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Early termination of vocational training: dropout or stopout?

Gabriele Wydra-Somaggio

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Gabriele Wydra-Somaggio (IAB)

Mit der Publikation von Forschungsberichten will das IAB der Fachöffentlichkeit Einblick in seine laufenden Arbeiten geben. Die Berichte sollen aber auch den Forscherinnen und Forschern einen unkomplizierten und raschen Zugang zum Markt verschaffen. Vor allem längere Zwischen- aber auch Endberichte aus der empirischen Projektarbeit bilden die Basis der Reihe.

By publishing the Forschungsberichte (Research Reports) IAB intends to give professional circles insights into its current work. At the same time the reports are aimed at providing researchers with quick and uncomplicated access to the market.

Erratum

I had to reestimate the models. Due to the inclusion of more persons, the odd-ratios changed. However, the (main) statements remain un-changed. I replaced the tables 1 to 4, and in the appendix the tables A1 and A2 and adapted the values in the text. I also adapted some statements (the pages refer to the previous version of the paper)

Page 12: I corrected the sentence „ in our further analysis, we exclude persons wihout Abitur“ into „ in our further analysis, we exclude persons wih Abitur“

Page 18: I deleted the references to the Models 4a and 4b as well as Model 5 and 6.

Page 20: I refer to Model 4 a and 4 b instead of 7. I deleted „.. that are estimated for all and seperated according to those who do not change the occupation and those who do (Models 8 and 9).“

I apologize for these circumstances.

Content

Abstract

This paper studies the factors that influence the beginning of either a new vocational training in another occupation (stopout) or the stop of vocational training altogether after an early termination (dropout of the vocational system). One influencing factor is the amount of the human capital acquired which is determined by the duration of (early terminated) vocational training. To analyse this for the German case, we use data (Ausbildungspanel Saarland) which contains detailed information about apprenticeship careers and their labour market outcomes for all apprentices between 1999 and 2002 in Saarland (a German federal state). 72 per cent of the premature terminations analysed here are stopouts. The estimations of robust logit-models show that early premature terminations and an above-average apprenticeship wage in the training occupation are more likely to lead to an apprenticeship stopout. Stopouts who terminate their contracts early on in the apprenticeship process are more likely to change their occupation.

Zusammenfassung

Der vorliegende Beitrag untersucht für Deutschland, welche Faktoren die Entscheidung beeinflussen nach einer vorzeitigen Vertragslösung, die Ausbildung in einem anderen Bereich fortzusetzen, also nur zu unterbrechen, oder aber ganz aus dem Ausbildungssystem auszuscheiden, also abzubrechen. Ein wichtiger Faktor ist die Höhe des erworbenen Humankapitals, die von der Dauer der (gelösten) Ausbildung bestimmt wird. Für die Untersuchung nutzen wir einen Datensatz, der detaillierte Informationen zum Ausbildungs- sowie zum weiteren Erwerbsverlauf für die Ausbildungskohorten zwischen 1999 und 2002 im Saarland enthält. 72 Prozent der Personen mit einer vorzeitigen Vertragslösung beginnt erneut eine Ausbildung, sind also Unterbrecher. Logitschätzungen zeigen, dass frühe Vertragslösungen und Ausbildungsvergütungen, die über dem Durchschnitt im Ausbildungberuf liegen, mit einer höheren Wahrscheinlichkeit nur zu einer Unterbrechung der Ausildung führen. Darüber hinaus werden Ausbildungen eher in anderen Berufen begonnen, wenn der Vertrag zu einem sehr frühen Zeitpunkt der Ausbildung gelöst wurde.

JEL Klassifikation: I21, (J24)

Keywords: Human Capital, German apprenticeship, dropouts

1 Background

Dropouts of educational system have negative consequences for individuals as well as for firms according to later labour market outcomes. Due to the lack of formal qualification, the likelihood of intermitted employment phases increases and potential of existing and future skilled workforce decreases. However persons who early terminate their educational investment are not necessarily dropouts, that means do not necessarily leave educational system ultimately. Often they continue their studies or vocational training at another field of study. In this case, despite the early termination of the first study or vocational training, a vocational degree can be received, which is needed to show the individual's occupational ability and secure a successful integration into the labour market. Furthermore temporary dropout sometimes enables the person to better match his or her abilities to the specific requirements. It is therefore necessary to distinguish between educational dropouts and stopouts (temporary dropouts). The decision for a further vocational training also depends on the amount of occupational knowledge invested which can be shown by the time at which time the vocational training is early terminated. Once the real dropout is identified, the reduction of their number may be enforced. This could be one way of securing and increasing the supply of skilled workers for the future.

Most studies particularly examine dropout decisions. Hence, reasons for educational dropouts (Stratton et al. 2008, Montmarquette et al. 2001, Gury 2011, Lassibille/Navarro Gomes 2008, Eckstein/Wolpin 1999, Kearney/Levine 2014, Coneus et al. 2011, for example) or their consequences for a person's future employment history (Rumberger/Lamb 2003, Campolieti et al. 2010, Bradley/Lenton 2007, Oreopoulos 2007, for example) have been examined in numerous studies. In these studies, the focus lies primarily on the connection between personal characteristics, such as education or family background, and a premature termination of high school or university. A few studies (Gury 2011, Stratton et al 2008, Mangan/Trendle 2008) differentiate between real educational dropouts and further educational investment decisions. The studies of Gury (2011) and Mangan/Trendle (2008) also include in the analysis the time at which the study was ended prematurely and ascribe a significant role to this with regard to dropouts and stopouts (those remaining in the educational system). These findings, namely, the relation between the point in time at which the study is terminated is significant, is important in order to learn more about the behaviour of further human capital investment. There are hardly any studies which analyse the impact of the point in time at which the vocational training terminate early (as an indicator of knowledge gained) on the likelihood of remaining in the system after early termination. The vocational training is therefore interesting as it is embedded in a standardised institutional setting in which the trainees and the training firms have a strong educational interaction. In this paper, we explore the significance of the point in time of the premature termination of the vocational training with regard to educational dropouts or educational stopouts. Hence the significance of the specific vocational knowledge gained, and likewise the significance of the monetary returns from

vocational training as a further indicator for specific vocational knowledge can be analysed. Furthermore, we also explore whether the point in time impacts on the successful completion of a further vocational, if it is a straightforward case of a stopout. Indicators of measures to be taken can be derived from the results so that those who terminate contracts prematurely can retain their options on the labour market.

