

Ethnic Inequality in Vocational Education: The Impact of Educational Policy and Contextual Factors in Germany's federal states

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Abstract

The degree of how strong young people with a migrant background are underrepresented in vocational education and training (VET) varies between Germany's federal states. The present study applied Fuzzy Set Qualitative Comparative Analysis to investigate the effects of the amount of apprenticeships and the presence of school-based VET and a transition system in Germany's federal states on the amount of ethnic inequality in VET for 1.generation migrants. The results indicate that a small supply of apprenticeships and a high presence of school-based VET or transition programs in a federal state are connected with a large amount of ethnic inequality in VET. A small amount of ethnic inequality in VET is appears in federal states with a large supply of apprenticeships and a small amount of school-based VET or transition programs.

1 Introduction

From primary school onwards, children with a migrant background¹ in Germany have, on average, weaker education outcomes than their native German peers (Autorengruppe Bildungsberichterstattung, 2012). The comparatively low educational attainment on the part of migrant children persists in the vocational education and training (VET) sector, but this area is much less explored. In 2010, only 49 percent of young people of foreign nationality in Germany participated in a VET program leading to a full vocational qualification—as compared to 71 percent of their native German peers (Autorengruppe Bildungsberichterstattung, 2012: 276).

Much of the debate about ethnic inequality has focused on individual resources as causes of the weaker educational outcomes. The fact that migrants have a lower chance of securing a place in a VET program can be explained in part by their lower endowments with human and social capital (Helland and Støren, 2006, Beicht and Granato, 2011). Migration-specific characteristics, such as generation, ethnic origin (Seibert, 2005; Seeber, 2011) or language skills (Diehl *et al.*, 2009; Fick, 2011) also play a crucial role. However, even when holding these factors constant, young migrants' chances of securing a place in a VET program are still lower than those of their native German peers. As a consequence, we still lack a consensus on one of the central questions addressed by this literature: why do people with a migrant background have lower chances to enter the VET system?

The main idea of this article is to examine how the supply of apprenticeships and the presence of school-based VET and a transition system affect the level of ethnic inequality in VET in Germany for 1.generation migrants. To analyze the impact of the contextual factors

¹ The definition of “People with a migrant background” as used in this paper according to the official German Federal Statistical Office definition is: “all persons who have immigrated into the territory of today’s Federal Republic of Germany after 1949, all foreigners born in Germany and all persons born in Germany who have at least one parent who immigrated to the country or was born as a foreigner in Germany.” (Statistisches Bundesamt 2013b)

on the amount of ethnic inequality, fuzzy set qualitative comparative analysis (fs/QCA) is applied.

Current research on the effects of educational systems focus more on the international comparison of the effects of secondary school systems on migrants' school performance (Ammermüller, 2005; Dronkers et al., 2012) or on educational systems and labor market outcomes in general (Allmendinger, 1989; Pfeffer, 2008). However, there is a lack of research regarding differences of the VET system.

The few existing studies on the influence of contextual factors on the transition from general education school to VET in Germany suggest that different education policies may produce different VET outcomes (Diehl *et al.*, 2009; Seibert *et al.*, 2009, Beicht and Granato, 2011; Lex and Zimmermann, 2011; Eberhard, 2012). However, although these studies examine the effects of education systems, in most cases these hypotheses have been derived and assessed on young adults in transition in general, not for the special group of migrants. Hence, they do not allow conclusions about how different VET systems affect the chances of young people with migrant background to begin an education in the VET system.

This article focuses on regional disparities of the VET system within Germany rather than on comparison with other countries. The advantage over an international evaluation is that the federal states are embedded in the same national political and economic system, thus many characteristics can be treated as constant. However, the decentralization of the education system in Germany—the 16 federal states enjoy educational autonomy—gives rise to major inter-state variations in education structures.

The next section describes the German vocational education system followed by a section which demonstrates why institutional or contextual factors play a crucial role in the transition from school to VET. Furthermore the three characteristics of the VET system which are analyzed in this article will be described regarding their expected effects on ethnic inequality: apprenticeships, school-based VET and transition system. The next section describes how the

concept of ethnic inequality is defined for this article and how the method fs/QCA is used to answer the research questions followed by a section which shows the results of the analysis. The final section discusses the study's findings and implications.

2 The German Vocational Education System

After general education secondary school, there are two paths to obtaining a full vocational education qualification degree: first, the tertiary or academic sector (ISCED Levels 5-8), which comprises the different types of higher education institutions; and second the vocational education and training (VET) system at upper-secondary and post-secondary non-tertiary level (ISCED Levels 3 and 4) (UNESCO Institute for Statistics, 2012). Figure 1 gives a simplified overview to the German Educational system.

Figure 1: Structure of the Educational System in Germany

ISCED 5-8 Tertiary Education	Different Types of Higher Education Institutions (e.g. University, University of Applied Science)			
ISCED 3/4 Secondary Level II	Vocational Education	Vocational Education and Training (VET)		General Education Vocational schools with the aim to obtain the preconditions to visit tertiary education
		Dual System of Vocational Education (Apprenticeships)	School-based Vocational Education	
		Transition System		
ISCED 2 Secondary Level I	General Education	Hauptschule	Realschule	Schools with Several Courses of Education
ISCED 1 Primary Education	General Education	Primary School		

Source: Secretary General of the Standing Conference of the Ministers of Education and Cultural Affairs (2013), own representation.

