

The transition behaviour from school to studies – Empirical evidence on the reasons of a delayed start of studies in Germany

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Abstract

The German education system is organised in a federal system, i.e. each of the 16 Federal States is solely responsible for the supply and financing of the university places. Offering a sufficient number of these places is important in achieving the aim of promoting academic education and increasing the participation opportunities in higher education. An elaborate planning and monitoring is hence necessary, that equally considers external factors such as demographic change as well as individual changes such as the propensity to study and the preferred starting point of the studies. While the reasons for the decision in favour of studies are well documented, the reasons for a delayed start of the study were less subject to empirical investigation. Using panel regressions with fixed effects the transition from school to studies can be explained for different time lags. It can be shown that the influences on the transition behaviour are manifold and vary with the kind of the admittance qualification (for university or for university of applied sciences) and the length of the time lag. Fast transitions are mainly supported by a high relative number of above average exams, a high share of people in need of long-term care as well as a high number of granted student loans (“Bafög”). Maintaining the school reform “G8” with a shortened schooling time, wage raises broadening the financial scope for a year abroad or a voluntary social year as well as an increase in the rate of vocational training tend to delay the start of studies by one year. A growing risk of unemployment especially enhance a later transition by prolonging the entrance in the job market with the related job hunt.

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1 Introduction

The German education system is organised in a federal system, i. e. each of the 16 Federal States (*Bundesländer*) is solely responsible for the specific organisation and structure of the education system. This also encompasses the supply and financing of the university places. Additionally, the Federal Government cooperates with the Federal States by means of political programmes and educational development schemes in order to promote academic education and to increase the participation opportunities in higher education.

For the provision of a sufficient number of university places an elaborate planning and monitoring is necessary that considers many different aspects: the demand for university places is influenced by external factors such as demographic change and individual factors such as the willingness to study. The latter includes also a time component – the timing of the enrolment. Thus, the need of university places depends on the number of school graduates who want to start their studies right away as well as on those past school leavers that waited one or more years.

Graduating from school with the university admittance qualification young people in Germany can choose between professional life, vocational education, studies and a combination of vocational training and studies (Schneider and Franke, 2014, p.8). In the period from 2000 to 2015 the share in young people that decided in favour of studies increased from 71 % to 74 % implying that the number of first-year students grew in average by 2.8 % p. a.¹ However, the decision for a study does not necessarily coincide with the start of the studies. The data (StBA, 2016) also shows that in 2011 only 62 % of the people who chose to study started their studies right after school. 24 % waited one year and 15 % waited two years or longer. Compared to the past there seems to be a tendency towards shortening the time lag, i.e. a growing number of people starts the studies right away. The supply of university places hence has to be adapted to changes in the demand and depends on the propensity to study and the preferred starting point of the studies.

The reasons for the decision in favour of studies are well documented (see e. g. Müller et al., 2011, Lörz and Schindler, 2016, Weßling, 2016). A good school performance (Marcel Helbig and Marczuk, 2015, Christofides et al., 2015), an academic background (Becker and Hecken, 2007, 2008, Schindler and Reimer, 2010, Björklund and Salvanes, 2011), immigrant origin (Cornelia Kristen and Kogan, 2008) and a high local supply of higher education institutions (Spiess and Wrohlich, 2010, Reimer, 2013) has been identified as the main drivers for studying in Germany.

Compared to that, the reasons for a delayed start of the study were less subject to empirical investigation. In a report of Mühlenweg et al. (2010) that mainly addresses the success of the “Bologna process” the transition behaviour is shortly discussed. The authors state that the transition rates primarily depends on the economic development and change with the business cycle (ibid., p.24). However, the survey on school leavers – regularly conducted by the German Centre for Higher Education Research and Science Studies – investigates the time period before and after students gain their university admittance qualification and suggests that the reasons for the time lags in the transition from school to studies are far more diverse and elaborate (Schneider and Franke, 2014). A more extensive explanatory approach for the time gaps in the transition from school to studies offer room for research.

This paper tries to make a start in contributing to the research potential and to provide

¹The information results from the statistics on higher education provided by the Federal Statistical Office (StBA, 2016).

empirical evidence in explaining the transition behaviour. The aim is to offer behavioural equations that explain the transition time of school leavers into university in order to enhance the planning of the necessary supply of university places and hence to improve the participation opportunities on higher education.

The transition from school to studies is modelled using a broad range of explanatory variables deducted from literature or surveys. They were integrated in panel regressions with fixed effects. It can be shown that the influences on the transition rates are manifold and vary with the kind of the admittance qualification (for university or for university of applied sciences) and the length of the time lag.