This differentiation between educational dropouts and stopouts is made with the help of a unique data set, the Saarland Apprenticeship Panel (*Ausbildungspanel Saarland*) for apprenticeship training, as an application for vocational training, in Germany. Apprenticeship is the most common way to gain a vocational qualification. More than 50 per cent of a cohort start an apprenticeship after school, in Germany. Apprentices and firms enter into a contract which involves on-the-job-training as well as attendance at a school or college. Final qualifications conform to a standard which is recognised in the wider labour market. This guarantees a smooth transition into the labour market, as is demonstrated by the low unemployment rate amongst young people in Germany. An early termination followed by a dropout do not guaranty this smooth transition whereas an early termination followed by a stopout which leads to a vocational degree save the chance of a smooth transition. According to analyses based on the Saarland Apprenticeship Panel, no less than 72 per cent of those who terminate the contract start an apprenticeship again and save the chance of a smooth transition into labour market. Just under 56 per cent of these had terminated the contract in the first year of the apprenticeship. The time of the contract termination has a significant effect on the further course of any further apprenticeship. Logit regressions show that the earlier the contract is prematurely terminated, the greater the likelihood that the apprenticeship will only be interrupted. High earnings from an apprenticeship are more likely to lead to apprenticeship stopouts, and the apprenticeship is then continued in the same occupation but in a different company. Furthermore the point in time has a significant influence on the taking up of a subsequent apprenticeship in another occupation. A late premature interruption reduces the likelihood of a successful graduation of the subsequent apprenticeship training, but the chances of a successful apprenticeship qualification increase if the subsequent apprenticeship is continued in the same occupation.

This paper is structured as follows: Section 2 provides an initial overview of literature, followed by the theoretical explanations for education being terminated prematurely and the resulting likelihood of a further apprenticeship being started. Section 3 gives a description of the characteristics of premature contract terminations within the context of dual vocational education and training, and then presents the data set, the variables and the analytical method. The results are interpreted in Section 4, followed by the conclusion.

2 Reasons for premature contract terminations and ultimate dropouts

2.1 Review of literature

There are many studies exploring the factors influencing educational dropouts, such as family and educational background. So far, there have been few studies that analyse the duration of an apprenticeship until the point at which it is terminated. Apart from the educational background of the parents and the family situation, Gury (2011), for example, includes the years of study as an additional influencing factor to explain educational dropouts. Here, the influence of education and the family situation seems to change according to the point in time or the duration of the vocational training. Hence, the educational background is only of significance in the case of dropout decisions in the first two years of study, for example. According to Arulampalam et al. (2001), the length of training until medical studies are terminated is the factor to be explained. In this case, the focus also lies on the connection between educational and family background and educational dropout. Here, the influence of education decreases with the length of training before the dropout decision. Karmel and Mlotkowski (2010), on the other hand, identify poor general conditions within the apprenticeship and an unfavourable relationship with the instructor as reasons for an educational dropout. Other explanatory variables, such as alternative education or apprenticeships which lead to better paid jobs, have the same significance throughout the duration of the apprenticeship. Jacobson and Rosholm (2003) use a group of first-generation immigrants in Denmark to explore how the factors influencing the decision to drop out of an apprenticeship change during the course of the apprenticeship. The hazard rate with regard to leaving the apprenticeship is greater at the beginning of the apprenticeship than towards the end. Here, the dropout decision is primarily influenced by marital status changing over the course of time.

Stratton et al. (2008) are the only researchers to differentiate between long-term dropouts and short-term dropouts, or stopouts. They find that the likelihood of a dropout is greater than a stopout if the educational level is low, and that married men are more likely to be stopouts than dropouts.

To date, no studies have been conducted for the German apprenticeship training system that differentiate between stopouts and dropouts based on the time at which apprenticeship was ended prematurely. Therefore, we lay the focus on this differentiation in the following analysis, and clarify what significance the time at which contract is terminated has as an indicator of knowledge gained, and what significance the apprenticeship wage has as an indicator of monetary returns in connection with an apprenticeship stopout.

2.2 Theoretical background

According to human-capital theory, educational investments are made when their monetary returns exceed the costs (Becker 1962). The decision to make an educa-

tional investment is taken under the assumption of complete markets, which are characterised by symmetrical information, for example. Within human-capital theory, once they have been taken, educational decisions are not revised because the individuals are aware of all the information at all times.

However, in contrast to the model assumptions – at the start of the apprenticeship, the individual does not know everything and only gains more knowledge in the course of the apprenticeship, which enables him or her to revise the apprenticeship decision taken (Stratton et al. 2008). The aspect of revising an (educational) decision is allowed for in a different model. According to Manski (1989) and Montmarquette et al. (2001), educational decisions are described as experiments which can lead to the educational decision being either upheld or revised, which would mean an educational dropout or stopout, respectively. The idea here is that the decision made directly after school is based on a cost-benefit calculus for a further educational investment with incomplete information. School-leavers do not know how likely they are to complete their apprenticeship successfully (Gury 2011). At the start, for example, they cannot yet judge whether they know enough to do the apprenticeship. Furthermore, the individuals do not know what the conditions are in the educational institution (at the university or in the company). To reduce this information deficit, school-leavers have to begin the training they have chosen in order to learn new information with regard to concrete educational requirements, such as the learning and working environment, aspects concerning content or specialist aspects, and concerning formal requirements (Karmel/Mlotkowski 2010, Snell/Hart 2008, Schöngen 2003). Based on the new information learned, they can decide at the start whether or not the apprenticeship was what they had envisaged. With information which is continuously accumulated during the apprenticeship, the individuals are put in the position of constantly reappraising their educational decision and thus the cost-benefit ratio (see Mangan/Trendle 2008, for example). In this way, educational decisions can be reassessed based on the costs that had been estimated and the earnings expected at the start of the apprenticeship. If the individuals come to a different result during the apprenticeship than they did at the start, they will leave the educational path they have been pursuing or they will strike a new educational path. The result depends on the type of new information learned (Jacobson/Rosholm 2003).

