions are tentatively tested with the most recent PISA (2006) data. It is concluded that Dutch students' test scores are more equal (lower variance) than the Netherlands' education system's institutional characteristics would suggest. Measures of inequality of opportunity in the Netherlands, however, match the assumptions derived from the institutional perspective.

Key words: Education, Differentiation, Stratification, Selection, Inequality as dispersion, Inequality of opportunity, The Netherlands.

Introduction

A study of educational differentiation finds its relevance in assessing the impact of differentiation on inequality. The Netherlands, specifically, is an interesting candidate for such an analysis. The country, for one, has a large degree of differentiation in secondary and tertiary education. Secondly, there have recently been concerned voices about a decrease in educational equality. This study addresses these matters in three ways: first, it offers a review of the scientific literature on the topic. Second, a theoretical perspective is suggested through which to analyze the effect of differentiation on equality of opportunity. Third, the assumptions derived from that perspective are tentatively tested with the most recent data from the Programme for International Student Assessment (PISA).

Educational differentiation, in this paper, is considered to comprise two elements: educational stratification and vocational orientation. Inequality is operationalized in two ways: *inequality as dispersion* and *inequality of opportunity*. The former reflects the amount of dispersion within a given population (*i.e.*, in student's test scores). In this respect, educational inequality can be measured in like manner as income inequality (*e.g.*, as one would calculate Gini coefficients). Inequality of opportunity concerns the relation between educational performance and main structural dimensions of inequality such as family background, sex, and immigrant status.

While we can make a clear conceptual distinction between these concepts, we must however realize that the two are related. Attaining equality of educational outcomes during secondary education ('equality as dispersion') can be considered *an instrument of* equality of opportunity, as it promotes equality in the access to higher education. Given the high impact of higher education attainment on labor market outcomes (*i.e.*, on earnings), equality as dispersion is an important means to promoting equality of opportunity.

In addressing both forms of inequality, we seek answers to three questions:

1. To what extent does educational differentiation *theoretically* affect educational equality?
2. To what extent does educational differentiation *empirically* affect educational equality?
3. To what extent does educational inequality in the Netherlands match our expectations based on what we know of educational differentiation?

We discuss these questions throughout the next three sections and conclude by assessing the answers to these questions jointly.

Educational targets

Educational differentiation is seen best as one in a range of institutional characteristics of educational systems. Not negating a certain degree of path dependency and historical traditions,

we pose that educational systems should be designed, to a certain extent, to optimally fulfill certain educational targets. To assess whether an educational system serves one or more of these targets, we have first to identify those targets. We take from Van de Werfhorst (2007a) four central targets of educational systems:

- Offering equal opportunities for all students (*equality target*);
- Efficient sorting on and optimization of students' talents (*efficiency target*);
- Teaching relevant (practical) knowledge and skills, effectively promoting labor market allocation (*allocation target*);
- Teaching knowledge and skills that promote active citizenship (*citizenship target*).

It is a difficult task to build an education system in such a way that it serves all four educational targets equally. In practice, one or more targets often conflict with one another – *e.g.*, an educational system in which students are selected at an early age, might encounter difficulties to maintain equality of opportunity. In like manner, the allocation target may interfere with promoting active citizenship (Van de Werfhorst 2007b). As such, for policy makers it is important to know where there might be tensions, both in theory and in reality; to prioritize educational targets; and to make policy decisions that, given this prioritization, minimize the negative effects on low-prioritized targets.

Section One. An Institutional Perspective

To map the characteristics of educational systems, which might conflict with others, we build upon the knowledge in the sociology of structural stratification tradition. Structural stratification sociology argues that educational systems differ on four dimensions: *stratification*, *standardization*, *vocational orientation*, and *track mobility* (Allmendinger 1989; Shavit and Muller 1998; Kerckhoff 2001). We will discuss the four dimensions in the following.

The dimension of stratification of educational systems indicates whether there are (two or more) tracks that are available for students in the same age group. On one extreme of this dimension, we find educational systems with a low degree of tracking, like the American (comprehensive) high school model and the Scandinavian countries. In all these countries, students of different ability levels attend the same schools in secondary education. When different educational tracks exist, they are not separated rigidly (*i.e.*, there are ‘honor’ classes available in specific courses). In such case, mobility is possible between one track and another or the possibility exists to take courses at different levels. Also, in these countries, tracks are often found within one school and in the same building.

The low degree of stratification in Norway and Sweden is motivated by social democratic principles of reducing social inequality. The idea is that the later the age of selection, the more the selection of lower class student will be based on ability rather than social origins. In this way, theoretically, social inequality between classes should be lower. If students were to make important educational decisions already at an early age, lower class students would more often end up in lower levels of education as their parents would, at early age, to a larger extent determine these choices (the so called ‘life-course hypothesis’; see Shavit and Blossfeld 1993).

England also has a system of ‘comprehensive schools’ which are at this time attended by 91% of all students (Department for children, schools, and families 2007). Besides comprehensive schools, the English educational system offers (public) ‘Grammar schools’ which select students on ability and a vast sector of private schools (‘independent schools’). The United States, likewise, have a large private school sector.

On the other end of the dimension of stratification, we find countries (*e.g.*, German-language countries and The Netherlands) which organize schooling in different tracks. In Germany, students have to choose at the age of ten, between *Hauptschule*, *Realschule*, and *Gymnasium* (listed in order

of increasing degree of selectivity). The Dutch educational system is described here in some detail, to illustrate the organization of education in a stratified system (figure 1).

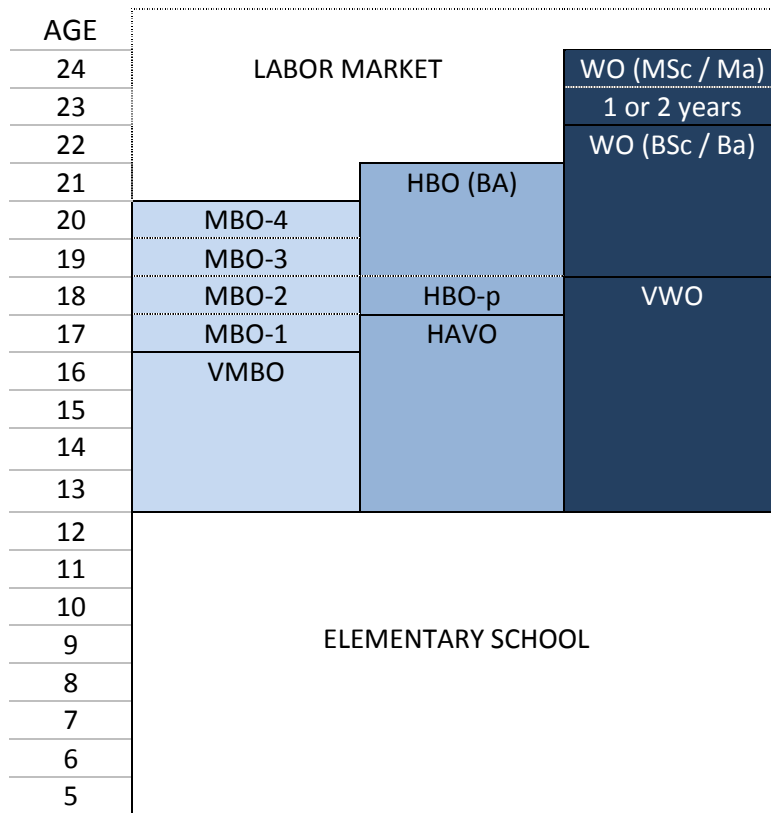


Figure 1. Tracking in the Dutch educational system.

While every child in the Netherlands attends elementary school from age five on, around the age of twelve children take a national, standardized, ability test ('CITO-test'), the score's of which determine their access to the different levels of secondary education: VMBO (lowest), HAVO or VWO. The solid lines represent clear boundaries between school levels, the dashed lines mean that within the school level, various programs are available, differing in years of schooling. In principle, the only way to go is up within a column. While movement between columns is possible, this often implies additional procedures, study delay, and sometimes additionally schooling. The steps, which

are possible between the columns, are those between the highest levels of VMBO onto HAVO,¹ from HAVO to VWO, from MBO-4 to HBO and from HBO-p to WO. Each transition implies successful graduation from the previous level of education and sometimes additional requirements; *e.g.*, if one wishes to study an economics program at HBO-level, one need to have finished a MBO-program with a focus on economics.