The remainder of the paper is structured as follows. Section 2 gives a short overview over the German education system and reasons for time lags between school and studies. In section 3 the modelling approach is specified: After a short introduction of the model, it follows a description of the operationalisation and the estimation procedure. Section 4 encompasses the results including their interpretation. The paper ends with the conclusion in section 5.

2 The transition from school to studies

The structure of the German education system is described in more detail in the next subsection including some first reasons for possible time lags between school and studies.² In subsection 2.2 a detailed analysis of reasons that could cause a delay in the start of studies is given.

2.1 The German education system and the related options for school leavers

The education system is individually organised by each Federal State. Nevertheless, the overall structure is quite similar: After four years of primary education, students have the choice between different types of secondary schools (see Figure 1). All degrees of these secondary schools enable the students for a vocational training, but only the upper secondary education (*Gymnasium*) leads to a university admittance qualification, the “Abitur”. At the moment the “Abitur” is obtained after 12 years of schooling. Thus, graduating from upper secondary schools offers the opportunity to study, to have a vocational training or to enter the labour market. If the decision is in favour of studying there is the option between universities and universities of applied sciences.³ There exist additional possibilities for studying without having an university admittance qualification: either by providing a special degree of professional qualification (after the vocational training) or by external exams.

The next steps after graduating from secondary education require some preparations. For the vocational education the students have to apply for a training occupation at a company that complies with the ordinance on vocational education and training.⁴ The vocational education normally starts in August or September. For studying the students

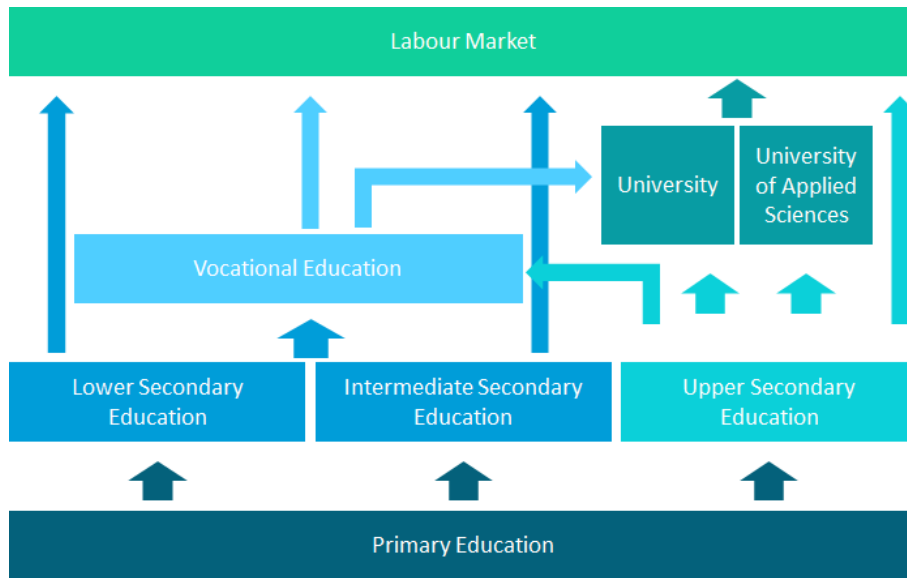
²To keep things simple, the description of the German education system focus on the school career that prepares for university.

³Universities aim at a more theoretical and research-based education with a broad range of disciplines. Universities of applied sciences have a more practice-oriented focus for a selection of disciplines such as engineering, business administration or social work.

⁴The ordinance regulates the vocational training on the job and the publicly provided vocational education in school.

need to select the subject and the university they want to apply for. Some subjects with extra restrictions require applications in July for enrolment in October. Additionally, universities of applied sciences often request the certificate of a subject related internship in advance. Due to the tight schedule between the end of school and the application for vocational education or studies, some students choose to wait for one year and fill the time gap with voluntary service, internship, military service or similar.

Figure 1: The education system in Germany



2.2 Reasons for time lags between university admittance qualification and university enrolment

The preceding subsection provides first indications for a prolonged transition between leaving school and university enrolment: application deadlines and a tight time schedule respectively as well as the roundabout way via a vocational education imply a delay of the start of studies.

