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# Apprenticeship as Critical Transition in Vocational Education – the Role of Training Agencies*

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**Abstract**
Vocational education and training involve a myriad of actors working together in a skills ecosystem. This paper focuses on the role of training agencies (TAs) in this system. They interrelate with schools, workplaces, and the apprentices themselves to enhance the quality of the apprenticeship training. Using data from one Norwegian county, we find a large variation in completion rates. One main finding is that apprentices having a contract directly with an independent private firm have a significantly lower probability of passing the final examination and achieving the trade certificate than apprentices with a contract with a TA.

Keywords: VET, skills ecosystem; apprenticeship, training agency

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## 1. Introduction

Transitions within education and training shape educational and labour market careers. Interest in transitions in Vocational Education and Training (VET) is connected to the cost of dropout and the demand for skills in the labour market (see, e.g., OECD, 2023; Nießen et al., 2020; Hanushek et al., 2017). In this article, we investigate the role of training agencies (TA) in Norway, regarding the transitions within apprenticeship.

VET is a crucial and widely utilised component of education systems in OECD countries. On average, 44% of upper secondary students are enrolled in vocational programs. Although these programs differ from country to country, they share common characteristics that contribute to the delivery of high-quality vocational education (OECD, 2023). In many countries, VET is assigned a key role in providing inclusion for diverse groups of students and achieving a smooth transition to the labour market for all young people. PISA data shows that students with fewer academic strengths often opt for or are directed into VET (OECD, 2023; Krötz & Deutscher, 2022).

VET includes critical transitions that often result in high non-completion rates, especially for certain social groups (Milmeister et al., 2023; Michelsen et al., 2023; Nießen et al., 2020; Nylund & Rosvall, 2019) although it varies by country, region, and sector (Krötz & Deutscher, 2022). Non-completion in VET is a pressing issue across Europe and has significant costs for individuals and society. Some studies stress that barriers to joining the workforce often coincide with other societal exclusions (De Witte & Rogge, 2013; Halvorsrud, 2017; Roos et al., 2021; Fix et al., 2019).

Successful transitions in the VET system are, therefore, crucial for reducing income inequality and exclusion from the labour market. Studies find that some students struggle to get access to in-firm training (Gambin & Hogarth, 2016; Bonoli & Wilson, 2019; Aerne & Bonoli, 2021). Apprenticeships are often suggested to bridge the gap between education and work since they may enhance learning and employment opportunities. Dual VET combines school-based and work-based training, giving apprentices practical skills in a relevant environment with employer involvement. Research finds that high integration between school-based training and apprenticeship improves employability and reduces unemployment among young people (Riphan & Zibrowius, 2016; Hanushek et al., 2017; Cahuc & Hervelin, 2024). Eiríksdóttir (2018) argues that the time spent on workplace training is essential for the success of VET. However, only 45% of upper-secondary VET students are enrolled in school and work-based programs across the OECD (OECD, 2023) and despite attempts to improve education-work integration in VET, both parties often find it difficult (Esmond, 2018; Jørgensen, 2004; Virolainen & Tønder, 2018).

These observations motivate specific studies of different actors involved in VET. VET systems involve a myriad of different actors and sub-systems, often denoted the skills ecosystem (Buchanan et al., 2017). The present paper analyses one specific institutional feature in the skills ecosystem, namely the use of Training Agencies (TAs). The TAs in

Norway are set up by firms to coordinate and follow up on the training in the firms. They might also serve as information sources in the matching of students to firms to form apprenticeship contracts, although it is the student's responsibility to apply for an apprenticeship. An apprenticeship contract is made between the school authorities, the apprentice, and the TA. To the best of our knowledge, the present paper is the first that quantitatively relates TAs to the outcome of the apprenticeship training.

Dual VET systems can be implemented in various ways. Although work-based training is seen as a success factor for quality VET, dual vocational training systems can be pretty selective as students need to secure an apprenticeship with a firm, and not all students will be able to obtain one (Bonoli & Wilson, 2019). Moreover, the transition between a school rationale and a production rationale can be problematic for the individual. The aim of the dual VET is apparently to bridge the gap between education and work. Nevertheless, in practice, the collaboration between businesses and educational institutions often falls short (Esmond, 2018; Jørgensen, 2004).

Earlier research has stressed the importance of overbridging critical transitions in VET. As an example, strengthening the ties between counsellors, students, and teachers is identified as essential for better networking and effectively addressing key transitional stages (Aspøy & Nyen, 2016; Ceelen et al., 2021).