Another indicator of stratification, besides early selection, is the size of the student population that continues on to tertiary education. An educational system can be given the label 'stratified' when a relatively small amount of students continues to tertiary education (either vocational or academic). This element of stratification correlates with the amount of tracks in secondary education: when selection occurs at an early age, a smaller group of students will continue to tertiary education.

On top of that, in stratified systems, there is differentiation within secondary education. Because of that fact, students are less likely to invest in higher education to distinguish themselves from other students on the labor market. In the Netherlands and Germany, for example, we can see this in the fact that students with secondary vocational schooling fare relatively well on the labor market (Muller and Shavit 1998). More generally put, in countries with high levels of stratification, schooling is a better predictor for the level of job attainment than in countries with a low degree of stratification. It is also shown that stratification of higher education in different tracks increases the differences in labor market outcomes (such as salary and job level) between fields of study (Van de Werfhorst 2004). Recent sociological research has shown that the expansion of tertiary education caused a new form of stratification within higher education (Shavit, Gamoran, and Arum 2007).

¹ VMBO itself is subdivided in four different programs, all of which take four years to finish, but differ greatly in level of difficulty. Consequently, only the highest level (as a rule) and the next-to-highest level (conditionally) give access to HAVO.

A second dimension on which national educational systems differ is the level of national standardization of educational curricula, exams, school budgets, quality of teachers, etc. Standardization of such factors contributes to the transparency of diplomas (what employers can expect from someone with a certain educational qualification). The Netherlands are an example of a country with a high degree of standardization. Nearly all schools are financed by the national government by standardized norms and guidelines. Additionally, in the Netherlands all teachers are required to have a teaching qualification in order to carry out their profession. This results in a nationally homogenous teachers population. Finally, primary education in most of the country is concluded with a, standardized, central examination. This element of standardization provides schools with enough information about students to accurately assess their learning capacities prior to attending secondary education. Also in higher education, the Netherlands have a high degree of standardization. Universities and Vocational Colleges (*Hoger Beroeps Onderwijs*) are to a large degree dependent on the ministry of education for their funding. There is little difference in quality of education between universities. Employers, consequently, have very good knowledge of what to expect from graduates with specific qualifications.

The United States are an example of a country with a low degree of standardization. Educational policy is usually made on state-level or even on county-level. There are no central exams in secondary education. This has led to the growth of a whole branch of 'central examinations' outside of the educational system. Consequently, all high school graduates who are willing to attend college must first take a Scholastic Aptitude Test (SAT), which largely determines their chances of access to prestigious universities. This system increases educational inequality as students of higher socio-economic background take preparatory classes disproportionately more than students from low socio-economic background. This helps them perform better on the SAT than students without the means to take such classes (Buchmann and Roscigno 2003).

The third dimension is that of vocational orientation of educational systems. German-language countries and the Netherlands have a high degree of vocational orientation – that is to say, their educational system is very much orientated on vocational preparation. This vocational orientation is expressed in different vocational tracks in secondary education as well as in tertiary education. Many countries (*e.g.*, France and Italy) have in the past years introduced short programs in higher education, in some aspects comparable with the Dutch Vocational Colleges. These short programs nevertheless have not yet managed to attract a number of students comparable to traditional vocational tertiary education – and, likewise, do not offer comparatively good labor market perspective.

The size of the sector of vocational education is not the only aspect that determines the educational system's vocational orientation. England and the U.S., for example, have vocational education in community colleges and in (higher) secondary schools respectively, while their educational system in general is not very vocationally oriented. Therefore, besides size, the organization of the vocational education is an important element when determining the degree of vocational orientation of an educational system. The most important example of such an organizational feature is whether dual education is offered or not. Educational systems that incorporate a dual system, in which classroom teaching is combined with apprenticeship, are the most vocationally oriented. Germany stands out in this regard. The dual system plays an important role in reducing youth unemployment – more important than vocational education as such. Countries with an advanced system of dual education consequently tend to have less youth unemployment than countries without (Breen 2005).

The American sociologist of education Alan Kerckhoff introduced a fourth dimension additionally

to the three already mentioned (Kerckhoff 2001): track mobility² – which he defines as the extent to which educational systems offer possibilities for switching tracks or, to put it differently, to reach the highest level of educational attainment through a detour. In Kerckhoffs words: “The clearest index of an educational system’s allowance for choice is the flexibility of the linkages between the structural locations at successive stages of attainment” (2001: 8). The reasoning is that when a choice, once made, does not limit a student’s later options in his educational career, educational equality is served. By optimizing track mobility, the inequality-inducing effects of early selection can effectively be reduced.

Conflicting targets

When we cross-tabulate the four dimensions of educational systems with the four central educational targets, we can determine to what extent characteristics of an educational system have negative effects on the attainment of certain educational targets (figure 1).

Characteristics of educational systems	Educational targets			
	Equality	Efficiency	Allocation	Citizenship
<i>Stratification/early selection</i>	-	+	+	-
<i>Standardization</i>	+	+	+	+
<i>Vocational orientation</i>	- / +	- / +	+	-
<i>Track mobility</i>	+	+	+	?

- + indicates that the educational target is positively influenced by this characteristic
- indicates that the educational target is negatively influenced by this characteristic
- + / - indicates that both positive and negative effects could be expected
- ? indicates that little is known about the possible effects

Table 1. Educational targets and characteristics of educational systems

² While Kerckhoff originally coined the term ‘student choice’, we chose to use ‘track mobility’ as we found it to better reflect what Kerckhoff meant.

As such, this exercise serves the purpose of identifying possible tensions in the design of educational policy. The grey fields concern the most important tensions that will be discussed in this paper: what is the effect of stratification (in terms of educational tracking and early selection), vocational orientation and track mobility on the extent in which an educational system promotes *equality*, is *efficient* in its selection on talents and offers a good *labor market preparation*.

As can be seen in the table, early selection presumably leads to lower equality of educational opportunity (Erikson and Jonsson 1996) (the first target). The earlier the selection, the more students will be affected by their parents. In effect, the earlier the educational choices are made, the less they will be based on student's preferences and ability (cf. the life-course hypothesis). This hypothesis is empirically confirmed when equality of educational opportunity is studied for different transitions in the educational career: the effect of social origin on these transitions is significantly lower for later transitions, than for transitions on an earlier age (Shavit and Blossfeld 1993).

According to Lucas (2001), tracking enables parents to *effectively maintain inequality* ('EMI'). As such, even in times of educational expansion, with a near saturation of high school diplomas (as we see in the U.S.), tracking allows parents with higher social-economic status to give their children an advantage over others (*i.e.*, through disproportionate enrollment in honors classes and/or better preparation for college). EMI implies that educational inequality does not necessarily need to decrease when a certain educational standard is universally met, as the 'Maximally Maintained Inequality'-thesis (MMI) predicts (Raftery and Hout 1993). In comparable ways, Van de Werfhorst, Kraaykamp, and De Graaf (2000) argued that inequality could be passed on through different 'horizontal' choices: choice of field of study (see also Van de Werfhorst 2002). This implies that horizontal options would eventually be translated into vertical advantages and disadvantages.

Alternatively, differentiation could play an indirect role in the following. Some scholars argue that we see students' ambitions as *relative* to their parents' socio-economic position. According to this view, the primary goal of social mobility is to prevent downward mobility (Goldthorpe 1996; 2000). Given this goal, students from different socio-economic backgrounds with comparable levels of ambition and ability will make different decisions regarding their education. Students of high socio-economic background will find it necessary to attain the highest levels of schooling, even if their ability to do so is not very high. Students of low socio-economic background will, especially when their educational performance is below average, be less likely to make the transition to higher levels (or tracks) of education since their goal of maintaining their position will often lie lower than that. According to this line of reasoning, the benefits of higher levels of education are higher for students of higher socio-economic background. Conversely, the (perceived) costs of higher education are higher for students of lower socio-economic background as educational failure is relatively costly for them. Multiple studies with diverse research designs in diverse constellations of countries have empirically confirmed the mechanism of what is called 'relative risk aversion' (Breen and Yaish 2006; Stocké 2007; Van de Werfhorst 2005). What is particularly relevant here is that the mechanism has a stronger effect for inequality in highly differentiated educational systems: the more educational choices and different levels of tracks, the more the 'high' and 'low' family background students' choices will differ.