The consequence of the revised educational decision can be an educational dropout – leaving the education system and entering the labour market – or a stopout – continuing the apprenticeship in a different area. Although the theoretical background primarily explains premature termination, conclusions can be drawn regarding the beginning of a further apprenticeship or the dropping out of the education system. If the new information learned is ascribed more to company conditions (bad relationship with the instructor, poor apprenticeship conditions, company closures) or to apprenticed occupation itself, a stopout is likely. The new apprenticeship can be a better match than the first one. If the individuals realise that they lack the skills necessary for the apprenticeship (because they do not obtain good results in intermediate examinations, for example), an educational dropout is likely.

New information is learned continuously throughout the apprenticeship. Accordingly, the individuals repeatedly reassess their decisions over the course of the apprenticeship. Here, information regarding the decision as to whether to interrupt the apprenticeship or whether to drop out should be evaluated in different ways, because the longer the educational investment takes, the more costs will already have been incurred. The individuals relinquish a higher wage or salary (opportunity costs) which would have been paid if they had not been doing the apprenticeship. However, as the apprenticeship progresses, the occupational knowledge also increases, which leads to higher productivity. The monetary returns likewise increase. They move closer to the goal of obtaining a formal qualification. Hence, the later the premature contract termination occurs, the higher the future earnings which are forfeited, as these cannot be gained due to the lack of a qualification.

Against this background it can be assumed that an educational dropout becomes more likely than an educational stopout the later the premature termination of the apprenticeship occurs or the greater the knowledge gained is, because it cannot be used in the new apprenticeship and thus becomes defunct. Monetary returns increase the likelihood of an apprenticeship stopout as they are already apparent during the apprenticeship. This connection should also apply in separate observations of apprenticeships started in the same occupation and those started in a different occupation. However, an educational stopout can still lead to an ultimate educational dropout if the subsequent apprenticeship started is not completed successfully. The same assumption also applies here: the later the premature end of the apprenticeship, the less likely it is that the new apprenticeship will be completed successfully, and the more likely an ultimate dropout will be. It is also assumed that this connection will be present when taking into account whether or not the second apprenticeship is continued in the same occupation after a stopout or in a different occupation. That means, the later the premature termination of the apprenticeship (and the higher the monetary returns paid in an apprenticeship), the more likely it is that the individual will remain in the occupation in which he/she has trained if he/she starts another apprenticeship and completes it successfully. In the following, we examine whether the theoretical connection between the time of the premature end of the apprenticeship and also the monetary returns from the apprenticeship and the continuation or successful completion of an apprenticeship also applies to apprenticeship training in Germany.

3 Empirical basis

3.1 Institutional background: Dual vocational education and training

For over a third of those leaving school in the same year (see Autorengruppe Bildungsberichterstattung 2016), the dual vocational education and training system in Germany still leads to a formal occupational qualification which provides apprentices graduates with good employment prospects. This qualification is obtained by a combination of attending college and working at a company that offers training for apprentices, where general and specific (occupation-based) knowledge and skills are

taught over the course of two, three or three and a half years depending on the occupation. Depending on the occupation and the company offering the apprenticeship, the apprenticeship begins between August and October each year and is remunerated with an apprenticeship wage.1 The apprenticeship is based on the contract concluded between the apprentice and the company offering the apprenticeship. Because of the employment relationship between the company and the apprentice, school-leavers have to apply for a position as an apprentice. The company offering the apprenticeship conducts interviews to select the school-leavers who best suit the apprenticeship requirements and high chances of success are accordingly made more likely. The result of the interviews is also that school-leavers are selected by training firms for apprenticed occupations. In this way, apprentices with weaker skills can also be successful in their apprenticeship.2 Nevertheless, this selection process can lead to a low level of satisfaction with the apprenticeship situation and therefore increase the likelihood of a premature contract termination (see Beinke 2011, for example), because the personal skills available are not enough to meet the requirements of the desired occupation and the individual therefore has to train for an occupation which is not his/her preferred choice.[3] Premature terminations for this reason primarily occur at the start of the apprenticeship due to institutional and legal conditions, for instance during the trial period, which can last for up to four months from the start of the apprenticeship. Within this time period, notice can be given by both the apprentice and the company without a notice period having to be complied with or a reason needing to be given for notice being handed in. After that, a notice period of four weeks applies. A premature contract termination can also occur later, however. This can happen for operational reasons such as a poor working relationship between the instructor and the apprentice or the insolvency of the company providing the apprenticeship or repeatedly failed (intermediate) examinations.

3.2 Data set

The Saarland Apprenticeship Panel was generated from the Integrated Employment Biographies (IEB) of the Institute for Employment Research (IAB) and information from the Saarland Chamber of Industry and Commerce (IHK) and Chamber of Trade (HWK).[4] It includes all apprentices doing apprenticeships in companies in Saarland for at least one day between the years of 1999 and 2002 (see Wydra-Somaggio 2015 for more detailed information). The information about the employment history covers the years up until 2012. Although the panel pertaining to Saarland only illustrates one federal state, it can be assumed that the findings also apply at least to the federal

1 The apprenticeship wage is between €241 / €379 (hairdresser in the first year of apprenticeship in East Germany/West Germany) and €987 / €1017 (production mechanic in the first year of apprenticeship in East Germany/West Germany), depending on the apprenticed occupation and the year of the apprenticeship.

2 In contrast to the study by Campolieti (2010), the effect of an overestimation of one's own abilities should be smaller for apprentices in the apprenticeship training system.

3 Here, it is primarily school-leavers with weaker skills that have less opportunity to train in their desired occupation (e.g. Boockmann et al 2014, Protsch/Dieckhoff 2011).

4 Saarland is the smallest Federal State in the Western of Germany. There is only one chamber district for each considered chamber. Therefore the Saarland Apprenticeship Panel covers all the apprentices in this Federal State.

states in western Germany, as the Saarland economic structure is now more closely aligned to that of western Germany due to the structural change. The structure of the apprenticed occupations also corresponds to that of other states in western Germany. The results are not valid for eastern Germany, as another tradition is present in the educational system.