The basic structure of the German VET system at upper-secondary and post-secondary non-tertiary level (ISCED Levels 3 and 4; UNESCO Institute for Statistics, 2012), which applies, to a greater or lesser extent, in every federal state, consists of two main sectors:

- The “dual system of vocational education” (*duales Berufsbildungssystem*), which combines theoretical education at a vocational school and practical in-company training in so called apprenticeships;
- The school-based vocational education system (*Schulberufssystem*), which offers vocational education at full-time vocational schools.

Both sectors lead to a full vocational qualification degree at the level of skilled worker or specialist employee (Secretary General of the Standing Conference of the Ministers of Education and Cultural Affairs, 2013).

The “transition system” consists of different publicly financed preparatory or substitute training measures for graduates of secondary schools who did not manage to enter the dual vocational or the school-based VET system. This transition system consists of an educational offer with a duration of one year with the aim to promote qualifications needed in VET or to make up for a general education degree. It came up as a reaction to a decline of apprenticeship positions over the last years, mostly in the western parts of Germany. Furthermore it is an alternative to fulfil compulsory schooling which ends with legal age (Vossenkuhl, 2010). However, programs in the transition system do not provide a full vocational education. Since the year 2000 about 40 percent of new entrants to VET enter the transition system, almost as much as young people entering the dual system. These programs have been created for disadvantaged youths in general, but young persons with a foreign nationality are over-represented here (Baethge, 2009).

Because of the decentralization of the education system in Germany, there are major inter-state variations in education structures. Thus, the organization of the VET varies

between the federal states (Table 1). The organization of the VET system in Germany's federal states is characterized by the distribution of three characteristics: the supply of apprenticeships, the size of school-based VET and the size of the transition system. For this reason, the distribution of these three characteristics on the amount of ethnic inequality in VET will be analyzed. In the following sections, these characteristics and their relation to ethnic inequality will be described in more detail.

Table 1: Contextual Factors in Germany's federal states

Federal State	Apprenticeships Demand and Supply Ratio ¹	Distribution of Members of VET System			Total
		School-based VET	Transition System	Apprenticeships	
Bavaria	91.1	26.6	20.5	52.9	100
Rhineland-Palatinate	85.4	31.5	34.0	34.5	100
Schleswig-Holstein	88.2	25.2	41.4	33.4	100
Baden-Wuerttemberg	86.8	28.0	41.7	30.3	100
North Rhine-Westphalia	80.7	29.5	32.8	37.7	100
Lower Saxony	81.7	27.4	40.4	32.2	100
Hamburg	88.8	23.7	24.8	51.5	100
Hesse	81.4	24.6	30.1	45.3	100
Berlin	73.2	36.1	22.3	41.6	100
Germany's eastern states	75.4	35.4	19.1	45.5	100

¹Relation between supply (number of new training contracts in apprenticeships plus the at the *Agentur für Arbeit* (Federal Employment Agency) reported vacant apprenticeships) and demand (number of new training contracts plus the at the *Agentur für Arbeit* (Federal Employment Agency) reported applicants who are still looking for an apprenticeship). This relation shows how many apprenticeship positions can be offered to 100 applicants. Thus, the larger the number, the better the supply of apprenticeship positions.

²Percentage of new entrants in the non-tertiary VET system starting in the transition system. Source: BIBB (2010; 2011), Statistische Ämter des Bundes und der Länder (2012), Statistisches Bundesamt (2013a), average of the data of 2008-2010.

3 Effects of the VET System on Ethnic Inequality

Recent research argues that the disadvantage of people with a migrant background is due not only to a lack of individual resources but also to the manner in which transition to VET is affected by institutional or contextual factors (Eberhard, 2012; de Graaf and van Zenderen, 2013; Ulrich, 2013). Aybek (2008) develops a theoretical multi-level model demonstrating the processes in the transition to VET. Based on the theories of Coleman (1990) he points out that the access to VET is also determined by developments at the macro level (e.g. economic situation) or mesoscale (e.g. institutions, programs) as they regulate opportunity structures for young people in their search for a VET position at a specific time. Thus, the transition process is embedded in specific structural, cultural and institutional contexts, which differ between different states (Walther 2006). The differences in institutional arrangements have an impact on choices and decisions and thus on the transition process itself (Raffe, 2008; Heinz, 2009). In the end, a successful transition to VET is an interplay between the institutional arrangements as well as social and individual resources (de Graaf and van Zenderen, 2013).

Eberhard (2012) reveals, that the distribution of the main parts of the VET system, the supply of apprenticeships, and the presence of school-based VET or a transition system, seem to produce different outcomes in VET for secondary school graduates. In the following sections the effects of the supply of apprenticeships and the presence of school-based VET and a transition system will be hypothesized on the special group of people with a migrant background.

3.1 Apprenticeships

Most of the graduates from secondary school seek for an apprenticeship. This applies to graduates with a migrant background with 62 percent as well as for graduates without a

migrant background (61 percent). This is especially true for youths whose highest secondary school certificate is a *Hauptschule* leaving certificate² (Beicht and Granato, 2011).