Stratification of an educational system could however lead to higher *efficiency* of learning (the second target). By selecting students on their talents and ability, homogenous classes can be created. In such classes the 'amount of learning' could be higher than in undifferentiated classes for two reasons (Brunello and Checchi 2007; Hanushek and Wössmann 2005). First, teachers would have an easier job as they could 'target' their teaching on just one level of difficulty. Second, *peer effects* could mean that students learn more from other students when they are on the same level

(Dobbelsteen et al. 2002).

Stratification (early selection) could have a positive effect also on *allocation* (the third target). In a differentiated system, there is more variety in levels of schooling. This variety increases educational credentials' *labour market signal*; it gives employers a clearer image of what to expect from their (future) employees. This 'signaling' function of early selection is an indirect effect: in highly differentiated educational systems, fewer students make it through tertiary education for reasons explained in the preceding (Shavit and Müller 1998). Consequently, such educational systems are less likely to suffer from 'overschooling' (Groot and Maassen van den Brink 2001) and, thus, give better labour market signals than educational systems in which the majority of each cohort attains a tertiary degree (countries such as Canada and the U.S.).

It is ambiguous whether vocational orientation of educational systems benefits or harms equality of opportunity. Empirical studies cannot be conclusive on the subject as there is no realistic possibility for conducting an experiment in which students are randomly assigned to either general or vocational orientation, after which the change in inequality is ascertained. That said the literature has multiple lines of reasoning to offer concerning the relationship between vocational education and equality of opportunity.

The first line of reasoning is that vocational education functions as a 'dead-end' as it locks some students off from tertiary education at a relatively early stage in their educational careers. This particularly harms students from low socio-economic background and, as such, negatively affects social mobility. Educational decisions are influenced by the extent to which parents are able to obtain (accurate) information on the educational system. According to the literature, students from low socio-economic background get more vocationally-oriented information than do students from high socio-economic background, and thus tend to be overrepresented in vocational education

(Erikson and Jonsson 1996; Morgan 2005; Van de Werfhorst 2002). This is important especially since research shows that students in secondary vocational education have a lower chance of making the transition to tertiary education than students in general education (Arum and Shavit 1995; Shavit et al. 2007; Rijken et al. 2007). However as argued above, this does not necessarily prove a lack of educational opportunity as it could also reflect a lack of necessity. A MBO-diploma, for example, provides good labour market chances, making further education unnecessary if having a decent job is one's primary goal. The latter correspond with the second view on vocational education: the 'lifeline thesis'. Vocational education gives students with limited ability for academic education a chance to learn relevant vocational training at a relatively early age. This prevents students from dropping out of school without a qualification.

However, there is little empirical evidence that vocational education decreases school dropout (see Section Three). Dropout in the Netherlands is high especially *after* vocational education in the transition from VMBO to MBO. There is no evidence that dropout is higher in countries without vocational secondary education, such as the Nordic states.

Vocational orientation presumably is positively correlated with *efficient selection*. As with stratification, vocational education increases the homogeneity of classes, possibly increasing total learning. Vocational education adds to stratification in that it sorts student not on the 'amount' of their ability, but on their interests. This is likely to make the teacher's job easier as it enables him or her to offer a kind of teaching that better corresponds with the students' interests.

Vocational education's effect on the *allocation* target is presumably positive as well. Vocational education offers well-defined knowledge, skills, and competence on multiple levels. Especially when employers have a say in what knowledge and which skills are taught, we can expect vocational education to increase students' productivity in the labour market. Research confirms that in systems of vocational education the effect of schooling on labour market outcomes is higher

than in systems with no vocational orientation (Shavit and Müller 1998; Müller and Gangl 2003; Scherer 2001; Iannelli and Raffe 2007).

Concerning the effect of track mobility on the *equality* target, we find it likely that more track mobility is beneficial to equality of opportunity. As stated in the preceding, early selection presumably is detrimental to equality of opportunity as students of low socio-economic background are more likely to end up in lower tracks than their ability scores would predict. However, when early selection is met with opportunities to deviate from one's initial choices later in one's educational career, early selection's negative effect on equality of opportunity would decrease.

Track mobility presumably contributes also to *efficient selection* based on ability. When track mobility is promoted, students have more opportunities to attain the educational credentials that best fit their ability. The *allocation* target is likely to be affected positively as well. When educational credentials better fit the students' actual ability and interests, employers will increase their trust in educational qualification's 'signaling function'.

In the next section, we will assess empirically to what extent educational differentiation affects equality as dispersion and equality of educational opportunity. We do so by examining in some detail the international literature on the subject.

Section Two. The Empirical Literature

In discussing the empirical literature on the impact of differentiation on educational inequality, we maintain our distinction between inequality of opportunity and inequality as dispersion. In both cases, research is carried out mainly using large cross-national datasets on students in primary and secondary education. In our review, we encounter the following datasets: PIRLS, TIMSS, and PISA

(see Appendix A for a description and comparison of the datasets).

We can furthermore distinguish between two approaches to studying the two forms of inequality. A first approach is the analysis of *cross-sectional data*, linking educational inequality in a country to specific characteristics of that country's educational system. A second approach is that using *difference-in-difference* models, comparing inequality measured in two datasets at different points in time – *i.e.*, one dataset based on primary-school, one on secondary school. The aim of this approach is to capture what happens in between. The idea is that if differentiation has a negative effect on equality, inequality will increase more across educational transitions in those countries that have a large degree of differentiation. The first dataset (*i.e.*, primary school) serves as a point of reference for the analysis of the second dataset, effectively holding constant any unobserved differences between countries.

While the above-mentioned property of difference-in-difference (DiD) models surely is one that appeals, the approach suffers from a major obstacle: comparing different datasets assumes that educational 'ability' or 'performance' is measured in like manner, while in fact it is not (Micklewright and Schnepf 2006). Ammermüller (2005) formalizes this point by stating that the measure derived from the second dataset contains an error component when used as a second measure of the first dataset. Ammermüller's formalization however makes it possible to formulate assumptions under which a DiD model is worth using. The most important of these assumptions, in research on inequality of educational opportunity, is that there is no variation between countries in the correlation between the error component and family background. There are however other techniques for modeling the unobserved variation between countries – *i.e.*, by using a dummy variable for countries in mixed models – which are often used in cross-sectional research (*e.g.*, in Brunello and Checchi 2007). This leads us to regard both approaches as important sources for our review.

	Inequality as dispersion	Inequality of opportunity
Cross-sectional data	Micklewright and Schnepf 2006 (x)	Wössmann 2004 (+) Schütz et al. 2005 (+) Brunello and Checchi 2007 (+ and -)
Difference-in-Difference models	Hanushek and Wössmann 2005 (+)	Ammermüller 2005 (+) Waldinger 2007 (-)

+ indicates a positive relationship between educational differentiation and inequality
 – indicates a negative relationship
 x indicates that no unambiguous relationship could be established

Table 2. Summary of findings research on educational differentiation and inequality

Table 2 schematically shows our findings, ordered in line with the two distinctions we introduced in Section One. Next, we discuss our findings in more detail.

Inequality as dispersion

Micklewright and Schnepf’s (2006) research serves as a good illustration of a cross-sectional approach to inequality as dispersion. Their research deals with inequality in learning outcomes for 21 OECD countries, including the Netherlands. Together with Hong Kong, Sweden, France, Canada, and Iceland, the Netherlands belong to the countries with the least dispersion in learning outcomes for mathematics and reading. Of the countries listed, only Hong Kong has lower dispersion than the Netherlands. The largest variance we find in Bulgaria, Macedonia, New Zealand, Rumania, Israel, and the United States. At first sight there does not seem to be a strong correlation between a country’s educational differentiation and its relative position in the ‘dispersion ranking’. Relatively differentiated countries like Germany and the Netherlands lie far apart when it comes to variance in learning outcomes, as is the case for relatively undifferentiated countries such as Sweden and the U.S. We should note however that while the US is often classified as undifferentiated, its educational system is in fact characterized by a (not-so-rigid) form of differentiation (‘streaming’).