Further reasons can be derived from a survey about the plans for the future of graduates holding an university admittance qualification. The German Centre for Higher Education Research and Science Studies (DZHW) conducts every two or three years the “DZHW Panel Study of School Leavers with a Higher Education Entrance Qualification” that aims at investigating the time period before and after students gain their university admittance qualification. The survey includes questions addressing the reasons for a delayed start of studies or vocational training. In the Panel Study referring to the 2012 cohort of graduates the two main reasons for a delay were the desire for a break after school and indecisiveness about the kind of professional career (Schneider and Franke, 2014, p. 47 ff.).⁵ Similar motives are a stay abroad, a year of voluntary work or earning money. Other

⁵The 2012 cohort of graduates is the latest available survey group. According to the online presence of the DZHW (<http://www.dzhw.eu/en>), the Panel Study of School Leavers with a Higher Education Entrance Qualification for 2015 is being conducted at the moment.

answers refer to obstacles in starting the desired studies such as admission restrictions, required preconditions (e.g. practical training), timing (determined starting time) or financing (ibid.). Compared to the 2010 cohort the reasons given for the time lag between graduation and post-school qualification changed mainly due to the end of the obligatory military service for male graduates in 2011 (ibid.). Before, the obligatory military service caused a delay of at least one year. Simultaneously, the demand for voluntary work and a year abroad increased in the 2012 cohort relative to the 2010 cohort and the reasons became more similar for male and female graduates (ibid.). The school reform starting in 2007 that implied a shortening of the schooling time by one year added to the transition period by increasing the indecisiveness of the graduates.⁶

Meyer et al. (2015) analysed in detail the effect of the one-year reduction in university preparatory schooling time on post-secondary education decisions. They showed that the students graduating from a more compressed school duration are less likely to start studying in the first year after high school graduation (ibid., p. 19). The authors explained the delayed university enrolment with the fact that the students feel less prepared or less oriented (ibid., p. 20). Instead, they would choose a year of voluntary service, go abroad or start a vocational education (ibid., p. 19). The results are similar to those given in Meyer and Thomsen (2016). One can hence assume that a shorter university preparatory schooling time leads to a time lag in the transition from school to studies of at least one year.

The immediate transition from school to studies can be supported by assistance during the application process: Castleman et al. (2014) show that especially students from low income brackets are more likely to enrol directly after high school if they take part in a counselling programme.

Weßling (2016) analysed the influence of the regional context for the transition to university education. She showed that a high visibility and traditionalism of local universities strengthen the school leavers' preference for university education (ibid., p. 168). As a consequence it becomes more likely that they enter university (ibid.).

3 Modelling approach

The theoretical findings described above were operationalised using official freely available data and a panel model approach. Both has been implemented into a model that aims at projecting the number of first-year students in Germany.

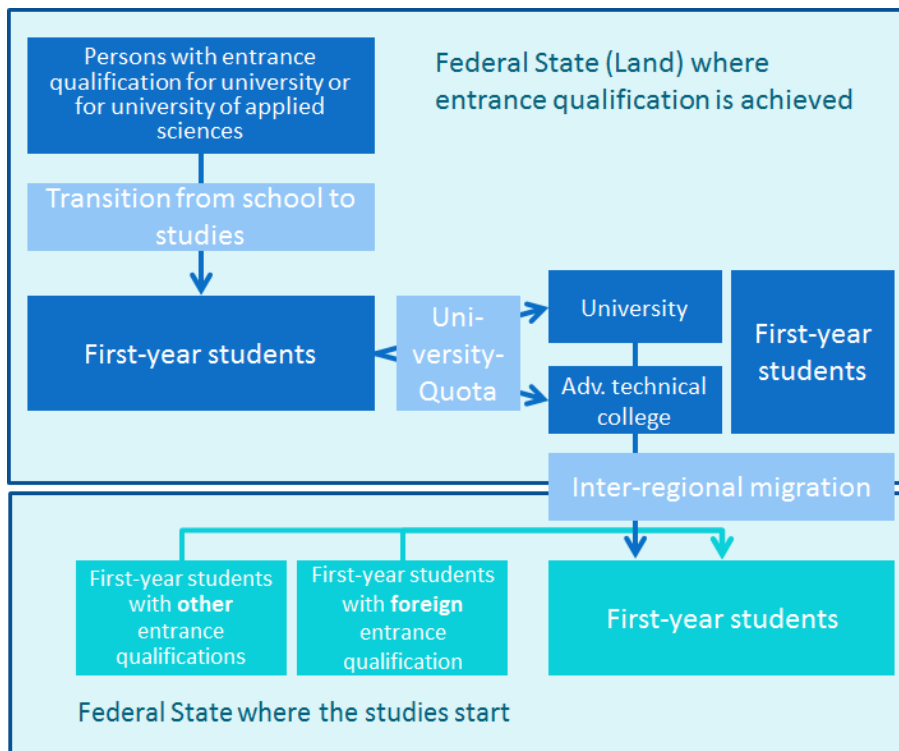
3.1 The model for estimating first-year students in Germany

The model for estimating the expected number of first-year students and needed university places in Germany was developed by the Standing Conference of the Ministers of Education and Cultural Affairs (KMK, 2014). The projection is demographically driven: The number of school leavers holding an university entrance qualification is exogenously given by KMK (2017) and determines after several transformations the overall number of first-year students. An overview is given in Figure 2. More precisely, the number of first