Less attention has been given to the TAs' role in the transition from school to work. The system with TAs in Norway was constructed with the aim of creating new organisational structures to facilitate more firms in offering apprentice training. However, TAs are organised differently in different countries and regions. In Norway, TAs have become essential components in the governance of the VET system. They function as general-purpose tools for local firms' collaboration in apprentice training, with around 80% of young people's apprentice training contracts being solicited by TA member firms. Many firms have membership in TAs and seem to benefit from their services (Michelsen et al., 2023). The TAs serve as mediating organisations and as a buffer between the school authorities on the one hand and member firms on the other. Their role is often to facilitate monitoring of quality and mediate between the training firm and the apprentice (Rapp & Knutas, 2023). Nevertheless, the knowledge of the impact of TAs on students' transitions and completion in VET is limited.

Section 2 provides relevant theoretical considerations, while Section 3 presents the Norwegian institutional system. We use longitudinal individual data on the transitions in VET education presented in Section 4 and classify the apprentice contracts into four types: thematic TAs, regional and cross-disciplinary TAs, public sector employers, and independent private firms. Section 5 analyses whether the probability of passing the final examination depends on the contract type, and Section 6 discusses our findings.

## 2. Theoretical considerations on transitions in VET

Dual VET systems include schools and workplaces, systems with different rationales and organisations. Workplaces have a context-specific rationale, whereas schools' focus, to a large degree, is on building general knowledge (Jørgensen, 2018).

In terms of Luhmann's system theory, a system refers to a set of elements that are interconnected and functionally related to each other (Luhmann, 1995). Systems maintain their identity through self-referential processes that create and communicate meaning. Their communication is based on contingencies; when a system chooses which communications to include in the system, it also chooses which to exclude. For Luhmann (2002), the concept of inclusion is closely intertwined with society's functional differentiation. Society comprises several systems, such as politics, economics, education, and work. These functional systems share the commonality of being based on a form and principle that excludes something from the external environment. The form of the system arises when operations connect to operations, thus defining which operations are suitable for being included in the system (Luhmann, 2002).

The systems can be seen as contexts of meaning in social actions that refer to each other and demarcate the external world. The meaning content is the internal node around which communication centres. Because the system produces the same communication as it is built upon, it can be considered autopoietic. System differentiations can be viewed as responses to the complex environment. According to Luhmann (2018), the establishment of organisations hinges upon the evolution within the economic or educational systems. The process of out-differentiation inherent in these functional systems serves as a prerequisite for the subsequent differentiation of organisations, even when their operational scope extends to other functional systems such as labour and politics. That is, when organisations adapt to an environment of change, they use system differentiation to deal with complexity, for instance, how to respond to contradictory expectations and demands (Brunsson, 2006).

A VET system consists of many subsystems. Cedefop (n.d.) defines VET subsystems as working together as a skills ecosystem. A skills community is a network of businesses, industries, education and training providers, non-governmental organisations, local or regional stakeholders, and individuals. The purpose of this community is to collaborate and interact with each other to address skill gaps and develop, use, and share knowledge, abilities, and competencies in an independent manner. Since education and workplaces are disparate systems, there is a need for system integration to overbridge their different meaning and rationale.

The idea behind a skill ecosystem is to highlight the relationship between different actors and policies that play a crucial role in creating and maintaining suitable conditions for the development and utilisation of appropriate skills in groups of firms located in specific regions (Cedefop, n.d.; Buchanan, et al. 2017).) Skill ecosystems refer to the connection between firms and skills/training organisations, with the aim of supporting sustainability,

innovation, and growth. To enhance workforce development, the OECD (2013) suggests that the skill ecosystem should contain regionally based networks and partnerships. These partnerships should focus on establishing and nurturing connections between firms and training institutions. According to OECD (2013), it is important to promote the creation of VET- networks that bring together various stakeholders such as public and private training providers, employers, industry representatives, unions, labour market and training agencies, as well as local and regional government agencies, and community representatives. The government plays a crucial role in acting as a catalyst by providing appropriate policy context, support, resources, infrastructure, and institutional frameworks for the establishment and functioning of these networks.

Students need to find their way in the networks and the skill ecosystem. They are particularly vulnerable in the transitions in their education and training. They do not have complete information on partnerships, networks, and workplaces. Similarly, other actors in the system, such as firms and training organisations, have limited information about individual students. Theoretical models based on limited information were first developed for mobility and transitions in the labour market (Mortensen & Pissarides, 1994; Albrecht, 2011). The idea in such search and matching models is that some individuals, in particular unemployed workers, search for jobs at the same time as employers search for workers for vacant positions. Individuals differ in terms of skills and preferences, and employers and jobs vary in their valuation of different kinds of skills. Thus, both sides of the market have costs and use time and effort in their searching activities in order to find a match and to optimise the match. There are "frictions" in the market due to limited information.