Some scholars argue that this characteristic makes the U.S.' educational system comparable to systems of more overt differentiation (Gamoran and Mare 1989; Oakes 2005).

Another aspect of inequality studied by the authors is the relationship between dispersion and the average level of learning outcomes. Theoretically, larger variance could go hand in hand with higher overall learning outcomes (Brunello and Checchi 2007; Hanushek and Wössmann 2005). This relationship is grounded in the belief that homogenization promotes efficiency in two ways. First, it is hypothesized that homogeneous classes, as compared to heterogeneous classes, offer less obstacles for adequate instruction. Secondly, it is argued that homogeneous classes benefit from a positive peer effect, as the students have comparable ability levels (Dobbelsteen et al. 2002; see Section One). Other research however shows the opposite: comparing average levels of learning outcomes with the variance of these outcomes lead many to find a negative relationship with average level of learning outcomes and their variance (Thomas et al. 2001; Rijken 1999; Hauser and Featherman 1976). Micklewright and Schnepf (2006) tackle this issue by comparing variance with the median score (the 50th percentile). Their analysis shows that less dispersion goes hand in hand with a higher median score. The Netherlands fit this picture perfectly: the median score is more than one standard deviation above average (and is the highest of all 21 countries included in the research), while its variance is one standard deviation below average. We, thus, find no support for the 'homogenization thesis' and refute the hypothesized trade-off between (low) variance and (high) learning outcomes.

Hanushek and Wössmann (2005) studied inequality as dispersion through a DiD approach. The authors analyzed learning outcomes in primary education – grade four – using PIRLS and TIMSS data and those in secondary education – grade eight and age 15 – using TIMSS and PISA data respectively. If differentiation in secondary education would result in higher inequality as

dispersion, one would expect the variance in learning outcomes to increase more in those countries in which students make the transition from primary school to a highly differentiated secondary school. Alternatively, we expect the variance in learning outcomes to increase less or not at all in those countries with comprehensive secondary education.

Using this approach, the authors made a total of eight comparisons, varying in data source and test type (reading, maths or science), each comparison containing 18-26 countries, totaling 45 countries (including the Netherlands). For each measure of dispersion used (standard deviation, P75-P25 or P95-P5) no bivariate relationship was found between early selection and dispersion in reading outcomes (PISA 2003). When however variance in primary education is added as an independent variable, a positive relationship is found between early selection and variance. In other words: controlling for the fact that countries, for unknown reasons, have different levels of variance in reading levels in primary school, early selection leads to an increase in variance at secondary school. This relationship is found also for maths and science in TIMSS 1995; for science in comparing TIMSS 1999 and TIMSS 1995; but is statistically insignificant for maths and science in TIMSS 2003 and maths in the comparison between TIMSS 1999 and TIMSS 1995. Adding all analyses together, however the positive relationship between early selection and variance persists. Research using panel data confirms this finding (Shavit and Featherman 1988).

Like Micklewright and Schnepf (2006), Hanushek and Wössmann (2005) analyze also the relationship between differentiation and average levels of learning outcomes. Controlling for learning outcomes in primary education, they find that early selection correlates with a lower average level of reading and maths in secondary education. Hence, using a DiD approach, they reaffirm the findings of Micklewright and Schnepf (2006). With regard to learning outcomes for science, however, the authors find that early selection leads to higher average scores.

Inequality of opportunity

We found several recent cross-sectional studies on equality of opportunity by family background (Wössmann 2004; Schütz et al. 2005; Brunello and Checchi 2007). Wössmann (2004) uses TIMSS 1995 data to assess the effect of family background (parental education and number of books in the household) on students' maths scores. His study shows that in the US and in all 17 European countries included in his research, family background is correlated with student's maths scores. The effect varies from relatively weak in Portugal, France, and Wallonia (Belgium), to strong in England, Germany and Greece. When comparing the maths scores of students from highly educated parents to those with only primary education, the differences are highest in the US – higher than in any European country. The Netherlands are found near the middle of the distribution.

Schütz et al. (2005) focus on early selection as the primary indicator of educational differentiation. Like Wössmann, they take number of books in a household to be the best reflection of family background. While the authors see 'books in household' to be best reflecting family income, sociological research shows that cultural resources, more than economical, affect children's learning outcomes (De Graaf, De Graaf and Kraaykamp 2000). Schütz et al.'s (2005) research shows that the effect of family background increases with early selection.

Brunello and Checchi's (2007) research can be seen as a landmark study of the relationship between differentiation and inequality of opportunity by family background. Using multiple data sets, on students as well as on (young) adults, the authors analyze the effect of family background on educational *and* on labour market opportunity. Differentiation is operationalized in two ways: length of tracking within the educational system and percentage of students enrolled in secondary vocational education. In addition to the standardized test scores used in most research, Brunello and Checchi include in their research indicators of educational attainment, access to tertiary education, school drop-out rates, language and maths skills, as well as indicators of early labour

market experience such as employment, training, and income. Their data sources are the European Community Household Panel (ECHP), the International Social Survey Project (ISSP), the International Adult Literacy Survey (IALS), and PISA (2003).

The authors show how, for a number of outcomes, the effect of family background increases with length of tracking. This concerns the effect of family background on educational attainment, school drop-out rates, access to and enrollment in tertiary education, and job income. With regard to maths, however, the outcomes *for young adults* contradict the hypothesis that differentiation increases inequality of opportunity; family background's positive effect on test scores *decreases* as tracking length increases. The authors offer two possible explanations for the discrepancy between their findings for students and young adults. First, time spent on the labour market could compensate for the negative effect of tracking on equality of opportunity. IALS respondents often have some labour market experience and those in countries with early tracking tend to have more of it as they are less likely to enroll in tertiary education. A second explanation is that the full effect of tracking can better be assessed at a later age (IALS) than at an age of 13- or 15 (PISA and TIMSS respectively).

With regard to training ('lifelong learning'), the authors find also that the positive effect of family background decreases as tracking increases. In other words, while students from highly educated parents are more likely to receive a form of training, this effect is stronger in countries with a comprehensive system of education than in those with highly differentiated educational systems.

An important conclusion from Brunello and Checchi's findings is that the length of tracking plays a stronger role than enrollment in vocational education in determining the effect of family background on educational and labor market outcomes. This implies that early selection, which is directly related to length of tracking, has a more negative effect on equality of opportunity than a system of vocational secondary education has. This conclusion is in line with the 'life-course

hypothesis' which states that early educational decisions are affected by the students' parents to a greater extent than later decisions are.

In addition to the cross-sectional studies discussed in the previous section, two studies have been conducted using a DiD approach (Ammermüller 2005; Waldinger 2007). Ammermüller studies inequality of educational opportunity for 14 countries (not including the Netherlands) using PIRLS (2001) and PISA (2000) data. He finds that the effect on reading skills of a number of family background variables (sex, number of books in the household, location of the school and parents' stance towards their child's education) increases with the transition from primary to secondary school. The effect of parent's country of origin and parental education however decreases. For all family background variables' effects, Ammermüller finds that the increase is highest in those countries, which have either a highly differentiated educational systems or a large private sector. The yearly amount of instruction at school reduces the effect of family background, while the level of autonomy for schools increases the effect of parents' educational stance on their children's reading skills.

The effect of educational differentiation on immigrant students' educational opportunity is ambiguous. On the one side, immigrant students in differentiated educational systems seem to suffer less from the negative effects of their parents' (low) educational attainment and country of origin. On the other side, the negative effect of any language deficiencies tend to be stronger in such educational systems, hitting immigrants harder than native students.