Companies are eager to hire applicants for an apprenticeship who appear most appropriate for their interests. In order to find the best candidate, the applicants are sorted depending on their signals that they send according to the experience the company made with the social group the candidate is belonging to (Thurow, 1975). So the employer prefers an applicant because of the average characteristics of the group the person is belonging to (people with migrant background) rather than his personal characteristics. The employer will choose the candidate which belongs to the category with on average e.g. higher productivity or a higher chance to finish the apprenticeship (Thurow, 1975).

In the literature there are several reasons discussed why young persons with a migrant background are not the first preference of companies: Firstly, youths with a migrant background have on average lower secondary school certificates (Beicht, 2011). But current research also shows, that holding the secondary school certificate constant, migrant background remains a disadvantage. Furthermore graduates with a migrant background in contrast to graduates without a migrant background more often cannot rely on relevant social networks, which can be very helpful especially for positions in smaller companies (Roth, 2014). Another reason for the lower chances of graduates with a migrant background as discussed in the literature is discriminating selection processes because of prejudice (Imdorf, 2010; Skrobanek, 2008).

In case of a higher demand for apprenticeships than the supply of these positions, there is a competition of many high-performance applicants. In this case less preferred groups have

² The German secondary school system is highly stratified. The bottom tier, *Hauptschule*, which ends at 9th grade, provides basic skills; the middle tier, *Realschule*, which ends at 10th grade, provides intermediate skills (*Mittlere Reife*), and the top tier, *Gymnasium*, which ends at 12th grade in most federal states, leads to *Abitur*, the higher-education entry qualification. Because a secondary school certificate is not required for an in-company-based vocational training, young people who leave school without a certificate can also avail of this kind of training. However, for school-based VET, the minimum requirement is a *Hauptschule* leaving certificate; some training programs require a *Realschule* leaving certificate (Cockrill and Scott, 1997).

even less chances to get an apprenticeship (Thurow, 1975). Beicht (2011), Eberhard (2012) or Ulrich (2011) show, that the larger the number of apprenticeship supply compared to the demand, the higher the chances of a successful entry in VET for all graduates from secondary school.

As migrants, as shown before, might not be the first in the competition row, the chance for this group to get an apprenticeship will be even smaller the smaller the supply of apprenticeships.

3.2 The School-based VET

In contrast, selection processes of school-based VET are more standardized, focusing mostly on secondary school certificates and performance at school. Thus, disadvantages of graduates with a migrant background regarding social networks or discriminating selection processes should not play a role.

On the other hand a position in a school-based VET often requires higher secondary school certificates than a vocational education in apprenticeships. Persons with a migrant background have on average lower secondary school certificates than graduates without a migrant background (Beicht, 2011). This fact should on average decrease the chance of graduates with a migrant background to secure a place in school-based VET.

Empirical evidence for this show Seibert et al. (2009) by focusing on the effect of a higher presence of school-based VET on migrants. Seibert et al. (2009) found, that the chances for men from Turkey and from Ex-Yugoslavia living in Germany are lower in school-based VET systems even when controlling for the secondary education degree.

3.3 The Transition System

In times of a higher demand for apprenticeships than the supply, the chance of youth is higher to fail in securing a place in the VET system. In these situations a process of “cooling out” is

possible, since youths see the reasons of their failure in a lack of their personal qualifications. Consequently this group will scale down their plans. As a consequence these youths try to find alternatives, which can be for example to continue secondary school or to stay in a program of the transition system (Goffmann, 2003).

In times where there is a lack of apprenticeships, several young persons are in programs of the transition system in federal states with a high presence of these programs, even if their qualifications are not in deficit (Eberhard and Ulrich, 2010). Eberhard and Ulrich (2011) analyzed the impact of the size of the “transition system” in different regions of Germany and found a negative effect of the presence of a large amount of these programs on the chances to get into VET for graduates of secondary school. Eberhard and Ulrich (2011) indicate in this respect that a high presence of a transition system might also be a possible determinant for ethnic inequality in VET.

3.4 Hypotheses

In this section the theoretical considerations of the effects of the supply of apprenticeships and the presence of school-based VET or a transition system will be summarized and hypotheses will be made for the effects of these characteristics on the amount of ethnic inequality in VET. As people with a migrant background might for several reasons not be the first to be chosen for an apprenticeship, they will suffer the most from a small supply of apprenticeships. So a small supply of apprenticeships is assumed to be connected with a high degree of ethnic inequality in VET.

As people with a migrant background have on average lower secondary school certificates than people without a migrant background, this group’s chances for a position in the VET system will decrease when the VET system consists to a high percentage of school-based VET, where higher secondary school certificates are required.

Therefore the following hypothesis can be assumed: When there is a high presence of school-based VET in a federal state, the level of ethnic inequality in VET is also high.

And a third hypothesis from the theoretical considerations above is:

In federal states with a large amount of transition programs, ethnic inequality in VET will also be high.

But the three characteristics of the VET system are not independent from each other. The size of one part will influence the size of another part of the VET system. And so the effects of one characteristic cannot be hypothesized independent from each other.

Therefore it seems to be logic, that a high presence of school-based VET will then have a negative effect on ethnic inequality, if there is a small supply of apprenticeships. Because in the case of a large supply of apprenticeships, there would be enough alternatives to secure a place in the VET system.