The theories of the labour market are relevant for VET because an apprentice is at a relevant workplace. Employers are an essential actor in the VET skill ecosystem. It seems realistic that similar rationales are relevant for the hiring of apprentices and as for hiring of regular workers.

In addition to the market imperfection due to frictions, there might be a more structural mismatch in the labour market in the sense that the education and skills of the workforce do not match the demands of the employers. Such skill mismatch, denoted horizontal skill mismatch by McGuinness et al. (2018), has implications for the adaption capacity of the skills ecosystem when skill demand changes in the labour market. The labour market might demand a different composition of skills than those provided by the educational and training system (Brunello & Wruuck, 2021). Skill mismatch leads some workers to be overeducated for their jobs (McGuinnes et al., 2018) and structural unemployment in the economy because unemployed workers do not have the required skills for the vacant jobs.

## 3. Institutional features of the Norwegian VET system

Norwegian compulsory education lasts 10 years, from age 6 to 16. It is a comprehensive education system in which all students have the same curricula, there is no grade

repetition and no dropout, and the students have the right to enrol in upper secondary education. More than 98% of the cohorts enrol in non-compulsory upper secondary education, but only about 82% complete upper secondary education with a degree in the expected time plus two years.[1]

Upper secondary education is the responsibility of the county authorities.[2] It consists of several study tracks, where the main difference is between vocational and academic study tracks. The vocational study tracks end in a specific vocational qualification, denoted certificate or apprenticeship, craft certificate, or journeyman's certificate, while academic study tracks qualify for studies at universities and university colleges. About the same number of students enrol in the two types of study tracks.[3] However, VET students face a higher risk of marginalisation than their peers in academic study programs. The completion rate is much lower, and the main explanation seems to be that students with to relatively high degree have an immigration background and low SES, reflected in, e.g., weak performance in compulsory education (Falch et al., 2014).[4] A critical phase in vocational studies seems to be the transition from in-school education to apprenticeship training.

The VET studies start with enrolment in one of the vocational study tracks in upper secondary education. Admission to study tracks is, to a large extent, based on grades from compulsory education, but the students have the right to enrol in one out of three tracks that they specify in their application. Within a specific track, the students have the same courses in their first year. There was a change in the track structure in 2020, expanding the number of vocational study tracks from 8 to 10 by some reallocation of the specialisations across study tracks.

In the second year of VET studies, the students choose a specialisation within their study track. Both the first two years are school-based, but often with practice periods at workplaces. Thereafter, the normal progression is to go into a two-year apprenticeship position at a workplace in the relevant specialisation. In 2018, the 8 study programs offered about 190 specialisations in total (CEDEFOP, 2019).

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[1] Source: Statistics Norway Table 12971. The completion rate has increased from 78.2% for the cohort starting upper secondary education in 2010 to 82.4% for the cohort starting in 2016.

[2] The number of counties was stable at 19 for several decades and up to 2018. Merger processes mainly led by the national government reduced to number of counties to 11 in 2021, but some reversing decisions by the national parliaments increased the number to 15 by 2024. The data in the present study are from a county established in 2018 based on two former counties and has been stable since.

[3] The share of students enrolling a vocational study track increased from 49.8% in 2018 to 52.2% in 2022. Source. Statistics Norway Table 09377 (https://www.ssb.no/statbank/table/09377). For the county under study in the present paper, the share of students enrolling a vocational study track increased from 55.4% to 57.0% in the period. Source. Statistics Norway Table 13259 (https://www.ssb.no/statbank/table/13259).

[4] For the cohort enrolling upper secondary education in 2015, 89% of the students in the academic study tracks achieved the degree during five years (the expected time of three years plus two more years) and 70% of the students in vocational study tracks achieved the degree during six years (the expected time of four years plus two more years). Source: Utdanningsspeilet (2022).

There are a few exceptions to this 2+2 VET system. Some specialisations offer 2.5-year school-based training, and some specialisations offer 2.5-year apprenticeship training. Additionally, the system offers two other pathways: the Apprentice candidate and the Trainee certificate candidate, both aimed at providing education adapted to specific student characteristics.