Hence, the IEB was supplemented with important information from the IHK and HWK on the course of the apprenticeship which is relevant to entry into employment and the further employment trajectory. With the Saarland Apprenticeship Panel a data-set is generated which can be used to make an exact analysis of premature contract terminations and further employment trajectories. Due to corresponding information on the termination of an apprenticeship, successful apprenticeships and likewise premature contract terminations can be determined to the exact day. The IEB provide information on the first years in employment after completion of an apprenticeship. This includes precise dates regarding time spent in apprenticeship, employment, measures and unemployment, and detailed personal characteristics (for more precise information, see Oberschachtsiek et. al 2009). As the apprenticeship training is completed in the company offering the apprenticeship, the conditions of the training firm have an influence on its success. In analyses of premature terminations in the case of apprenticeship training, it is therefore necessary to attach greater importance to the company characteristics than would be the case with dropouts from vocational training or higher education. The data set is used to add firm-specific aspects to prior studies to show a comprehensive picture of the connection between the conditions of the training firm during the apprenticeship and the trajectory after a premature contract terminations.

For this analysis, all apprentices beginning their apprenticeship in Saarland between 1999 and 2002 are taken into account. Apprentices who complete their training but end it without a qualification, who are known as repeaters, are not included in the further analysis. Those who are listed as apprentices in an apprenticed occupation but never began this apprenticeship are also left out of the analysis. Likewise, apprentices who interrupt their apprenticeship and then continue in the same company and apprenticed occupation do not count as persons terminating the contract, and are therefore not included in the assessment. Furthermore, the analysis requires that the apprenticeship done by each individual can be clearly identified as his or her first training position. This means that persons with information on the apprenticeship in the IEB which lies before the apprenticeship in connection with one the two considered Chamber are not observed, as they could already terminate an apprenticeship training in another Chamber district. Only apprentices where the start of the apprenticeship tallies in both data sources (Chamber data and IEB) are included in the analysis. Furthermore, those cases where the end of the apprenticeship clearly differs in the two data sources are also not included. If apprentices are recorded with apprenticeships in both regional Chambers, these are not included either. Ultimately, the

apprentices that are included in the analysis are only those who have started a standard apprenticeship – which is not funded – and who were younger than 23 when they began the apprenticeship (see Table A1 in the Appendix).

3.3 Methodology

For the question at hand – apprenticeship stopout or apprenticeship dropout – it is particularly important whether a further apprenticeship was begun after a premature termination or not. The apprenticeship information from the IEB is used for this aspect, as the second apprenticeship may also be started outside the region to which the Chamber is attached, and so the Chamber may not have information on all subsequent apprenticeships. Identification using the Chamber information available would not take all subsequent apprenticeships into account, which would lead to the biased results. Therefore, the second apprenticeship is defined using the information in the IEB. As there is no direct information in the IEB to determine the successful completion of an apprenticeship, this is determined by the change in the occupational position (employed with vocational degree) and the duration of the apprenticeship (at least 730 days). This means that in contrast to other data sets, the Saarland Apprenticeship Panel can be used to differentiate between apprenticeship stopouts and ultimate apprenticeship dropouts. The long time series spanned by the panel makes it possible to identify apparent apprenticeship dropouts as apprenticeship stopouts if the subsequent apprenticeship is not begun until several years after the premature contract termination (see Stratton et al. 2008). Apprenticeship stopouts are defined as such if the subsequent apprenticeship takes place in a different company and/or apprenticed occupation. This also corresponds to the definition of the variable to be explained, which differentiates between a further apprenticeship (stopout) and no further apprenticeship (dropout).

The time of the contract termination is included in the estimation models as the explanatory variable in order to estimate the influence on the start of a new apprenticeship. Four categories are differentiated: a premature contract termination in the trial period (first four months of the apprenticeship), in the second half of the first year of the apprenticeship, in the second year of the apprenticeship and in the third/fourth year of the apprenticeship. The costs of the apprenticeship are not recorded in the data set, but the daily wage of each apprentice is provided, which can be interpreted as individual returns from the apprenticeship. The individual daily wage at the time of the contract termination is categorised. A difference is made between wages which lie above the average of all daily wages according to years of apprenticeship and apprenticed occupations and those which lie below it.

The school qualifications obtained are included as a further control variable. It is to be assumed that apprentices with low school qualifications are more likely to drop out of the apprenticeship after a contract termination than to interrupt it. However, it is also conceivable that apprentices with higher qualifications will terminate their contract prematurely if they were not able to start their apprenticeship in their desired occupa-

tion despite their higher qualifications. Here, they could be given the chance to complete the apprenticeship of their choice afterwards. This must particularly be viewed with a discerning eye in the case of school-leavers with *Abitur*, who may terminate their contract prematurely because they will start studying for a degree at university. The decision to terminate apprenticeship early is not independent on the fact of starting another study or vocational training. Apprentices without *Abitur*, on the other hand, may decide to do another apprenticeship after deciding on a premature termination. It is therefore to be assumed that this decision is independent of whether a new place as an apprentice has been granted, as the decision to terminate the contract is made before a new apprenticeship is sought.[5] To handle with this eventual endogeneity, in our further analysis we exclude persons with *Abitur*. The apprenticed occupation has a decisive influence on the decision to terminate a contract (Rohrbach-Schmidt/Uhly 2015). It is to be assumed that it also influences whether a new apprenticeship is started. Either the individual uses the second apprenticeship to continue searching for the best occupation to suit him/her or leaves the apprenticeship training system for good. However this is more likely for training occupation with a duration of two years. Due to their shorter duration less ability is required and can be learned. For a better comparison between the different levels of apprenticeships, it is only apprentices in apprenticed occupations lasting for three or three and a half years that are observed. Furthermore, the share of early termination in a training occupation may also impact the decision to take up a further apprenticeship. If the share of early termination is high, it could be explained rather with the content of training occupation than by apprentices' ability. So apprentices in a first training occupation with high early termination rates should be more likely to attend a subsequent apprenticeship. The size and industry of the company offering the apprenticeship are also included in the estimation as control variables. Table A2 shows the distribution of the characteristics mentioned in the group observed.