Furthermore for the same reason it can be assumed, that a large amount of transition programs is even worse for graduates in the transition from school to VET, when there is a lack of apprenticeships.

4 Data and Methods

The empirical basis for the analyses is German Microcensus data (German Labour Force Survey). The German Microcensus is the official representative survey of the population and the labor market in which one percent of all households in Germany are surveyed annually. De facto anonymized scientific use files (SUFs) are available for research purposes. SUF data are a 70-percent sample of the original data. The size of the sample and the high response rate³—also in the case of individuals with a migrant background—are two of the advantages

³ The rate of household attrition—2.5–3 percent—is relatively low. This is due to fact that provision of information for the microcensus is compulsory.

of these data.⁴ This data was used to compare ethnic inequality between Germany's federal states. Furthermore aggregated data from the Statistical offices of the Federation and the Länder and from the Federal Employment Agency was used (BIBB, 2010, 2011; Statistische Ämter des Bundes und der Länder, 2012; Statistisches Bundesamt, 2013a) to compare the distribution of apprenticeships, school-based VET and the transition system between Germany's federal states.

The concept "ethnic inequality in VET" is based on results of binary logistic regressions and shows the correlation between migrant background and the dependent variable to participate in VET or not to participate in VET. People with a migrant background are divided into people who were born in Germany or immigrated to Germany until age six (2./1.5 generation) and people who migrated to Germany later than age six (1.generation). This multivariate analysis is used to hold the differing composition of the group of persons with and without a migrant background and between the federal states in Germany as well as interactions concerning sex, age, school leaving certificate and migrant background constant. Binary logistic regressions were computed for each federal state separately. VET as defined for this article includes apprenticeships and school-based VET. To increase the size of the sample in order to be able to compare the federal states in more detail, I use pooled cross-section data from 2008 to 2010. The Microcensus is designed as a rotating panel sample for which the households of a sample district are surveyed in four consecutive years. In order to avoid an overlapping of persons in the pooled data set, I filtered for new graduates from secondary school in the years 2009 and 2010. The analyses include persons aged 15 to 24 with and without migrant background. The lower boundary is the earliest age at which a young person can get into VET after leaving secondary school. The upper boundary is used as the German Microcensus data show, that 95 percent of the persons who are in VET are

⁴ For more information on these data, see <http://www.gesis.org/en/services/data-analysis/official-microdata/microcensus/microcensus-grundfile/>

younger than 25. Students in secondary schools, young persons in military duty or in community service and persons who already have a training qualification are excluded from the analyses. Since the number of cases for the federal states Saarland and Bremen are quite low, these states must be excluded from these analyses. There are generally not many people with a migrant background living in Germany's eastern states of Thuringia, Saxony, Saxony Anhalt, Mecklenburg Pomerania or Brandenburg which is the reason why they cannot be examined separately. But due to the great similarity of the economic situation and educational policy in Germany's eastern states, they can be examined together as one case.

Table 2 shows the probability to be in VET for young persons with a migrant background from 2./1.5 and 1.Generation for each federal state. Since model coefficients are reported as average marginal effects (AME) in order to compare them between federal states, they can be interpreted as average additive effects of an independent variable on chances of being in VET (Mood, 2010), being higher for higher values and lower for lower values. The extent of ethnic inequality in VET varies across the federal states. Ethnic inequality for 1. generation migrants is highest in Berlin where the probability to be in VET is 23 percentage points lower for 1.Generation Migrants than for native Germans. The difference between the two groups is only 10 percentage points and above all statistically insignificant in Schleswig-Holstein. The differences in the chances for 1.5 or 2. generation migrants are not as large as for 1. generation migrants. They vary between 11 percentage points in Berlin and 4 percentage points in Germany's eastern states. For this reason, further analyses will focus on 1.generation migrants.

Table 2: Extent of Ethnic Inequality in VET⁵

Federal State	AME on chances to be in VET	
	1.Generation Migrants	1.5/2.Generation Migrants
Berlin (BE)	-0.231***	-0.111**
Germany's eastern states (GES)	-0.211***	-0.44
North Rhine-Westphalia (NW)	-0.208***	-0.074***
Lower Saxony (LS)	-0.194***	-0.053
Baden-Wuerttemberg (BW)	-0.149***	-0.071
Bavaria (BV)	-0.134***	-0.090***
Hesse (HE)	-0.129***	-0.102***
Rhineland Palatinate (RP)	-0.128*	-0.096*
Hamburg (HH)	-0.114	-0.080
Schleswig-Holstein	-0.101	-0.171***

Note: Controlled for age, sex, secondary school certificate and year of the survey.

* : $p \leq 0.05$; ** : $p \leq 0.01$; *** : $p \leq 0.001$

Source: Own calculations, only young adults between 15 and 24 years, data set: Microcensus 2008-2010;

Reference categories: persons without migrant background.