Waldinger's (2007) starting point is the correlation, in the PISA as well as TIMSS datasets, between tracking and the effect of family background on educational success. Contrary to Ammermüller (2005) however, Waldinger finds that educational differentiation does *not* increase inequality of educational opportunity. In highly differentiated educational systems, he finds

educational inequality is higher but this inequality precedes secondary education; it is so in (*undifferentiated*) primary education also. The discrepancy between Ammermüller and Waldinger can be explained, to Waldinger's advantage, by the fact that the latter author studied a larger variety of tests (maths and reading skills as opposed to reading skills alone) and that he used a more detailed measure of tracking.

Section Three. A Tentative Exploration

In this section, we use PISA data to, first, ascertain the effect of differentiation on various measures of inequality, and, second, to determine the Netherlands' position in international comparison. In our analysis, we use an indicator devised to measure differentiation of secondary education (Van de Werfhorst 2007b). Our measure is a summary of four characteristics of educational systems into one index of differentiation, taking into account amounts of students enrolled also (cf. Brunello and Checchi 2007). The four elements constituting our measure are:

- Percentage of students enrolled in secondary vocational education;
- Percentage of students educated in a dual system;³
- Age of first selection in the educational system;
- Number of different school types available for students 15 years of age.

Our index is constructed in such way that the OECD average = 0 and standard variation = 1. Given the high factor values,⁴ it is possible to get a good view on the relationship between differentiation and inequality in PISA 2006 using this index as the only independent variable. In our

³ The term dual system refers to the prototypically German system of apprenticeships combined with classroom education.

⁴ Factor values are 0.475, 0.564, -0.857 and 0.872, respectively.

analysis, we focus on performance on maths and science tests. We prefer using maths over reading as it has been shown that schools – as opposed to parents – play a relatively large role in learning maths while the opposite is true for reading (Brandsma and Knuver 1989). While the existing literature focuses primarily on family background, we include ethnicity and gender in our analysis of the effects of differentiation on inequality of opportunity. First, however we discuss inequality as dispersion.

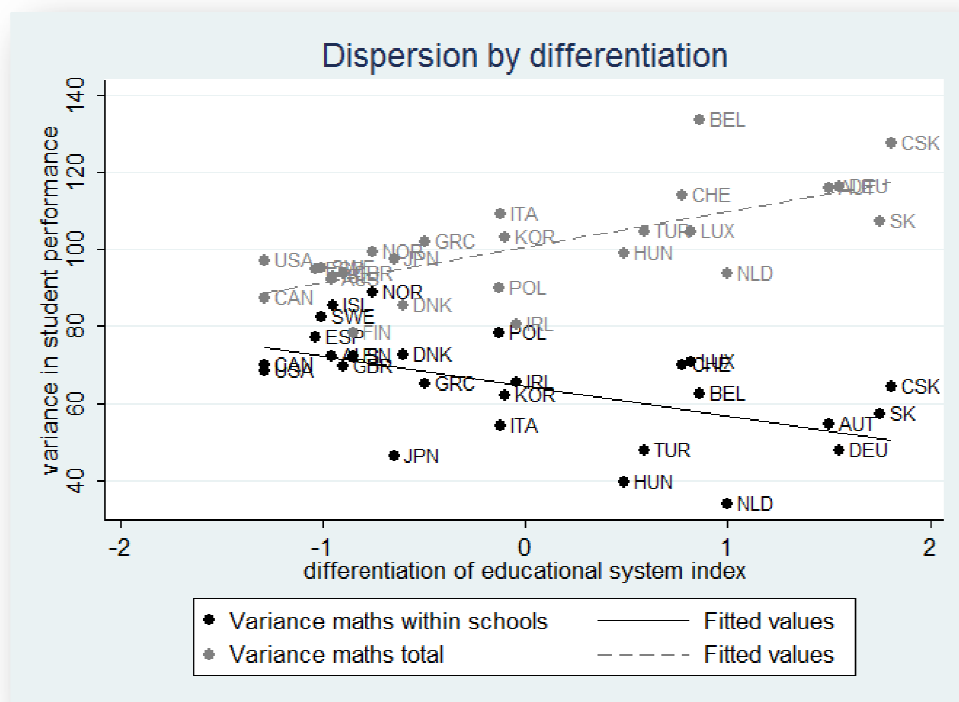


Figure 2. Within school and total variance by educational differentiation. Source: PISA 2006.

In figure 2, we compare the level of variance in maths test scores with our index of differentiation. Dots mark the positions of individual countries; the lines show the best fit for which the sum of squared residuals has its least value. Comparing the dots with the lines, enables us to quickly see whether inequality in a country is higher or lower than expected based on the level of differentiation. Plotted is a line (dashed) showing the total variance of maths scores and one (solid) indicating the within schools variance in maths scores. The figure shows that total variance

increases with increased differentiation, while there are a few deviations concerning specific countries (such as Belgium and Ireland). The highest degree of inequality as dispersion we find in Belgium and the Czech Republic. The lowest level of variance goes hand in hand with low levels of differentiation. The clearest examples of this are Finland and Denmark. Zooming in on the Netherlands we find that the level of variance is far lower than we would expect based on the (relatively large) level of differentiation. This finding matches that of Micklewright and Schnepf (2006). With regard to within school variance we find a very strong negative relationship with differentiation; that is, as differentiation increases, within school variance decreases. This we associate with stronger homogeneity of schools in highly differentiated education systems (*i.e.*, Hungary and Germany) in comparison with comprehensive systems of education (*i.e.*, Norway and Iceland). The Netherlands stand out as a country with relatively high differentiation and very low within school variance (or homogeneity).

Figures 3 and 4 deal with inequality of opportunity by family background. Figure 3 shows that the amount of within school variance that can be explained by family background slightly decreases as educational differentiation increases. In other words, greater homogeneity causes family background to lose some influence on educational success *within* schools. Family background however explains to a larger extent the *between school variance* as differentiation increases. The latter phenomenon can be explained by 'school segregation' by means of tracking (*i.e.*, different tracks in different schools) in highly differentiated educational systems (cf. the life-course perspective); if family background in differentiated educational systems plays a large role in determining which school children go to, we expect to find a big difference between schools, correlated with family background.

Looking at the Netherlands we find that both within and between school variance is near the international average (figure 3).

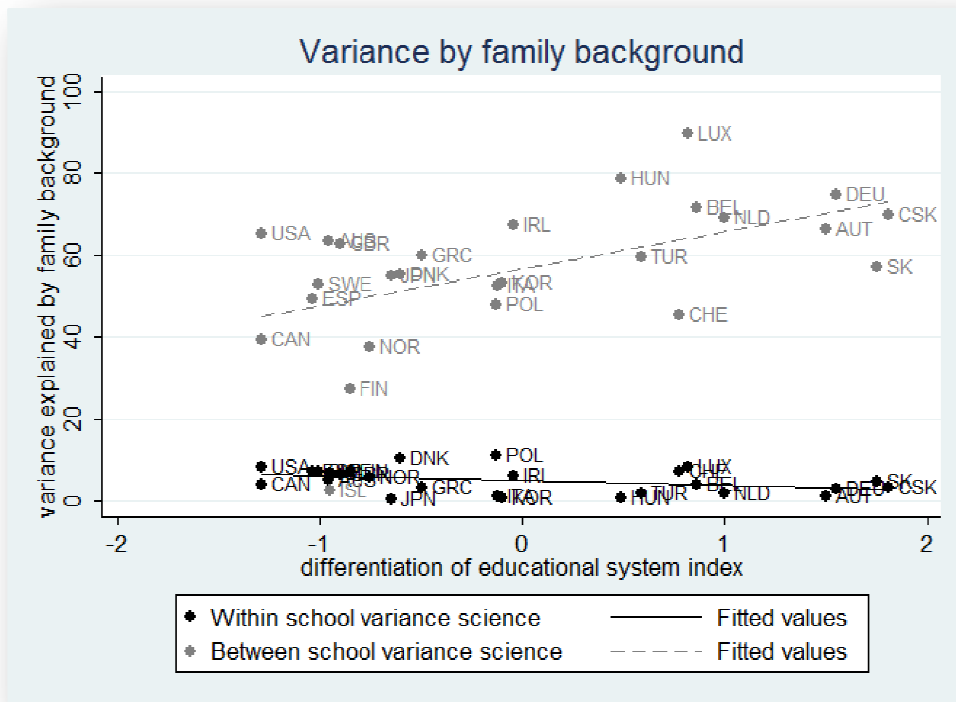


Figure 3. Within and between school variance explained by family background for different levels of stratification. Source: PISA 2006.