The connection between educational stopouts and the characteristics is tested using a robust binary logit model. The influences of the explanatory variables are estimated as an odds ratio. They give the relative probability in relation to the reference category of a respective explanatory variable. A multilevel logit model was likewise estimated to allow for the aspect that the frequency of terminations is above-average in certain occupations. This may be due to the content of the apprenticed occupation begun, which does not match what the apprentice had imagined, or it can also be poor working conditions (such as shift work). In this case, the apprenticeship stopout depends on the distribution of personal and operational characteristics within the apprenticed

[5] After the trial period, the notice period also plays a role, as in this period the current apprenticeship is continued, but at the same time, an individual can search for a new apprenticeship.

occupations, which can differ greatly.[6] Apprenticed occupations can therefore be seen as being superior to personal and operational characteristics.

4 Empirical results

4.1 Apprenticeship stopouts or dropouts

It is primarily men and apprentices with low school qualifications who terminate contracts prematurely. The average age at which contracts are terminated is between 18.4. Almost half of the contract terminations are performed by apprentices in their first year of apprenticeship who began their apprenticeship in a small company with fewer than 10 employees. Approximately 37 per cent of those who terminated their contracts prematurely earned a wage that was above-average for the apprenticed occupation and the first year of apprenticeship, and about 45 per cent of those terminating their contracts in the second year of the apprenticeship earned an above-average wage.

Table 1
Characteristics according to time of premature contract termination

Time of contract t	First year of apprenticeship		**Second year of apprenticeship**	**Third/Fourth year of apprenticeship**	**Total**
		trial period			
Men in %	61.2	*58.0*	72.6	77.7	68.1
Low school qualification in % (Hauptschule and lower)	*75.4*	*75.7*	*74.9*	*86.6*	77.0
Small companies in % (< 10 employees)	46.0	*47.3*	40.4	40.2	43.4
Large companies in % (>= 250 employees)	6.3	*6.7*	9.3	9.2	7.6
Above-average wage on contract termination in %	37.5	*36.8*	45.3	33.9	39.4
Apprenticeship dropout in %	24.7	*23.4*	29.6	38.6	28.3
Apprenticeship stopout in %	75.3	*76.6*	70.4	61.4	71.7
Apprenticeship with change of occupation in %	*53.7*	*53.5*	*48.8*	*39.2*	*49.6*
Apprenticeship without change of occupation in %	*46.3*	*46.5*	*51.2*	*60.1*	*50.4*
Cases (Number)	1372	*581*	777	381	2221

Source: Saarland Apprenticeship Panel, author's own calculations

[6] A clear segmentation of the apprenticed occupations can be identified on the labour market, particularly with regard to schooling. In the apprenticeship as a bank administrator, for example, 96 per cent of the apprentices have obtained an *Abitur* certificate, while around 75 per cent of the hairdressers have qualifications no higher than a school-leaving certificate from a *Hauptschule* (lower secondary school) (see Buch/Wydra-Somaggio 2013).

Of the premature contract terminations, 72 per cent are apprenticeship stopouts. About 28 per cent are apprenticeship dropouts, who, by definition, leave the apprenticeship training system completely.

75 per cent of those who terminate the apprenticeship contract during the first year of apprenticeship start a subsequent apprenticeship. If apprentices terminate their contract in the final year of their apprenticeship, only around 61 per cent continue in the apprenticeship training system. The sooner the contract termination takes place, the higher the proportion of those who start another apprenticeship.

The second apprenticeship can be continued in the same occupation or begun in a different one. The percentage of apprenticeship stopouts with or without a change of occupation is connected to the time the contract is terminated: if the apprentice stays in the apprenticed occupation, the knowledge specific to the occupation which was gained up until the contract termination can be used further, but in the case of an apprenticeship in another occupation it cannot. Of the apprenticeship stopouts who terminated the contract in the first year of the apprenticeship, almost 54 per cent begin their second apprenticeship in a different occupation, compared to only 39 per cent of those terminating their contract in the final year of the apprenticeship. A negative connection between apprenticeship stopout with a change of occupation and the time of the contract termination can be observed.

The logit model in the following shows whether these connections between apprenticeship stopout or dropout and the time of the premature contract termination are of significance.

Table 2
Logit model to calculate the probability of a further apprenticeship being started after a contract termination (odds ratio, robust)

Variables	All			*Apprentice-ship with change of occupation*	*Apprentice-ship without change of occupation*
	Model 1a	**Model 1b**	**Model 1c**	**Model 2**	**Model 3**
Time of premature apprenticeship contract termination					
Trial period (reference)					
First year of apprenticeship	0.885	0.885	0.916	0.881	0.903
	(-0.96)	(-0.94)	(-0.66)	(-0.86)	(-0.67)
Second year of apprenticeship	0.727***	0.683***	0.707**	0.653***	0.777*
	(-2.54)	(-2.99)	(-2.65)	(-2.82)	(-1.67)
Third/Fourth year of apprenticeship	0.486***	0.480***	0.468***	0.303***	0.698**
	(-5.01)	(-4.95)	(-5.00)	(-6.58)	(-2.05)
Logarithmised apprenticeship earnings		1.510***	1.271**	1.175	1.392***
		(4.34)	(2.29)	(1.36)	(2.78)
Schooling					
Hauptschule qualification (lower secondary school) *(reference)*					
Mittlere Reife upper secondary school)		1.420***	1.476***	1.325*	1.607***
		(3.08)	(3.24)	(1.94)	(3.55)
Individual characteristics		yes	yes	yes	yes
Duration of apprenticeship for occupation			yes	yes	yes
Company size			yes	yes	yes
Industry			yes	yes	yes
Start of apprenticeship			yes	yes	yes
N	2,530	2,530	2,530	1,630	1,616
Pseudo R^2	0.0097***	0.0276***	0.0600***	0.0970***	0.0524***

* p<0.10, ** p<0.05, *** p<0.01

* between 5 and 12 months after start of apprenticeship

Source: Saarland Apprenticeship Panel

To confirm the assumption, that a later premature contract termination is more likely followed by a dropout rather than by a stopout, Model 1 shows the net impact of time