For the purpose of examining how characteristics of the VET system affect ethnic inequality, Fuzzy Set Qualitative Comparative Analysis (Fs/QCA) was applied. The decentralization of the educational system leads to a vast variation in educational structures among the federal states. Thus, the federal states are complex constellations of different characteristics of the VET system. For this reason, I expect, that the degree of ethnic inequality can be explained by

⁵ To take the varying distribution of people belonging to different nationalities between the federal states into account, a weight was computed. This weight adjusts for the different distribution of the three groups of people with Turkish background, people from other countries of recruitment (Italy, Greece, Portugal, Jugoslawia, Spain, Marokko) and people from all other countries. This is accomplished by setting the percentage of the group in the federal state in proportion of the percentage of the group in Germany on average. Because of the small number of cases in the nationality groups in Schleswig-Holstein, Hamburg and Germany's eastern states, the weights cannot be computed for those federal states. The results of the weighted regressions models are shown in table 1 in appendix.

a specific combination of institutional characteristics and not by one single dimension. Fs/QCA is a technique which explores the interaction of characteristics rather than net effects of individual variables. With fs/QCA it is possible to demonstrate connections between characteristics and the outcome when none of the characteristics alone is sufficient or necessary for an outcome. Thus, single characteristics can play different roles in combination with different other characteristics (Schneider and Wagemann, 2007; Ragin, 2000).

Fs/QCA is based on Boolean and Fuzzy logic (Schneider and Wagemann, 2007; Ragin, 2000). Thus, in order to use this method, all conditions (supply of apprenticeships, school-based VET, transition system) and the outcome (ethnic inequality in VET for 1. generation migrants) are converted into “fuzzy sets”. Thus, a federal state can have a membership in a condition and in the outcome with a value between “0” and “1”, where “0” is fully out and “1” is fully in. The cross-over point allows a qualitative distinction of cases being more in or more out of a specific set. These fuzzy sets provide a way to capture the complexities of educational policies and the variations between the federal states. The fuzzy-sets for this analysis are constructed using the direct method (Schneider and Wagemann, 2007) on the basis of the values showed in table 1 and 2. The qualitative thresholds which were used to do this are shown in table 3. Table 4 presents an overview of all fuzzy-set scores of the conditions and the outcome.

Table 3: Qualitative Tresholds

	Treshold Full Non-Membership	Crossover Point	Treshold Full Membership
High ethnic inequality in VET for 1. generation migrants	-0.108	-0.172	-0.221
Small supply of apprenticeships	90.0	83.6	74.3
High presence of transition system	19.8	37.2	41.6
High presence of school-based VET	24.2	28.8	35.8

Table 4: Fuzzy-Set Data Matrix

Cases	Outcome High ethnic inequality in VET for 1.generation migrants	Small amount of apprenticeships	High presence of school-based VET	High presence of the transition system
SH	0	0.10	0.09	0.95
HH	0.06	0.08	0	0.11
RP	0.11	0.30	0.76	0.37
HE	0.12	0.67	0.06	0.23
BV	0.14	0	0.19	0.05
BW	0.25	0.18	0.37	1
LS	0.79	0.65	0.29	0.90
NW	0.90	0.72	0.57	0.32
GES	0.92	0.93	0.94	0
BE	1	1	1	0.07

5 Finding patterns

With the help of these fuzzy sets, patterns of similarities and differences across cases (necessary and sufficient conditions) behind the variations in ethnic inequality in VET for 1. generation migrants can be discovered. In order to test the hypothesis the computer program fs/QCA⁶ is used.

The values in Table 4 are now transformed into dichotomous values, being 1 for fuzzy scores larger than 0.5 and 0 for scores smaller than 0.5. The results are shown in table 5, with 1 meaning the condition is available and 0 meaning the condition is absent. Table 5 lists all logically possible combinations of conditions and shows the correspondence of cases to those configurations of characteristics according to their best fit. Column 5 in table 5 displays the consistency score, which shows to which degree each condition is consistently associated with high ethnic inequality in VET (Schneider und Wagemann, 2007).

In row 3 of table 5 we can see an ideal type which is characterized by the absence of all conditions which are hypothesized to be connected with high ethnic inequality (small supply of apprenticeships, large amount of school-based VET and high presence of a transition

⁶ <http://www.u.arizona.edu/~cragin/fsQCA/software.shtml>

system). We can see that the absence of these characteristics, as can be seen in Hamburg and Bavaria, is connected with low ethnic inequality (fuzzy score <0.5 , see table 4).

Other similarities can be seen between the federal states of Schleswig-Holstein and Baden-Wuerttemberg. Both federal states are characterized by a large amount of positions in apprenticeships, a small amount of school-based VET and a large amount of transition programs, which is in both cases connected with a small amount of ethnic inequality (fuzzy score <0.5).⁷

The cases which are described above, all have in common, that either all the characteristics which are hypothesized to lead to high ethnic inequality are absent or only one characteristic is present. This is also the case with Hesse or Rhineland-Palatinate.

A small supply of apprenticeships, a large amount of school-based VET and a small amount of the transition system is covered by Germany's eastern states (including Berlin) and North Rhine-Westphalia. All of these cases show a large amount of ethnic inequality (fuzzy score >0.5). The case of Lower Saxony, which is characterized by the presence of two conditions which are hypothesized to be connected with high ethnic inequality (small supply of apprenticeships, large amount of transition programs) also shows a comparably large amount of ethnic inequality (fuzzy score >0.5). To summarize that, the patterns described above show that at least two of the conditions need to be present to have high ethnic inequality in a federal state.