⁶The school reform called G8 addresses the university preparatory school shortening the schooling time of overall 13 years to 12 years. The time of the implementation rests with the 16 Federal States in Germany and is therefore different for each single State. It started in 2007 in Saxony-Anhalt. The last implementation took place in Schleswig-Holstein in 2016. For more details to that matter see Meyer et al. (2015, p. 2 ff.) or KMK(2014, p. 14).

year students (differentiated by the kind of university entrance admission) is the sum of the school leavers that decide to study immediately or that waited for one, two, three or at least four years with the start of study. The number of first year students are then distributed on universities and universities of applied sciences using a quota. In this part of the model the region (Federal State) is set by the location where the entrance qualification is achieved. However, more important for the estimation of the necessary number of university places is the location of the university. The transfer between the State of the entrance qualification and the State of the university is represented by the inter-regional migration matrix. The described modelling routine so far refers only to school leavers with university entrance qualifications received in Germany. First-year students with other or foreign entrance qualifications are added to the total number of first-year students using a fixed share in first-year students with German university entrance permission or keeping them constant respectively.⁷

Figure 2: The model structure for estimating first-year students in Germany



The model is based on many status quo assumptions indicated by the light blue boxes in the model overview of Figure 2: The school leavers' transition behaviour between completion of school and start of studies equals the average value of the last available three years (2013–2015) of the historical data set (1992–2015) and stays constant throughout the projection period (2016–2030). The university quota is set at the last available value of 2015 and the inter-regional migration is represented by the 3-years-average of the period 2013–2015 and held constant during the projection as well.

⁷A detailed model description is available in German language in Stöver (2017).

The constancy assumption of the school leavers’ transition behaviour was tested by a sensitivity analysis changing the estimation of the transition quota to a 5-years (SIM1), 6-years (SIM2) and 1-year (SIM3) average. The impact of these changes for the year 2030 is shown in Table 1. The values indicate the percentage deviation in the number of first year students compared to the results based on the original 3-years-average assumption. The changes in the number of first-year students due to a different choice of average-length vary across countries and range from a positive deviation of 1.2% to a negative deviation of -2.5%. Additionally, there exists no distinct pattern related to the sign and the amount of change. The Federal State Saarland for example experience in 2030 1.3% less first-year students than originally calculated if the transition quota is estimated using a 5-years-average. If a 6-years-average is taken the percentage difference to the baseline model results becomes smaller reaching -0.7%. Setting the last available transition quota constant (the 1-year-average of SIM3) the number of first-year students will even be higher (+1.2%) than in the baseline.

Table 1: Impact of different transition quotas (using a varying length of averages) on the total number of first-year students measured in percentage deviation from the baseline in 2030

	Number of first-year students	percentage deviation		
	BASIS	SIM1	SIM2	SIM3
Baden-Wuerttemberg	72012	-2.5	-2.2	0.4
Bavaria	69951	-0.5	-0.8	0.2
Berlin	37677	-1.3	-0.8	-0.4
Brandenburg	8984	-1.2	-0.7	-0.3
Bremen	6499	-1.1	-1.1	-0.0
Hamburg	16703	-0.8	-0.2	0.0
Hesse	39403	-2.0	-1.4	0.1
Mecklenburg-Western-Pomerania	7282	-0.5	0.4	0.1
Lower-Saxony	33022	-0.7	-0.8	0.5
North-Rhine-Westphalia	122018	-2.1	-1.3	-0.3
Rhineland-Palatinate	22669	-1.6	-1.0	0.8
Saarland	5570	-1.3	-0.7	1.2
Saxony	21600	-0.4	0.4	0.1
Saxony-Anhalt	9918	-0.4	0.4	-0.3
Schleswig-Holstein	10407	-0.1	0.9	-0.7
Thuringia	11592	-0.7	-0.1	-0.0
Germany	495307	-1.5	-1.0	0.0

The sensitivity results suggest that the quotas seem to change over time and in a different pace depending on the region. Furthermore, the results are sensitive to the choice of the length of the average. The transition quotas should hence be variable in time and for each region. Using econometric analysis the constancy assumption can be relaxed, so that the time lag depends endogenously on time trends or on other explanatory variables.

3.2 Data and operationalisation

The econometric estimation of the transition behaviour could be based on individual information using the survey results of the “DZHW Panel Study of School Leavers with a Higher Education Entrance Qualification” described in subsection 2.2. However, these data

set is not freely accessible. Alternatively, the published results from the survey (Schneider and Franke, 2014) can be operationalised using indicators on macro level. The indicators then act as explanatory variables in estimating the different transition quotas.