(Model 1a) and the impact controlled by apprenticeship earnings respectively schooling (Model 1b) and firm characteristics on the likelihood of a stopout. It makes no difference to the probability of a new apprenticeship being started whether the contract was terminated in the trial period or in the second half of the first year of the apprenticeship (Model 1a, 1b and 1c). In contrast, the odds-ratio of a termination in the second year of apprenticeship is 0,727 (Model 1a). That means, the probability of a subsequent apprenticeship being started by those who terminate the contract prematurely in the second year of the apprenticeship is only about 73 per cent compared to those who terminate the contract in the trial period. There is only a 49 per cent probability of a further apprenticeship after a premature contract termination in the final year of the apprenticeship. In Model 1b and 1c the probabilities of time of premature termination slightly decline. The later the contract termination occurs, the stronger the connection becomes. Even when the other control variables are taken into account, this connection is revealed to be significant. Model 1b additionally checks the assumption that a higher monetary returns are gained until the termination, the more likely a stopout is. The above-average apprenticeship earnings gained in the case of premature contract terminations have a significant influence: the higher the earnings, the higher the probability of a subsequent apprenticeship after a premature termination. However, the odds-ratio becomes smaller whereas the influence remains as strong as in Model 1b, if the occupational and company characteristics of the apprenticeship earnings are considered (Model 1c). Likewise, there is a significant connection between schooling and the starting of a further apprenticeship (Model 1b). Those with *mittlere Reife* (roughly equivalent to upper secondary school) show a 42 per cent higher likelihood of remaining in the apprenticeship training system than those with a *Hauptschule* certificate (general school-leaving certificate at the age of 16, lower secondary school). Even if occupational and firm characteristics are taken into account, the time of contract terminations and schooling continue to significantly influence the likelihood of a subsequent apprenticeship (Model 1c).

Model 2 and 3 checks the assumptions by separately estimating persons changing occupation and those who do not. The estimations show that the influencing factors have a different significance for the apprenticeship stopout – whether this occurs with or without a change in occupation. The time of the contract termination has a significant influence on the apprenticeship stopout with a change in occupation: apprentices who have prematurely terminate their contract in the second year of the apprenticeship are 65 per cent less likely to start an apprenticeship in a new occupation than apprentices with a contract termination during the trial period, while the probability among those terminating the contract in the final year is 30 per cent. The later the contract is terminated, the less likely it is that the new apprenticeship will be started in a new apprenticed occupation (Model 2). Among the apprenticeship stopouts who continue their apprenticeship in the same occupation (Model 3), on the other hand, the wage earned up until the contract termination is significant. Those who terminate the contract with monetary returns that are higher than average are 39 per cent more

likely to continue an apprenticeship in the same occupation than those who terminate the contract and earn less than the average.

Overall, the assumption that a negative connection between the time of the contract termination and the probability of starting another apprenticeship exists is confirmed. The sooner the first apprenticeship contract is prematurely terminated, the more unlikely an apprenticeship dropout and the more likely an apprenticeship stopout becomes, because when the contract termination occurs at an earlier stage, not much has yet been invested in the apprenticeship. Accordingly, the monetary returns or the productivity and the knowledge gained that may be lost under the circumstances are also low. In the case of premature contract terminations at a later juncture, on the other hand, a great deal has already been invested in the apprenticeship and more knowledge has been gained. Starting another apprenticeship means that educational investments have to be made in full once again if the new apprenticeship is not continued in the same apprenticed occupation as before. An apprenticeship dropout at a later juncture reduces the costs at least in the short term, because the wage paid for unskilled work is higher than the apprenticeship wage. In the long term, however, the lack of formal qualifications will have a negative effect on the success on the labour market (see Gesthuizen/Solga 2014, for example), as the chances of obtaining (more highly paid) skilled work are low. When observing apprenticeship stopouts with and without a change in occupation separately, a different significance is shown between the time of the premature contract termination and thus the knowledge gained and the monetary returns from the apprenticeship. In the case of apprenticeship stopouts with a change of occupation, the knowledge gained cannot be used, and goes to waste. The earlier the point in time and the smaller the amount of knowledge gained, the less goes to waste. In the case of apprenticeship stopouts without a change of occupation, the apprenticeship earnings are of great significance because they continue and are achieved as a result of a qualification. In conclusion, the theoretical assumption, that the later the premature contract termination occurs, the more likely becomes a dropout, can be confirmed. Also, the second assumption is confirmed, a late premature termination of the apprenticeship and high monetary returns, yield more likely a stopout decision as well as proceeding the subsequent apprenticeship in the same occupation.

Robustness checks

The estimations of the multilevel logit model yield robust results for our interesting variable. Even taking into account the characteristics within the training occupations and their effect on the other influencing variables, the connection observed remains. After a contract termination in the second year of the apprenticeship, the probability that a new apprenticeship will be started stands at 67 per cent in comparison to those terminating the contract in the trial period, while there is a 34 per cent likelihood for those terminating the contract in the final year of the apprenticeship. The connection does not change even if the other control variables are considered. Apprenticeship wages that are above-average at the time of the contract termination decrease the likelihood of an apprenticeship stopout rather slightly. This effect is not significant. In

the multilevel model, schooling has no significant impact on the probability of a new apprenticeship being started neither. This could be due to the segmentation of the schooling within training occupations. Apprentices has similar ability preconditions which becomes less important during an apprenticeship whereas other (occupation-specific) abilities gain in importance. Even if separate estimations are made according to apprenticeship stopouts with and without a change in occupation, the different significance of the time of the contract termination and the apprenticeship wage is still shown. The influences that are estimated in the multilevel logit model and the logit model are equally strong. The effect of the apprenticeship wage on the apprenticeship stopout without a change in occupation is the only one to be more than 10 percentage points higher in the multilevel logit model than in the logit model.

4.2 Apprenticeship stopouts and the success of the subsequent apprenticeship

A subsequent apprenticeship can also end in a dropout if this is not completed successfully. This means that stopouts can still become dropouts. Of those who terminated the contract prematurely and started a further apprenticeship, around 57 per cent complete it successfully on the "second attempt", which also means that 43 per cent of those terminating the contract become dropouts after the second attempt. The time of the premature contract termination can also influence the probability of completing a second apprenticeship successfully. An early contract termination can lead to apprentices noticing early that the apprenticeship they have begun is not what they had envisaged, and they therefore start a new apprenticeship. If this is the case, there should be no perceivable negative effects on the success of the second apprenticeship they begin.