However, there is no case evident which describes best the ideal type in the last two rows. So no state has a large supply of apprenticeships, a high presence of the transition system and a high presence of school-based VET or a large supply of apprenticeships and a large amount of school-based VET and transition programs.

⁷ In Baden-Wuerttemberg people who are in their first year of their apprenticeship, are taught in a full-time vocational school with a duration of one year. This can explain partially the high presence of the transition system in Baden-Wuerttemberg (Baethge *et al.*, 2007).

Table 5: Dichotomous Truth Table Including the Ideal Types

Small amount of apprenticeships	High presence of school-based VET	High presence of transition system	Cases	Consistency Sufficiency Outcome high ethnic inequality in VET for 1.generation migrants
1	1	0	NW, GES, BE	0.92
0	0	1	SH, BW	0.44
0	0	0	HH, BV	0.32
1	0	1	LS	0.80
1	0	0	HE	0.54
0	1	0	RP	0.55
1	1	1	-	
0	1	1	-	

6 Necessary and sufficient conditions

Fuzzy QCA helps to find necessary and sufficient conditions within the patterns shown above.

A condition is necessary when it occurs with the presence of the outcome. This means in fuzzy logic that the fuzzy score of the necessary condition must be equal or higher than the fuzzy score of the outcome.

A higher consistency benchmark of 0.90 was used in the test of necessity. For all analyses only empirically observable configurations are included, which favors empirical complexity but is the more conservative solution (Schneider und Wagemann, 2007).

The test of necessity shows that none of the characteristics of the VET system analyzed here appears to be consistently necessary for high ethnic inequality in VET. The same applies for the outcome “low ethnic inequality in VET”.

The reason for that might be that high ethnic inequality is caused by varying or multiple conditions. Therefore the appearance of sufficient conditions will be analyzed.

A condition is sufficient if the outcome occurs whenever the condition is present. Thus, the fuzzy score of a sufficient condition must be equivalent or smaller than the fuzzy score of the outcome.

Regarding the outcome high ethnic inequality in VET the consistency threshold was set at 0.82 which instructs the program that configurations which have a consistently higher than this score should be considered as reasonable subsets of the outcome.

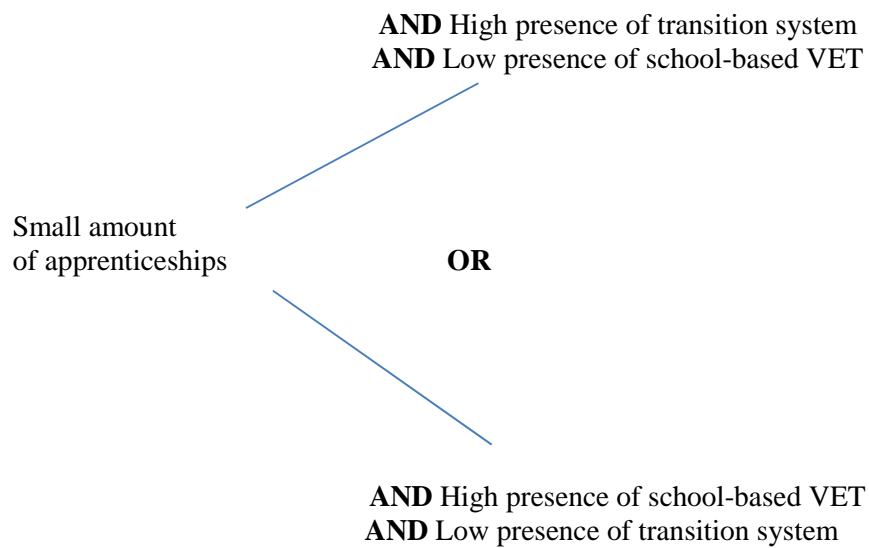
With these information patterns and configurations that are sufficient for a high ethnic inequality in VET can be identified. Using the Quine-McClusky Algorithm the conditions connected with the amount of ethnic inequality can be shown in a less complex but logical equivalent way.

Two different combinations of characteristics are connected with a large amount of ethnic inequality in VET (Figure 2). The Scatter plots (Figure 3/4) show the distribution of the 10 cases along the combination of the conditions and the outcome.

The large amount of ethnic inequality in Lower Saxony is explained by a small supply of apprenticeships in combination with a high presence of a transition system and a low presence of school-based VET (Figure 3). The second path which is a sufficient condition for the outcome high ethnic inequality in VET is a small supply of apprenticeships and a high presence of school-based VET with a low presence of a transition system. This path covers Berlin and other Germanys eastern federal states and North Rhine-Westphalia (Figure 4).

In order to compare the relevance of both paths with each other it is useful to take a look at the coefficients of raw coverage and unique coverage (Figure 3/4). 34 Percent of high ethnic inequality can be explained by a small amount of apprentice ships and a high presence of a transition system. 63 percent of federal states with a large amount of ethnic inequality in VET can be explained by a small supply of apprenticeships in combination with a high presence of school-based VET.