Thus, the dataset used in this study to endogenously estimate the transition behaviour of first-year students consists of freely available data provided by the Federal Statistical Office, the statistical offices of the Länder and the Office of the Standing Conference of the Ministers of Education and Cultural Affairs. It contains information on regional NUTS2 level, i. e. for each of the 16 Federal States and for the time period 2006–2015.

With this dataset the reasons for time lags between university admittance qualification and university enrolment given in subsection 2.2 were operationalised. Table 2 gives a summary of the explanatory variables, their connection to the determinants given in subsection 2.2 and the expected effects on the transition behaviour.

Table 2: Selected explanatory variables and expected effects on the dependent variables

Variable name	Content	Transition	Expected effect	Interdependency with transition behaviour
pante	Share in university admittance qualifications with grades better than average	fast transition (t= 0,1) slower transition (t = 2,3,4)	pos neg	Good grades increase the probability to fulfill the numerus clausus restrictions or qualification requirements and promote a faster start of studies. They also increase the overall probability for studies (Müller et al., 2009).
aendq	Share of single parents in total population	slow transition (t = 3,4)	pos	Households with single parents are characterised by low income levels, high risk of poverty and a precarious economic situation (Becker 2016). In this kind of households the financing of studies could pose a problem and lead to a delay of studies (earning money first or start with vocational training)
aungq	rate of vocational training	faster transition (t= 0,1,2) slow transition (t = 3,4)	neg pos	A vocational training needs about three years before a profession is achieved. Afterwards (or in some cases during the training), the option for supplementary studies exists. Starting a vocational training first hence delays the start of studies.
bafgq	share of students receiving the student loan "Bafög"	fast transition (t= 0,1)	pos	The student loan "Bafög" offers an opportunity to finance studies. The assumption is, that a high number of student loans decreases the probability of financial obstacles and foster a fast start of studies.
blgan	gross wages and salaries per employee	emmediate transition (t= 0) faster transition (t=1,2) slow transition (t=3,4)	neg pos pos/neg	Gross wages and salaries per employee is an indicator for disposable income. The assumption is that the higher the parents' income the more likely a year abroad, a break or voluntary work can be afforded and would hence result in a delay of one year. Simultaneously, high gross wages and salaries imply high indirect cost for studying that might inhibit the propensity to study.
sder	schooling time (0 = 9 years, 1 = 8 years)	emmediate transition (t= 0) slower transition (t = 1,2,3,4)	neg pos	Shorter schooling time leads to a delay of one year in the start of study, mainly due to the reasons "desired break after school" and "indecisiveness" (Meyer et al., 2015).
pfgeq	Share of people in need of long-term care	fast transition (t= 0,1) slower transition (t = 2,3,4)	neg pos	The variable is supposed to function as indicator for family- and health-related reasons that tend to prolong the transition into studies.
elq	unemployment rate (unemployed relative to labour force)	faster transition (t = 0,1,2) slow transition (t = 3,4)	pos/neg pos	In times of an unfavourable labour market due to high unemployment, studying could be a way to postpone job hunting (especially after the completion of a vocational training). Additionally, the cost of higher education will decrease with higher unemployment. But there also exists studies that suggest an increase in vocational training: After three years one holds an certificate for a proper profession which conveys a feeling of security (Fernández and Shioji, 2001).
hsde	density of universities (number of universities per 1000 qhm)	fast transition (t= 0,1)	pos	A high density of universities increases their visibility and create a favourable context for studying. School leavers are positively influenced by the academic background (Weßling, 2016). It can be assumed that the likelihood to study immediately or with only one year delay is positively influenced.
qster0t qster1t qster2t qster3t	share of graduates with enrolment in t=0,...,3	subsequent transition, i.e. t=1,...,4 for qster0t	neg	Supposing a maximum number of graduates that want or can start to study, the rates of a fast transition determine the remaining number of possible students for the subsequent longer transition times. Thus, an increase in the preceding transition rates should result in a decline in the subsequent rates.

3.3 Estimation of the transition from school to studies

The transition considering different time lags ($t = 0, \dots, t = 4(+)$) and university admittance qualifications (for university and for university of applied sciences) was estimated using regression models for panel data.⁸

Different models has been tested. In almost all cases Fixed Effects with Time-fixed Effects has to be preferred over Pooled OLS, Fixed Effects and Random Effects. Exceptions form the estimations for the transition of two years for school leavers with an university admittance qualification, the transition of three years for school leavers with admittance qualification for universities of applied sciences as wells as the transition of two years for school leavers with an admittance qualification for universities of applied sciences. In the first two cases Time-fixed Effects are not present, whereas in the last case a model with Random Effects is more convenient.