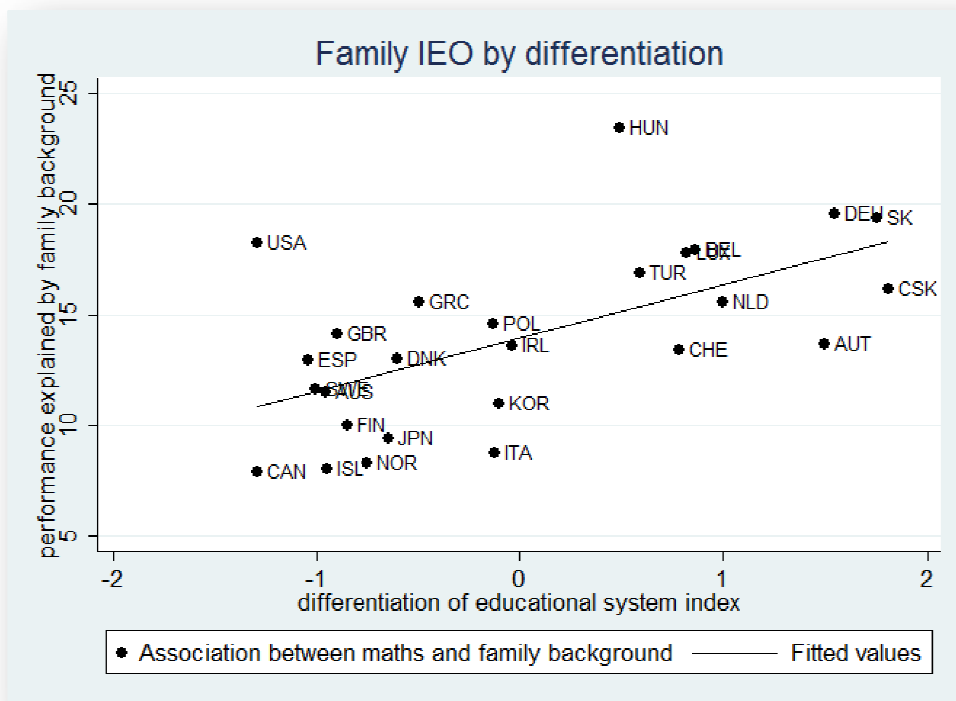


Figure 4. Total variance explained by family background for different levels of differentiation. Source: PISA 2006.

Figure 4 takes between and within school variance together as the total variance in maths test scores that can be explained by family background indicators. The trend is clearly visible: the amount of variance explained by family background increases with increased differentiation. The U.S. stands out as a country with high inequality of educational opportunity although it is classified as having low differentiation. In this observation, we find support for the argument that the U.S. educational system, albeit less visible, is indeed differentiated (cf. Gamoran and Mare 1989; Lucas 2001; Oakes 2005). With regard to the Netherlands, we find that the variance explained by family background is somewhat higher than average but lower than expected based on our differentiation index. The general pattern found in the graph matches our expectations and those found in our review of the international literature.

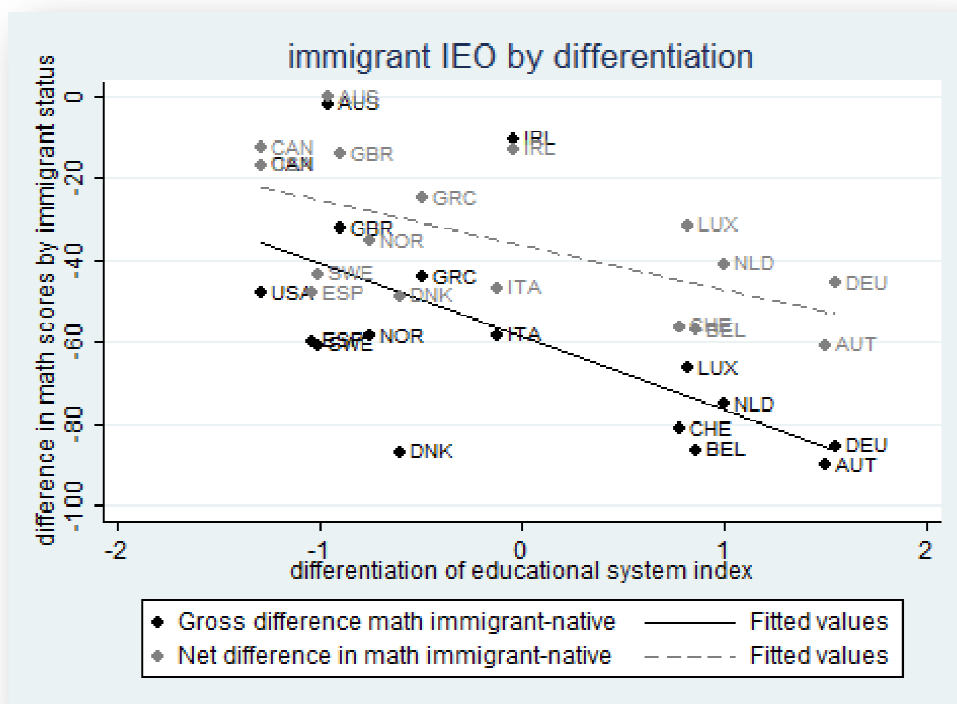


Figure 5. Gross and net difference between immigrants' and natives' maths test scores by differentiation. Source: PISA 2006.

Figure 5 indicates inequality of educational opportunity by migration status. The figure shows

how the relationship between immigration status and maths test scores increases with educational differentiation, with and without controlling for family background (referred to as ‘gross’ and ‘net’ respectively). Controlling for family background strongly reduces inequality of opportunity but does not remove the effect – except for what can be called ‘immigration countries’: Canada, Ireland, Australia, Great-Britain and the U.S. Inequality of educational opportunity by immigration status in the Netherlands is relatively high and deviates little from our prediction.

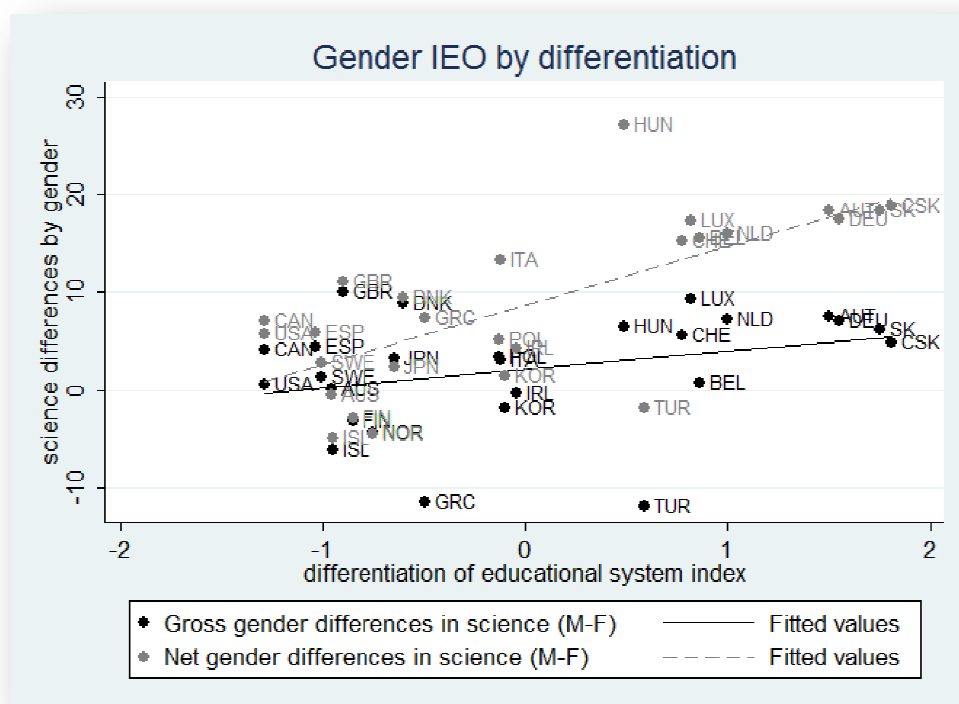


Figure 6. Gross and net gender difference in science scores by educational differentiation. Source: PISA 2006.