Figure 2: Minimal Solution of Sufficient Conditions for the Outcome High Degree of Ethnic Inequality in VET for 1.generation migrants (Complex Solution)⁸



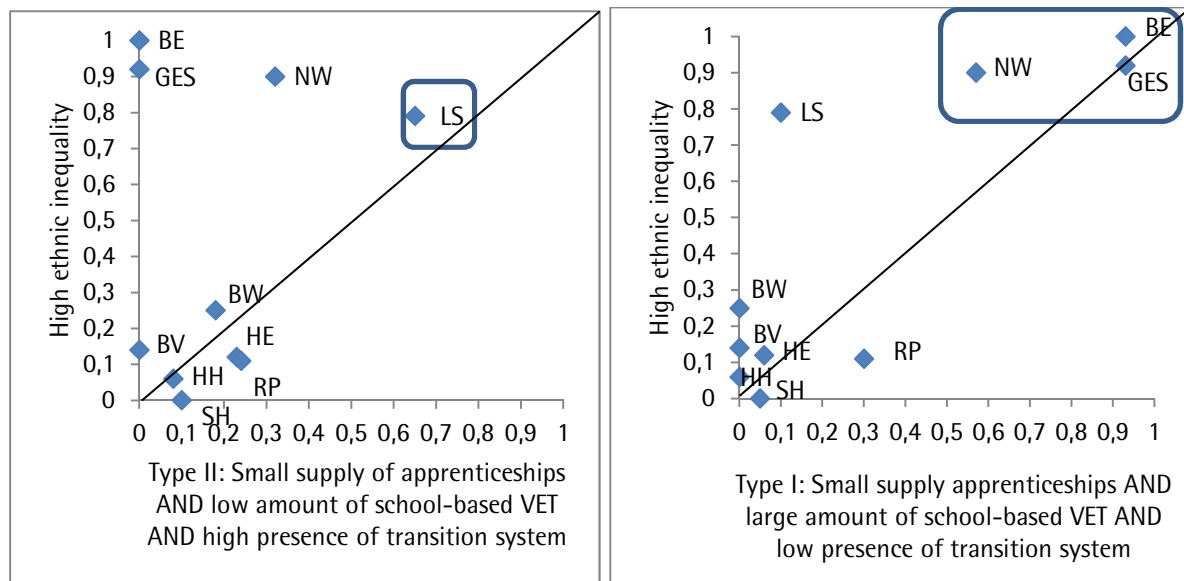
Solution Consistency: 0.89
Solution Coverage: 0.83

The two paths can explain all cases with a high outcome⁹. However, the results show that a small supply of apprenticeships is not a sufficient condition on its own. It needs either the combination with a high presence of a transition system or with a high presence of school-based VET.

⁸ Parsimonious Solution: small supply of apprenticeships and large amount of school-based VET; or small supply of apprenticeships and high presence of transition system.

⁹ The results are the same when taken the results for ethnic inequality from the weighted regression models in table 1 from appendix.

Figure 3: Sufficient Paths for the Outcome High Ethnic Inequality in VET – 1.generation migrants



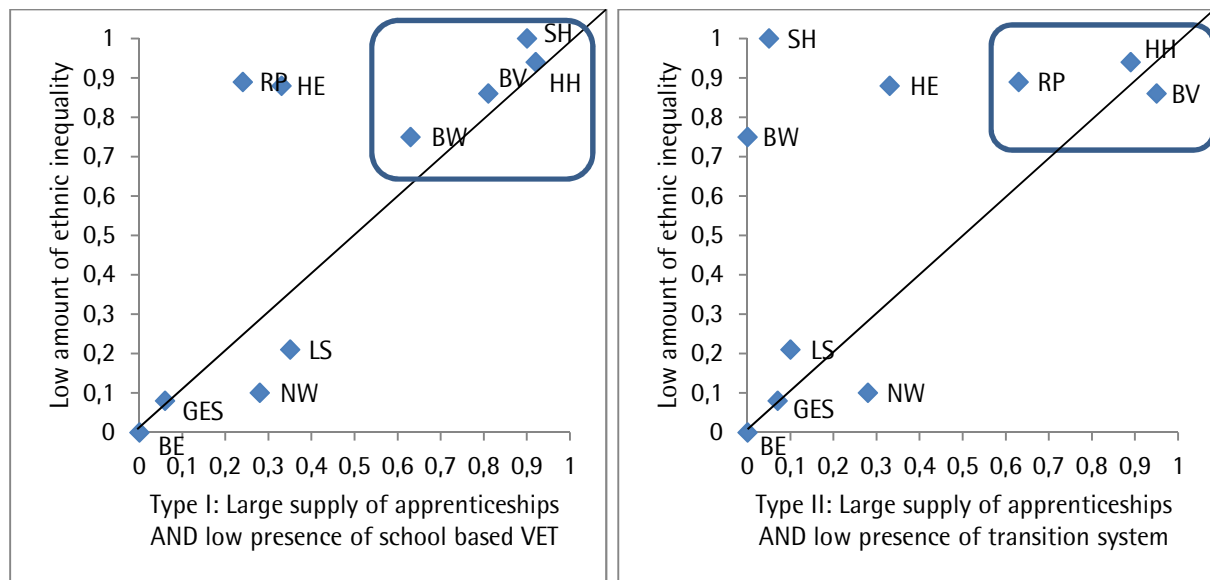
Raw Coverage: 0.34
 Unique Coverage: 0.20
 Consistency: 0.80

Raw Coverage: 0.63
 Unique Coverage: 0.49
 Consistency: 0.92

The next step is to test sufficient conditions for the outcome low ethnic inequality in VET. In this case, all conditions with a consistency higher than 0.87 are seen as sufficient. The analyses show, that low ethnic inequality in VET is achieved by the opposite of the characteristics that are connected with high ethnic inequality: a large supply of apprenticeships and a small amount of school-based VET or a large supply of apprenticeships and a small amount of transition programs (Figure 5).