Table 3
Connection between the time of the premature contract termination termination and the success of the second apprenticeship

Time of contract termination	**Not successful (in %)**	**Successful (in %)**		
		All	***Change of occupation***	***No change of occupation***
In first year of apprenticeship	41.2	58.8	45.8	73.9
Of these in trial period	*41.6*	*58.4*	*45.8*	*73.0*
In second year of apprenticeship	42.1	57.9	42.1	74.6
In final year of apprenticeship	54.7	45.3	40.5	47.9
Total in %	43.2	56.8	41.3	70.0
Cases	784	1030	386	531

Source: Saarland Apprenticeship Panel, author's own calculations

Overall, it makes clear that the success rate of the subsequent apprenticeship drops the later the contract was prematurely terminated. If the success rate after a termination in the first year of the apprenticeship still stands at almost 59 per cent, the proportion of second apprenticeships completed successfully after a termination in the final year of apprenticeship is then only 45 per cent.

The success of the second apprenticeship is linked to different kinds of factors. Thus, remaining in the apprenticed occupation could have a positive effect on the success of the subsequent apprenticeship, and a change of occupation could tend to negatively affect the successful completion of the subsequent apprenticeship. This is shown by the success rates of apprenticeship stopouts subdivided into those that change the occupation and those that do not. Of those that do not change the occupation and already terminated their apprenticeship contract in the first year of apprenticeship, 74 per cent complete the subsequent apprenticeship successfully. In the case of those who change the occupation, on the other hand, the figure is only 46 per cent. However, the percentage of successfully completed second apprenticeships falls considerably when the first apprenticeship is ended prematurely in the third or fourth year. For those who do not change the occupation, the percentage is only a mere 48 per cent, and for those changing the occupation it is 41 per cent.

Whether these results are significant or not is shown by the following estimation models, which are based on logit models (Model 4).

Table 4
Logit regression for the likelihood of a successful second apprenticeship (odds ratio, robust)

Variables	Apprenticeship stopouts	
	Model 7a	Model 7b
Time of premature apprenticeship contract termination		
Trial period (reference)		
First year of apprenticeship*	1.024	0.998
	(0.19)	(-0.01)
Second year of apprenticeship	0.98	0.858
	(-0.15)	(-1.09)
Third/Fourth year of apprenticeship	0.589**	0.443***
	(-3.25)	(-2.96)
occupational change		0.290***
		(-11.00)
Schooling		
Hauptschule (lower secondary school) *(reference)*		
Mittlere Reife (upper secondary school)		1.428***
		(2.96)
Individual characteristics		yes
Duration of apprenticeship for occupation		yes
Company size		yes
Industry		yes
Start of apprenticeship		yes
N	1814	1814
Pseudo R^2	0.0058***	0.0855***

* p<0.10, ** p<0.05, *** p<0.01

Source: Saarland Apprenticeship Panel

Model 4a checks the assumption if a later premature termination negatively impacts on the likelihood of terminating the subsequent apprenticeship with success. First, Model 4a confirms the descriptive results. Premature contract terminations occurring in the third or fourth year of the apprenticeship have a significantly lower likelihood of success (59 per cent of the likelihood of those who terminated during the trial period) than contract terminations in the trial period. If the further influencing factors are taken into account (Model 4b), this probability is reduced to 44 per cent compared to contract terminations in the trial period. The likelihood of success in the second apprenticeship is also influenced by schooling. Those with *mittlere Reife* who terminate the contract are considerably more likely to complete the subsequent apprenticeship successfully than those with a *Hauptschule* certificate. This could be due to the greater abilities and motivation of persons with *mittlere Reife* who prematurely terminate to obtain a vocational qualification after all. Furthermore, those who terminate the contract and begin their further apprenticeship in a different occupation are considerably

less likely to complete it successfully than those continuing their new apprenticeship in the same occupation.

The assumption that the probability of a second apprenticeship being successful declines if the contract is terminated later is confirmed. Moreover, a subsequent apprenticeship after a premature termination is more likely to be completed with success by those who continue the subsequent apprenticeship in the same apprenticed occupation.

5 Conclusion

Against the background of rapidly ageing population and the ensuing reduction in the relative size of the qualified workforce, premature contract terminations are increasingly becoming a matter for consideration in the political arena. One of the ways to counteract the reduction in qualified workforce potential is to increase the level of education amongst young adults. Here it is not only the level of educational qualifications which can be tackled but also the issue that young adults achieve a formal educational qualification at all. First of all, a lack of qualifications – whether due to poor opportunities for gaining access to the education system or due to an apprenticeship dropout – means poor labour market opportunities, because if there is a lack of formal vocational qualifications, the likelihood of phases of unemployment and subsequently intermittent employment increases (Kalina/Weinkopf 2005, Reinberg/Hummel 2007; Funcke et al. 2010, Autorengruppe Bildungsberichterstattung 2010). We have shown, that early terminations do not have a disadvantageous effect on future apprenticeship opportunities per se. Hence, our paper distinguishes between apprentices dropouts and apprentices stopouts. It also allows for controlling the impact of the time at which the apprenticeship ended prematurely and the impact of monetary returns from an apprenticeship on the likelihood of apprenticeship stopouts. In fact, 28 per cent of the premature contract terminations are apprenticeship dropouts. Of the premature contract terminations, 72 per cent are simply apprenticeship stopouts. In these cases, new apprenticeships are started again in the apprenticeship training system. However, 43 per cent of the apprenticeship stopouts also prove to be apprenticeship dropouts in instalments, as this share also ends the second apprenticeship unsuccessfully. If both groups of apprenticeship dropouts are added together, the dropout rate among the premature contract terminations amounts to 59 per cent. It is primarily the time of the contract termination which can be seen as an important influencing factor, as the later the contract termination occurs, the more likely an apprenticeship dropout becomes. Likewise, a late contract termination in the case of an apprenticeship stopout negatively affects the successful completion of the second apprenticeship. High apprenticeship earnings have a positive effect on the likelihood of an apprenticeship stopout. However, the different significance of the time of the contract termination or knowledge gained and monetary returns from the apprenticeship is revealed when separate observations are made of those who change the occupation and those who do not. Thus, in the case of apprenticeship stopouts with a change of occupation it is the point in time which plays a decisive role, and in the case of stopouts without a

change of occupation it is the apprenticeship earnings that are key. The estimations from the multilevel model also confirm the influence of the time of the premature contract termination in the logit model. Educational stopouts or dropouts do not seem to depend on the characteristics within the apprenticed occupation.