In a first step all explanatory variables given in Table 2 were included in each estimation function. Then each regression was reduced by subsequently excluding the insignificant variables. The performance and the results are given in the following section.

4 Results

The regression results for school leavers with an university entrance admission are depicted in Table 3 and Table 4. The estimation results for the transition behaviour of students holding an entrance admission for universities of applied sciences can be found in the Annex in Table 5 and Table 6.

Most of the independent variables of Table 2 show the expected effects on the transition behaviour of graduates with university entrance admission. A growing share of exams with above average grades (*pante*) increases the relative number of school leavers that start immediately with their studies. As a consequence, the share in people starting very late (after 3 or 4 years) tends to decrease. An additional interpretation for the decline in the late transition rates might be that students who did more poorly at school and hence do not comply with the admission restrictions are discouraged by the increasing number of good performing graduates and abstain from an application even after some years of waiting.

With regard to the gross wages and salaries per employee (*blgan*) a per capita increase affects a very early ($t = 0$) and a later ($t = 3$) transition negatively as well as a medium-term transition after one year positively. The higher income of the parents represented by the wage raises promote the possibility for a break by going abroad, engage in social work etc. The start of studies is hence delayed by most likely one year, consequently increasing the share of graduates starting the studies with a time lag of one year. As for the transition after three years the cost for higher education increase relative to the earning possibilities. Especially graduates having completed a vocational education after three years might find the labour market more attractive. The share of school leavers that enrol in university three years after their exams hence declines.

The identified retarding effects of a shorter more compressed schooling time described in subsection 2.2 are confirmed by the regression results as well. While the share of students directly enrolling in university is negatively affected by less years of upper secondary

⁸The transition with time lag t is represented as a quota, i. e. it shows the percentage number of students of the same year of the university admittance qualification who started their studies after t years.

education, the transition rates of two or more years show a positive relationship with the reduction in schooling time.

The variable “unemployment rate” has a negative impact on the relative number of students starting studies with one year delay but a positive one for time lags of three or more years. This suggests that with an increasingly unfavourable labour market the lower education costs are outweighed by the security aspects of a vocational training. After three years of vocational training the job hunting then seems to be postponed by the enrolment in university.

The density of universities is relevant in explaining the transition from school to university after one year and after four and more years. The positive effect on the short-term transition goes along with the description in Table 2: An academic background and favourable context for studying created by a high number of available universities in the respective Federal State seem to have a positive influence on a faster decision in favour of studies. The negative connection with the late transition suggests that more graduates start to study earlier reducing the transition rate of the late transition.

The effect of the share in students being enrolled prior to the considered transition rate is as expected. The higher the number of school leavers that already started their studies the lower becomes the relative number of students with later transitions. Especially the amount of direct starters (with $t = 0$) is relevant for the development of the other subsequent transition quotas. An exception to these findings is the positive relationship between the share in graduates starting their studies after two years with those showing a delay of three years.

Also different to what was expected behave the explanatory variables “share of single parents” (*aendq*), “rate of vocational training” (*aungq*) and “share of people in need of long-term care” (*pfgeq*).

While not affecting the early transition rates at all, an increasing share of single parents has a negative impact on the late transition of three or more years delay. The assumption that the start of studies is postponed due to the lack of financial resources cannot be confirmed. The missing impact in the years $t = 0..2$ indicates that various ways of financing such as funding, student jobs or the student loan “Bafög” offer enough opportunities to study, i. e. the German education system seems to be sufficiently open and accessible for all income brackets. A break of three or more years between the obtainment of the university admittance qualification and the start of studies suggests that the time was used for a vocational education that qualifies for professional work. The cost for not entering the labour market and earning money but starting studies instead becomes very high, especially when there might be no financial support from the parents. As a consequence, an increase in the number of single parents (including less financial support) could lead to a lower propensity to study after three years and reduces the share of students with a late transition into university.

An increasing rate of vocational training was supposed to have a negative impact on the share of school leavers with a faster transition and a positive effect on the share of those with a slower transition. But the regression results contain no significant coefficients for the share of graduates starting their studies after two years or later. Thus, there seems to be no direct connection between the completion of a vocational education and the subsequent start of complementary university studies. The impact on the share of students that directly enrol in university is negative and confirms the expected competitive link: An increasing number of school leavers starting a vocational training result in a lower number of students starting studies. For the transition rate with one year delay however, this

connection does not hold. The positive relation between vocational training and studies can be interpreted in the way that students that did not succeed in finding a training occupation start studying instead. An increasing share of graduates starting a vocational education intensifies the competition for the (interesting) training occupations and lowers hence the probability to find a training place in a company. Another interpretation might be that students back out of a vocational training after one year and start to study instead. With a growing share of vocational training the number of break-offs would most likely increase as well.