However, it does not explain the small amount of ethnic inequality in the federal state of Hesse. This federal state might have other causes of ethnic inequality. Hesse is characterized by a relatively small supply of apprenticeships but does not compensate this with a higher presence of school-based VET or more transition programs.

Figure 5: Sufficient Paths for the Outcome Low Ethnic Inequality in VET – 1.generation migrants



Raw Coverage: 0.74
 Unique Coverage: 0.28
 Consistency: 0.93

Raw Coverage: 0.53
 Unique Coverage: 0.08
 Consistency: 0.92

All in all, the three characteristics of the VET system can explain ethnic inequality for 1.generation migrants in 9 out of 10 federal states.¹⁰

7 Conclusion

The present study investigated how the supply of apprenticeships and the presence of school-based VET or a transition system affect the level of ethnic inequality in VET for 1.generation migrants. Thus, this article differs from the earlier literature by focusing on institutional characteristics rather than on individual resources. Furthermore the analyses focused on regional disparities within Germany rather than on comparison with other countries.

In short, the findings of this analysis confirm, using fs/QCA, that ethnic inequality in VET for 1.generation migrants cannot be explained by a single factor but has multiple causes.

¹⁰ For 1.5/2.generation migrants no such pattern can be found. The reason for this might be that the variation of ethnic inequality for this group is not that large between Germany's federal states.

Factors that are connected to high ethnic inequality in VET are a small supply of apprenticeships in combination with a high presence of school-based VET and a low presence of a transition system. This is the case in Berlin and other eastern states and in North Rhine-Westphalia. On the other side, low ethnic inequality in VET is accomplished in federal states with a large supply of apprenticeships in combination with a low presence of school-based VET. In four federal states these conditions apply (Baden-Wuerttemberg, Bavaria, Schleswig-Holstein and Hamburg).

These findings stay in line with those from Seibert et al. (2009), who found a negative correlation of a high presence of school-based VET on the chances of migrants to get into VET. But the current study extends the knowledge by showing that a high presence of school-based VET only has an effect in the combination with a small supply of apprenticeships.

High ethnic inequality can also appear in another combination of conditions: A small supply of apprenticeships in combination with a high presence of a transition system and a small amount of school-based VET. This is the case in Lower Saxony. This fits to hypotheses of Eberhard and Ulrich (2011) who indicated that a high presence of a transition system might also be a possible determinant for ethnic inequality in VET.

The opposite is connected with a small amount of ethnic inequality: a large supply of apprenticeships and a low presence of a transition system. This is the case in Rhineland Palatinate, Hesse and Bavaria.

In both paths we can see that a small supply of apprenticeships alone does not necessarily lead to a high level of ethnic inequality in VET. This is only the case in combination with a high presence of school-based VET or a transition system.

However, the above discussed conditions do not explain the low ethnic inequality in the federal states of Hesse. Future research could focus on this federal states in order to learn more about their ability for structural integration of persons with migrant background.

Furthermore, research could profit from evaluations of special programs for persons with a migrant background to increase their chances for places in the VET system. Another reason for low ethnic inequality in VET could be for example programs like “Supplementary apprenticeships in organizations with migrant proprietors“ („Migranten schaffen zusätzliche Lehrstellen“ (TG S-H) in Schleswig-Holstein.

Several further conditions could also play a role. The fact that the number of conditions taken into the analysis would increase the number of possible combinations and therefore the number of combinations where there are no cases, limits the choice of conditions that can be analyzed. But further research could discuss the role of the prevalent economic sector. Furthermore, analysis could be done separating ethnic inequality in school-based VET and in the dual system. On this part research could also discuss differences of vocational schools between the federal states. Also effects of educational policies and contextual factors on different ethnic groups could be tested.

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APPENDIX

Table 1: Extent of Ethnic Inequality in VET

Federal State	AME on chances to be in VET	
	1.Generation Migrants	1.5/2.Generation Migrants
Berlin (BE)	-0.228***	-0.107**
North Rhine-Westphalia (NW)	-0.208***	-0.071***
Lower Saxony (LS)	-0.204***	-0.045
Baden-Wuerttemberg (BW)	-0.149***	-0.081***
Bavaria (BV)	-0.133***	-0.090***
Hesse (HE)	-0.123***	-0.103***
Rhineland Palatinate (RP)	-0.130*	-0.102**

Note: Controlled for age, sex, secondary school certificate and year of the survey. Weighted for different distributions of nationality groups in different federal states.

* : $p \leq 0.05$; ** : $p \leq 0.01$; *** : $p \leq 0.001$

Source: Own calculations, only young adults between 15 and 24 years, data set: Microcensus 2008-2010.

Reference categories: persons without migrant background.