In principle, the students are responsible for finding an apprenticeship position. They might contact workplaces or apply for positions. They may have some networks from practice periods during schooling, and they might have other networks in their community (Rapp et al., 2023). Some students have challenges finding an apprenticeship position. Then, they might get some help from a Training Agency (TA), see the description below, or their schools and county administration. The scope of such extended support seems, however, to vary considerably between schools, TAs, and regions. For students not succeeding in finding an apprenticeship position, the county is responsible for providing in-school training.

Apprenticeships are considered partly training and partly participation in regular work. The training part is essentially geared towards passing the final examination. The workplace's ability to provide relevant training is, therefore, essential. One advantage for firms of joining a TA is that the TA can be responsible for part of or the whole training. There has been a political discussion on how the juridical system should include the TA. The School Act has defined TAs as training establishments and equal foot as the firms. Thus, it is up to the individual TAs and their member firms to allocate the training part between the TA and the firm (Michelsen & Høst, 2024).

The county authorities have the general responsibility for all training and supervisory of the apprentices. This includes approval of TAs, firms, and training leaders. They are obligated to remunerate employers for the training part when hiring apprentices. If the workplace is a part of a TA, the county pays the remuneration to the TA, and the TA itself determines how the funding is allocated between the firms and the TA. In addition, the county, via an Examination Board, is responsible for organising, designing and assessing the final examination (The Norwegian Directorate for Education and Training, 2021). The students achieve a qualification equal to level 4 in the European Qualification Framework (Cedefop, n.d.; Rapp et al., 2023).

In Norway, as in many other European countries, there has been a concern about shortages of apprentice positions (Tønder & Aspøy, 2017). Such a concern motivated a 'completion reform' of the Norwegian government in 2021 (Ministry of Education and Research, 2021). The number of firms involved in VET has increased in recent years. However, one might also argue that there is a reasonable balance between students searching for an apprenticeship position and apprenticeship places. The question is difficult to evaluate since there are no centralised allocation mechanisms. Clearly, some students are not able to find an apprenticeship position, but the employer side might argue that those students are not adequately qualified for a position. They will claim that the challenge is the

qualifications provided by schools and not a lack of apprenticeship positions. Indeed, some studies find that the completion rate in upper secondary education improves when the state of the local labour market worsens (Reiling & Strøm, 2015; Bensnes & Strøm, 2018), which is the opposite finding of what one would expect in the case of shortages of apprenticeship positions. The number of such positions should decrease when firms demand less labour and unemployment increases. Gambin and Hogarth (2016) find that the association with local unemployment depends on the type of apprenticeship training.

Some research shows that TAs may significantly influence the critical transition between students' first two years in school-based education and their last two years as apprentices. They can be of substantial importance for students at risk of dropout and marginalisation (Rapp & Knutas, 2023). TAs work on behalf of their member firms with the goal of supporting the firms in training the apprentices towards examination. They often recruit, mediate, and follow up on apprentices in their member firms and currently serve as a link between the school and the county authorities on one side and the firms on the other (Becken et al., 2016). As Høst (2014) explains in a NIFU report on Norwegian training agencies, they have, over time, taken over an essential function from the county: the provision of information regarding the regulations of vocational training to potential apprentices, and especially the communication with the firms. Many TAs do extensive work to promote and inform on vocational education in general and their specific trades in particular to parents, potential apprentices, and the business community. Some TAs also assist in placing students in firms for work experience projects, even though this is not a task they are obliged to undertake. This can be explained by the role they play in helping firms find apprentices. Work placements are an important tool in this regard. Still, there is a vast difference between how TAs work, and there is a lack of research on different types of TA organisations.

Michelsen et al. (2023) present a comparison of TAs in Norway and Switzerland. They conceptualise TAs as intermediary organisations and discuss four core questions: Who trains? Who pays? Who monitors? Who recruits? In the Norwegian case, in contrast to the Swiss case, there is no rotation of apprentices between firms, it is high state subsidies, the TAs are responsible for reporting on training quality, and the TAs are not formally involved in recruiting apprentices. Høst et al. (2014) provide a description based on several data sources, including two national-wide surveys of TAs. They conclude that one of the core tasks of the TAs is visits to the workplaces in order to contribute to the quality of the apprentice training, which places the TAs in between the counties and the workplaces.

There is a variety of different types of TAs, where some are industry or branch-specific, and others are regional and cross-disciplinary, including all possible vocational study tracks. The TAs support member firms with the practicalities surrounding the apprenticeship, usually for the cost of part of the apprenticeship grant. Throughout the apprenticeship, they hold legal responsibilities, ensure that the curriculum is adhered to, and play a key role in enrolling apprentices for their final examination. The TAs are also

supposed to maintain a steady connection with the county authorities and other relevant agencies, ensuring a seamless flow of communication and cooperation.