The explanatory variable “share of people in need of long-term care” shows complete adverse effects than are expected. The reason might be that the variable does not work as indicator for family- and health-related causes for a delayed start of studies. Other reasons might be, that graduates in need of caring for family members use studies as opportunity for continuing education, as the time management is more flexible than on the job. This group would not give family- and health-related problems as reason for a delay in the DZHW Panel Study (see subsection 2.2). If this group is bigger than the one indicating family-related reasons as the cause for the delay, the effect of the explaining variable becomes interpretable and comprehensible.

Overall, the regression results for the transition behaviour of students with an university entrance admission seem to be plausible and the independent variables explain a large part of the time lags between school and studies. For the estimations of the transition time of students with an entrance admission for universities of technical sciences, the coefficient of determination (R^2) is smaller (see Table 5 and Table 6 in the Annex), but most of the explanatory variables keep the same or similar effects. Nevertheless, some independent variables bear a different meaning or are of different importance.

While the variable *bafgg* – the share of students receiving the students loan Bafög – is of no importance for the transition time of students with an university entrance admission, it contributes to the explanatory power when addressing the behaviour of students with an entrance admission for universities of applied sciences. This suggests, that for them financing issues are more pressing and a higher number of granted student loans encourage the start of studies.

The rate of vocational training is given a higher priority as well and adds to the explanation of the dependent variables in four out of five cases (start of studies in $t = 0, \dots, 3$). The immediate start of studies is negatively affected while all other transition times show positive reactions. The practice-oriented structure of the studies in universities of applied sciences facilitates the combination of vocational training and studies which might be especially appealing to the graduates under consideration.

Also more often significant is the variable “density of universities” (*hsde*): it especially explains later starts of studies ($t = 2, 3, 4$). While an academical aura has a positive impact on the start of studies two to three years after school, the effect is negative for longer time spans. Due to the academic background, there seem to be a positive impulse or trigger that enhance the decision in favour of studies after e.g. the completion of a vocational training.

The transition rates prior to the estimated ones – e.g. the relative number of students immediately starting their studies (*qster0tfh*) as explanatory variable for the share in students starting one year later (*qster1tfh*) – have a positive impact and hence show a different behaviour than for the school leavers with university entrance admission. This suggests some kind of bandwagon or peer-group effect. The general choice in favour of studies is less common for school leavers with entrance admissions for universities of applied

sciences. In 2011, only 44.4% of these graduates did actually enrol in university. This is 41.6 percentage points less than for those with university entrance admission starting studies with an overall rate of 86%. Thus, the comparably low propensity to study of school leavers holding an entrance admission for universities of applied sciences suggest a wide scope for more first-year students. If studying becomes more popular in one year in combination with positive feedback and first-hand reports of the peer group, fellow graduates could be motivated or convinced to start studying as well. The experiences regarding the application process can be transmitted as well. The fellow students already enrolled in university then work as a kind of counsellor which has been identified as positive for the enrolment by Castleman et al. (2014). As a consequence, the previous years' transition rates have a positive effect on the subsequent ones.

Finally, the independent variables "share of people in need of long-term care" (*pfgeq*) and "schooling time" (*sder*) are less important or significant in explaining the transition behaviour of students with entrance admittance for universities of applied sciences.

Table 3: Panel model results for the transition with a lag of 0 to 2 years for students holding an university entrance admission

	<i>Dependent variable:</i>		
	transition in t=0	transition in t=1	transition in t=2
	(1)	(2)	(3)
pante	0.297*** (0.070)		
aungq	-0.548*** (0.130)	0.167* (0.089)	
blgan	-0.002*** (0.0003)	0.0004** (0.0002)	
sder	-6.083*** (0.609)		0.718*** (0.095)
pfgeq	4.485*** (1.205)		
elq		-0.656*** (0.133)	
hsde		0.170*** (0.045)	
qster0tah		-0.437*** (0.043)	-0.061*** (0.006)
d06	-12.638*** (1.500)	2.486* (1.280)	
d07	-9.951*** (1.363)	3.474*** (1.124)	
d08	-9.698*** (1.097)	3.317*** (0.945)	
d09	-10.296*** (0.911)	4.138*** (0.828)	
d10	-9.043*** (0.763)	4.148*** (0.686)	
Observations	160	144	128
R ²	0.898	0.859	0.525
Adjusted R ²	0.879	0.829	0.451
F Statistic	117.942*** (df = 10; 134)	71.874*** (df = 10; 118)	60.762*** (df = 2; 110)

Note:

*p<0.1; **p<0.05; ***p<0.01

Table 4: Panel model results for the transition with a lag of 3 or 4+ years for students holding an university entrance admission