Gender inequality in science scores is depicted in figure 6. Generally, the difference between boys and girls is low – boys perform just a little bit better than girls do. Marked exceptions are Greece, Iceland and Turkey (girl greatly outperform boys) and Great-Britain and Denmark (countries where boys outperform boys). Gender difference in the Netherlands is relatively high.

When we however accounting for the programme level and programme destination in which

students are enrolled, the differences increase markedly. This means that while female students on the general score little lower than male students do, they fare less well in differentiated countries, when matched with male students of the same educational level (*i.e.*, in the same track). The difference between gross and net indicators can be explained as follows: female students generally do better in school than male students. At the same time, female students tend to do worse in science. The latter however is ‘masked’ from the gross indicator since female students’ average scores are higher than those of male students are. After correction (net), that ‘mask’ disappears.

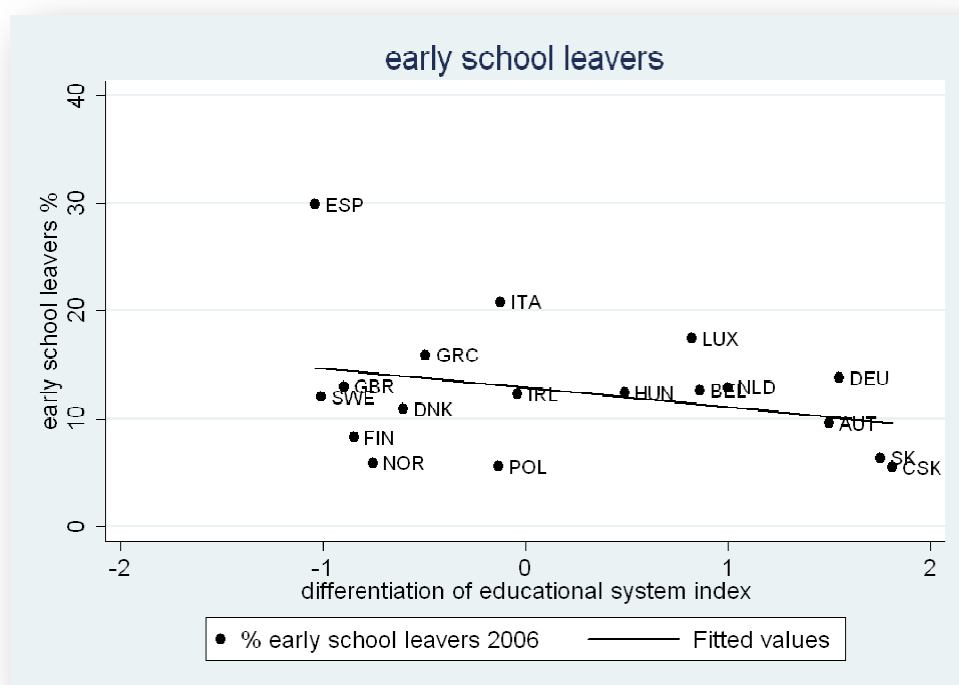


Figure 7. Percentage of school dropout by educational differentiation. Source: EU-LFS 2006.

We conclude by examining the relationship between educational differentiation and school dropout (figure 7).⁵ An important argument in favor of differentiation and vocational education is their alleged positive effect in preventing school dropout. Vocational secondary education, for

⁵ The data on school dropout are from the European Labour Force Survey (2006), the results of which are reported in Commission of the European Communities (2007).

example, is seen as offering a good alternative to academic education for those students with limited scholastic potential. In our data, however we find only a weak negative correlation between differentiation and school dropout (figure 7). The weak correlation is mainly caused by Spain; the other countries show no correlation. An argument against differentiation regarding school dropout is that differentiation causes family background to have a bigger effect on school dropout (cf. the life-course hypothesis; see Brunello and Checchi 2007).

Conclusion & Discussion

Based on the international comparative literature we can conclude the following. *Firstly*, educational differentiation leads to more inequality as dispersion. This finding has been reported in research based on multiple datasets, multiple tests (reading, maths, science, and average score over these three), and multiple research designs. We found no study that contradicts this finding.

Secondly, the hypothesized trade-off between variance of learning outcomes and average level of learning outcomes has been disproven. Instead, we found that low variance tends to go hand in hand with a high average level of learning outcomes.

Thirdly, dispersion of learning outcomes is low for students in the Netherlands. The Netherlands also shows more equality of educational opportunity than expected based on its highly differentiated educational system. This phenomenon can perhaps be explained by the high level of standardization of its educational system. The relatively high average scores alone could be explained by standardization too; Fuchs and Wössmann (2007) show that higher autonomy (in other words, less standardization) for schools has a negative effect on learning outcomes, especially when there are no central examinations.

Fourthly, equality of educational opportunity tends to decrease with increased educational differentiation. This finding is confirmed in multiple studies with diverse research designs, with only

one exception: Waldinger (2007) shows that international differences in inequality of opportunity are already there in primary education, and thus cannot be caused by educational differentiation.

As countries' individual position cannot be easily made up from the literature, we performed our own examinations of educational differentiations' effect on inequality (as dispersion and of educational opportunity by family background, immigrant status, and sex) using PISA 2006 maths and science tests. From these analyses, we draw the *fifth* conclusion: inequality in the Netherlands is about as high as one would expect based on the countries' level of educational differentiation, namely just above average. This conclusion matches the Lisbon Council's concerns with regard to the negative effects of early selection on equality of educational opportunity in the Netherlands (Schleicher 2006).⁶ Educational scientists however find the Netherlands to be largely meritocratic; selection is based on students' test scores and, controlled for these scores, the effect of family background is not so large (Meijnen 2004). Additionally, we must underline the fact that inequality as dispersion is very low in international comparison.

When we look at young adults instead of secondary school students, we can formulate our *sixth* conclusion: the Netherlands, in international comparison, has a large degree of equality (Shavit and Blossfeld 1993; Breen et al. 2007). Brunello and Checchi (2007) found that inequality in reading under young adults decreased with increasing differentiation. This they explained by the fact that young adults in countries with high educational differentiation tend to have more labour market experience, thus negating the negative effect of early selection. Their study also shows that inequality in attained education under young adults increases as differentiation increases. That finding is confirmed by the literature on inequality as dispersion for students (although these studies did not allow us to obtain the relative position of the Netherlands).

⁶ The OECD classifies the Netherlands as a country with average levels of inequality (OECD 2004: 179).

Summarizing we can pose that the Netherlands' educational system partly contributes to equality. The relatively low level of inequality as dispersion (in secondary education) could lead to more equality of access to higher education. Early selection however causes many to lose the opportunity to apply for higher education. Whether low levels of dispersion lead to higher equality of opportunity depends on whether students' *relative* performance is of importance (in which case the level of dispersion would be irrelevant) and whether students' educational performance is structurally affected by their family background. With regard to the latter, the Netherlands' educational system does not optimally serve equality of opportunity, since we find that higher differentiation leads to higher inequality.

Relating these findings back to our analysis of conflicting targets, we can make a tentative exploration as to whether the Netherlands' educational system could better serve equality. Abandoning early selection, it seems would increase equality. Such a change would however most probably affect the 'signaling' function of education (the *allocation* target); if abandoning early selection leads to an increased enrollment in tertiary education, employers could end up with less accurate information on these students' qualifications. Standardization could however compensate for the increased enrollment if national standards, such as curriculum and central examinations, are effectively maintained.