From the results it is possible to derive recommendations for action that target the point in time as an influencing factor in a variety of ways. For one thing, apprenticeship mismatches must be recognised early on by training firm and/or the apprentices themselves, because if action is taken early, it is more likely that young adults will start an apprenticeship that is a better fit for their interests and abilities. When the contract is terminated at an early juncture, the knowledge gained (non-monetary returns) which can go to waste in a new apprenticeship is relatively little. Therefore, in the case of an early decision to terminate a contract, it is more likely that measures will be taken with the aim of finding a suitable occupation for the young adult.

In the case of decisions to terminate the contract which are not made until late on in the apprenticeship, the starting point should then be to encourage the person terminating the contract to continue with an apprenticeship in the same occupation in another company instead. In this way, those who do not change the occupation can continue to use the knowledge they have gained which is specific to the occupation and hence complete the second apprenticeship successfully despite the contract termination. Nevertheless, they have a significantly lower likelihood of completing the second apprenticeship successfully, which means that the lack of qualified or cognitive abilities is of great significance. In this case, the focus should lie on the support of the companies or the school in the form of more intensive support and additional lessons in order to compensate for the lack of skills. However, the dropout risk should be reduced overall by training support and teaching staff to identify young people with a high dropout risk in order to counteract a premature contract termination. Further research is needed to analyse whether a second chance graduates (after a stopout) have negatively consequences for the employment trajectories compared to first chance graduates.

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Appendix

Table A1
Data cleansing

Cleansing steps	Chamber of Crafts		Chamber of Industry and Commerce		Overall	
	Beginner	Premature contract terminations	Beginner	Premature contract terminations	Beginner	Premature contract terminations
Beginner between 1994 and 2006	17702	6704	40001	7796	57703	14500
Apprentice without prior apprenticeship (first apprenticeship in Chamber)	14189	5215	27435	4847	41624	10062
Apprenticeship begun in Chamber = Apprenticeship begun in IEB	12606	4397	24931	4092	37537	8489
Apprenticeship not funded	12396	4302	24609	4017	37005	8319
Apprenticeship beginner <23	12204	4242	23812	3889	36016	8131
Apprenticeship ended in Chamber = Apprenticeship ended in IEB		3739		3105		6844
Apprentice only in one of the Chambers with first apprenticeship						6791
Premature contract terminations between 1999 and 2002 without missing data						2530

Source: Saarland Apprenticeship Panel, author's own calculations

Table A2
Characteristics of persons who terminate the apprenticeship contract prematurely in %

Characteristics	Premature contract terminations	Apprenticeship dropout	Apprenticeship stopout	t-test
Subsequent apprenticeship		28.3	71.7	
Duration of apprenticeship before contract termination				
In trial period	23.0	19.0	25.1	1.42
Between 5 and 12 months	31.2	28.4	32.4	0.99
In second year of apprenticeship	30.7	32.1	30.2	-0.47
In third/fourth year of apprenticeship	15.1	20.5	12.3	-2.04
Schooling				
Max. *Hauptschule* certificate	77.0	81.6	75.1	-1.65
Mittlere Reife	23.0	18.4	24.9	1.65
Sex				
Men	67.2	64.8	68.1	0.78
Women	32.8	35.2	31.9	-0.78
Nationality				
German	95.6	92.7	96.7	1.36
Not German	4.4	7.3	3.3	-1.36
Age at premature contract termination	18.4 years old	19.0 years old	18.2 years old	-9.64
Company size				
<10 employees	43.4	37.7	45.8	1.95
10 und 49 employees	31.1	27.6	32.4	1.16
50 und 249 employees	17.9	23.9	15.5	-2.16
>250 employees	7.6	11.0	6.3	-1.46
Occupations				
3-year apprenticeship	61.4	68.0	65.7	-0.57
3.5-year apprenticeship	33.7	32.0	34.3	0.57
Wage				
below average when contract terminated	60.6	71.3	57.7	-2.41
above average when contract terminated	39.4	28.7	42.3	2.41
Industry				
Agriculture. forestry. mining	1.5	1.9	1.5	-0.23
Processing trade	25.7	24.3	26.2	0.48
Construction	22.3	17.0	24.4	1.93
Retail. wholesale & repairs	20.0	19.1	20.4	0.33
Traffic. information & communication	1.6	2.2	1.3	-0.41
Hotel & restaurant	7.3	7.4	7.2	0.06
Financial & insurance services	0.4	0.7	0.2	-0.30
Real Estate. professional services	2.4	2.1	2.5	0.19

Characteristics	Premature contract terminations	Apprenticeship dropout	Apprenticeship stopout	t-test
Public authorities. social insurance	0.3	0.3	0.3	0.04
Education & teaching	8.4	15.8	5.5	-3.06
Health & social services	3.1	4.2	2.7	-0.57
Art & entertainment. other services	7.0	5.0	7.8	0.95
Start of apprenticeship				
1999	26.5	26.7	26.5	-0.05
2000	26.4	25.7	26.7	0.24
2001	25.0	24.0	25.4	0.35
2002	22.1	23.6	21.4	-0.55
Number	2530	716	1814	2530

Source: Saarland Apprenticeship Panel. author's own calculations

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Editorial address
Institute for Employment Research
of the Federal Employment Agency
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D-90478 Nuremberg

Editorial staff
Ricardo Martinez Moya, Jutta Palm-Nowak

Technical completion
Renate Martin

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For further inquiries contact the author:

Gabriele Wydra-Somaggio
Phone +49.211.4306.108
E-mail Gabriele.Wydra-Somaggio2@iab.de