	<i>Dependent variable:</i>	
	transition in t=3	transition in t=4
	(1)	(2)
pante	-0.023** (0.009)	-0.084*** (0.028)
aendq	-0.447** (0.173)	-1.359*** (0.423)
blgan	-0.0003** (0.0001)	
sder	0.371*** (0.096)	0.409* (0.213)
pfgeq	-0.644** (0.260)	-1.999** (0.925)
elq	0.143*** (0.028)	0.247*** (0.060)
qster1tah	-0.040*** (0.013)	
qster2tah	0.124** (0.057)	
d07	0.238*** (0.089)	
d08	0.767*** (0.143)	
hsde		-0.203*** (0.034)
d09	0.508*** (0.155)	-1.232*** (0.175)
d10	0.876*** (0.226)	-1.858*** (0.227)
d11	1.185*** (0.345)	-3.283*** (0.292)
d12	1.404*** (0.430)	
Observations	112	96
R ²	0.725	0.963
Adjusted R ²	0.628	0.951
F Statistic	15.444*** (df = 14; 82)	207.191*** (df = 9; 71)
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01	

5 Conclusion

The reasons found in literature and especially in the “DZHW”-survey for a delayed start of studies can be operationalised and used to explain the different transition quotas. The regressions give plausible results that helps to understand the transition behaviour and the related time lags between school and studies.

A first assessment regarding the development of the demand for university places can be made: An ongoing improvement in the performance of the school leavers indicated by an increase in the relative number of above average exams, the growing number of people in need of long-term care as well as a continuing willingness of the government to support students with the student loans “Bafög” are factors that support a very fast transition from school to studies. Maintaining the school reform “G8” with a shortened schooling time, wage raises broadening the financial scope for a year abroad or a voluntary social year as well as an increase in the rate of vocational training tend to delay the start of studies by one year. A growing risk of unemployment especially enhance a later transition by prolonging the entrance in the job market with the related job hunt.

As next steps in a future work it may be appropriate to test the predictive power of the regression functions. An implementation in the model for forecasting the first-year students until 2030 could possibly give more precise results. Next to that, it prevents the variation in the results that arises due to the free choice of the average length in the transition rates (as was shown in Table 1 in subsection 3.1).

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Appendix with supplementary tables

Table 5: Panel model results for the transition with a lag of 0 to 2 years for students holding an entrance admission for universities of applied sciences

	<i>Dependent variable:</i>		
	transition in t=0 (1)	transition in t=1 (2)	transition in t=2 (3)
aendq		2.506** (1.146)	
pante			-0.031** (0.013)
aungq	-1.026*** (0.230)	0.175* (0.090)	0.035** (0.016)
bafgq	0.785** (0.327)	0.294*** (0.106)	
elq	1.596*** (0.450)		
blgan		0.001*** (0.001)	0.00005* (0.00003)
hsde			0.034*** (0.009)
qster0tfh		0.271*** (0.024)	0.047*** (0.010)
d10		-2.389*** (0.611)	
d11		-5.328*** (0.893)	
d12		-5.791*** (1.164)	
d13	7.271*** (1.728)	-5.353*** (1.481)	
d14	9.352*** (1.955)	-5.511*** (1.870)	
d15	9.009*** (2.436)		
qster1tfh			0.184*** (0.023)
Constant			-2.205 (1.963)
Observations	160	144	128
R ²	0.398	0.664	0.699
Adjusted R ²	0.307	0.593	0.684
F Statistic	15.212*** (df = 6; 138)	23.365*** (df = 10; 118)	46.850*** (df = 6; 121)

Note:

*p<0.1; **p<0.05; ***p<0.01

Table 6: Panel model results for the transition with a lag of 3 or 4+ years for students holding an entrance admission for universities of applied sciences

	<i>Dependent variable:</i>	
	transition in t=3	transition in t=4
	(1)	(2)
pante	-0.075*** (0.020)	
aungq	0.048*** (0.014)	
bafgq	0.117*** (0.029)	
sder		0.880** (0.345)
elq		-0.195** (0.095)
hsde	0.034* (0.020)	-0.216*** (0.046)
qster0tfh	0.041** (0.016)	
qster1tfh		0.142* (0.076)
qster2tfh		0.444** (0.221)
d07		-0.828** (0.332)
d08		-1.699*** (0.422)
d09		-2.963*** (0.437)
d10		-3.927*** (0.489)
d11		-5.648*** (0.582)
Observations	112	96
R ²	0.289	0.887
Adjusted R ²	0.133	0.847
F Statistic	7.402*** (df = 5; 91)	55.168*** (df = 10; 70)

Note: *p<0.1; **p<0.05; ***p<0.01