On a different note, allocation might not necessarily be a good thing. While early selection increases the signaling function of education, this signal is based to a certain extent on students' family background, as the latter is found to affect students' educational performance. While good allocation increases productivity, it remains a moral issue whether one wants employers to, indirectly, select graduates based to a large extent on their family background. Given that Brunello and Checchi (2007) find vocational education to be less detrimental to inequality than early

selection, and that vocational orientation serves allocation better than early selection, it can convincingly be argued that the vocational pillar in Dutch education is a better alternative, yet perhaps at a later stage than is currently the case.

One dimension of educational systems has been mostly overlooked in the international comparative literature: track mobility (Kerckhoff 2001). The opportunity to change one's initial choice of education and to attain high educational credentials through detours in the educational system could greatly serve the meritocratic dimension of educational systems. Track mobility compensates for early selection and offers more opportunities for students' ability to be decisive in their educational attainment. This element of track mobility arguably plays a large role in explaining the difference between highly differentiated countries such as the Netherlands and Germany. The latter is known to have very little track mobility; the German educational system is focused on preparing *Hauptschule* and *Realschule* students for vocational dual education, but does not offer graduates from those school-types the access to higher (academic) education. Given that Germany selects students for such schools already at age 10, the countries' relatively high rate of inequality could be an effect of its low rate of track mobility. The Netherlands, on the other hand, while in many respects similar to Germany, has integrated their vocational education in the educational system in such way that each level of vocational education (preparatory, middle and higher) offers, indirect, routes to general and academic education. It can thus be argued that track mobility accounts for the relatively low rate of inequality in the Netherlands relatively to the high rate of differentiation.

Current research on social inequalities can be divided into two parts: research on inequality of educational performance (mainly using data on students) and research on inequality of educational attainment (mainly using data based on young adults). Future research should be aimed towards

integrating these two, as that would allow us to gain insight in 'primary' and 'secondary' effects of family background (or ethnicity) on educational outcome variables (Boudon 1974; Goldthorpe 1996). Primary effects refer to inequalities caused by differences in learning outcomes (*i.e.*, test scores) between students of different family background. Secondary effects refer to the effect of family background on educational choices of students with comparable learning outcomes. Reducing primary effects (by equalizing learning outcomes over students of different family background) requires other policy measures than the reduction of secondary effects does. Providing accurate information on education (*e.g.*, on the workings of the system and the choices that are available to students), would be effective mainly for decreasing secondary effects, as these tend to be caused by differences in information (Van de Werfhorst and Andersen 2005; Morgan 2005). International comparative research would benefit greatly from an integrated approach to studying primary and secondary effects, as that would allow us to gain insight into the impact of educational institutions on the magnitude of the two effects. An important step in this direction would be to change the data collection of international student data PISA and TIMSS from cross-sectional to longitudinal data. Longitudinal data, through which educational performance and choices of students are followed over their educational careers, are necessary were we to optimally discern and study primary and secondary effects.

Appendix A: International Student Tests

The *Progress in International Reading Literacy Study* (PIRLS) concerns students in 4th grade of primary school; children of nine or ten years of age. These students are tested on reading skills and are asked to answer questions on their situation at home and at school. Also, their parents and teachers are asked to provide information concerning the child's development, and their own role in upbringing and educating, the school environment, etc. Finally, the school board provides

information on the schools' organization, staff, and numbers and on characteristics of the student population. This information allows a good view on differences in test scores as well as the factors, which might be of influence – such as school environment, ethnicity, family background, etc.

To enable comparison between countries, Test scores are standardized to an international average of 500 with a standard deviation of 100. The data are collected through a *two-stage stratified sampling design*: schools are selected in the first round of sampling, classes within those schools in the second round. The target is to select a minimum of 150 schools for all participating countries, of which one class each is picked.

The first PIRLS was conducted in 2001, a second in 2006 and the intention is to maintain this 5-year cycle. 35 countries participate in PIRLS, with 150,000 respondents in 2001. The test is financed jointly by the participating countries and the World Bank and is performed under supervision of the *International Association for the Evaluation of Education Achievement (IEA)*, an organization of 62 countries that is active since 1959. The same IEA also organizes the TIMSS.

The complete list of participating countries in PIRLS is: Austria, Belgium (Flemish), Belgium (French), Bulgaria, Canada (Alberta, British Columbia, Nova Scotia, Ontario and Québec), Chinese Taipei, Denmark, England, France, Georgia, Germany, Hong Kong SAR, Hungary, Iceland, Indonesia, Iran, Israel, Italy, Kuwait, Latvia, Lithuania, Luxembourg, Macedonia, Moldova, Morocco, The Netherlands, New Zealand, Norway, Poland, Qatar, Romania, Russian Federation, Scotland, Singapore, Slovak Republic, South Africa, Slovenia, Spain, Sweden, Trinidad and Tobago, and the United States.

The *Trends in International Mathematics and Science Study (TIMSS)* tests children 13 years of age, mostly in grade seven or eight. The questions, on maths and science, are strongly based on the standards of international curricula – the common grounds of the participating countries' curricula.

The test scores (average 500, standard deviation 100) are supplemented by background questions for students and questions on factors specific to schools, which are answered by the school board. The sample is drawn in like manner as PIRLS: at least 150 schools per country are selected of which one grade seven and one grade eight class is randomly picked.

The first TIMSS was conducted in 1995 and repeated every four years: in 1999, 2003, and 2007. The most recent test results will be available by December 2008. The total list of participating countries and regions is: Alberta (Canada), Algeria, Armenia, Australia, Austria, Bahrain, Basque (Spain), Bosnia and Herzegovina, Botswana, British Columbia (Canada), Bulgaria, Chinese Taipei, Colombia, Cyprus, Czech Republic, Denmark, Dubai (United Arab Emirates), Egypt, El Salvador, England, Georgia, Germany, Ghana, Hong Kong, Hungary, Indonesia, Iran, Israel, Italy, Japan, Jordan, Kazakhstan, Republic of Korea, Kuwait, Latvia, Lebanon, Lithuania, Malaysia, Malta, Massachusetts (United States), Minnesota (United States), Moldova, Mongolia, Morocco, Netherlands, New Zealand, Norway, Oman, Ontario (Canada), Palestinian National Authority, Qatar, Quebec (Canada), Romania, Russian Federation, Saudi Arabia, Scotland, Serbia, Singapore, Slovak Republic, Slovenia, Sweden, Syrian Arab Republic, Thailand, Tunisia, Turkey, Ukraine, United States, and Yemen.

The *Programme for International Student Assessment* (PISA) tests students 15 years of on their knowledge and skills in the subjects of mathematics, science and, on reading. Scores are standardized in like manner as PIRLS, but there are large differences in what is measured: while PIRLS only tests reading, and TIMSS is based on an international standard (curriculum), PISA is aimed more on assessing general skills and competencies related to real-world situations. Because of these differences, the results of the tests cannot be compared as if they were measures of the same thing (see Micklewright and Schnepf 2006).

The data collection of PISA, through a *two-stage stratified sampling*, is organized somewhat differently from PIRLS and TIMSS, as the target group is an age group instead of a grade level. After schools have been randomly selected in the first stage, individual students are selected in the second. PISA is an initiative of the Organization for Economic Cooperation and Development (OECD) and is repeated every three years since 2000. In that year 43 countries participated; 41 did so in 2003; 57 in 2006; and that number will rise to 69 in 2009. The number of respondents is 250,000 and up. The total list of participating countries, and regions, for 2009 is: Albania, Argentina, Australia, Austria, Azerbaijan, Belgium, Brazil, Bulgaria, Canada, Chile, Colombia, Croatia, Czech Republic, Denmark, Dominican Republic, Dubai (UAE), Estonia, Finland, France, Germany, Greece, Hong Kong-China, Hungary, Iceland, Indonesia, Ireland, Israel, Italy, Japan, Jordan, Kazakhstan, Korea, Kyrgyz Republic, Liechtenstein, Lithuania, Luxembourg, Latvia, Macao-China, Mexico, Republic of Moldova, Republic of Montenegro, The Netherlands, New Zealand, Norway, Panama, Peru, Poland, Portugal, Qatar, Romania, Russian Federation, Republic of Serbia, Shanghai (China), Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Chinese Taipei, Thailand, Trinidad and Tobago, Tunisia, Turkey, United States, Uruguay, and United Kingdom.

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