Our presentation of the institutional system illustrates that within Norway's official national VET framework, multiple actors have essential roles, including schools, workplaces, and communities. Training agencies were constructed because of the need for new organisational structures that could coordinate some parts of the skills ecosystem.

## 4. Data and empirical approach

### *4.1. The data source and restrictions*

Our data were kindly made available by the county of Trøndelag. Trøndelag is a medium-sized county located in the middle of the country and inhabiting about 9% of the total population of the country. The data set is defined by individuals showing interest in apprenticeship training during the period 2018 until summer 2023. The starting date of the data is 2018 because the county of Trøndelag was formed as a merger of two previous counties this year. The last part of the data period is affected by the COVID pandemic. However, continuation of the training of apprentices was one important priority during the pandemic.

Individuals with sufficient basic vocational education, that is 2 – 2.5 years in a vocational study track at a school, are eligible for apprenticeship contracts. Most of the students have normal progressions, which implies that they start the apprenticeship training the year they turn 18. However, some students might be delayed in their studies for several different reasons, for example, because they transfer from one vocational study track to another during the schooling period.

The VET students apply yearly to the county authority for their further education and training. The application might include several alternatives, for which apprenticeship in a specified specialisation is one of several possibilities. The application deadline for studies next school year is March 1. It is one common national application system for all upper secondary schooling and training.

Our data only includes individuals with apprenticeships or other training in firms on their ranking list. Most applicants in the data have apprenticeship training in the county of Trøndelag as their first priority. Others might have transitioned to general academic schooling as their first priority or apprenticeship in another county as their first priority, with apprenticeship training in Trøndelag further down on their ranking list. Students from other parts of the country might apply in Trøndelag and vice versa. There is no cost or risk in including apprenticeship training in the application.

From the application deadline onwards, there are processes in order to find the best alternative for each individual. The goal of the county educational body is to achieve the

best possible situation for each individual applicant. Thus, the process is pragmatic and the final outcome of the process might differ considerably from the student's ranking in the application to the county. In addition, applying for apprenticeship positions at workplaces is a separate issue that is the responsibility of the students. The data do not include information about these searching and matching processes, but they include the outcome of the process when it is either an apprenticeship contract or schooling in upper secondary education.

The original data include 12,201 unique individuals. The data are longitudinal and include educational information from the end of compulsory education (typically at age 16) and throughout upper secondary education for each individual, including the result on the final vocational examination. Several of the individuals do not have apprenticeship training as their highest priority, for example because they want to transfer from VET to academic qualifications.

The present paper is based on realised apprenticeship contracts. During the period from 2018 and to summer 2023, 10,945 apprenticeship contracts were made. Some students have multiple contracts during the period because of, e.g., new preferences, mismatch with the employer, personal issues, and failure on the final examination. It is 9,758 unique individuals in the contract dataset.

We restrict the sample in the following way:

- We exclude contracts with firms and TAs outside the county of Trøndelag (1,240 contracts).
- We exclude the alternatives to apprenticeship (905 contracts).[5]
- We do consider a new formal contract due to organizational changes at the workplace, e.g., merging of municipalities, as a continuation of the same contract (55 contracts).
- We exclude the contracts for the year 2023 because we only have information up to summer and the majority of the contracts are made after summer (160 contacts). Thus, the working sample is 8,745 contracts and 8,197 unique individuals.

### *4.2. The training agencies*

The training agencies are formed partly based on common vocational specialisation, partly based on common industry, and partly based on geographical vicinity (Høst et al., 2014). In larger cities, the TAs are often thematic in the sense that they cover only a limited number of study tracks, specialisations, or industries. For example, this organisation is very common for craftsmanship in the building and construction industry. It varies how many specialities these agencies cover. Firms outside the cities might be

[5] There are some other types of training in firms based on less than two years in a vocational training in school.

members of such hematic TAs, but they typically cover only specific regions within the county.

In less populated areas, with relatively few apprentices, regional TAs are cross-disciplinary and include firms in different industries and might also include municipalities. They are located in regions without basis for thematic TAs of reasonable size.

Public sector units typically form their own internal TA. This is possible because they typically are large and have several apprentices. Public sector units include municipalities, hospitals, universities, and the Armed Forces. The size of these units varies considerably

Finally, in many cases, the county authority makes contracts directly with individual firms and not a TA. The firms are not organised in a TA, but nevertheless want to recruit apprentices. This is the historical organisation of the dual VET system in Norway, and is today most common in some service industries without traditions for making TAs.[6]

Table 1 provides information on the contract types. In the data, there are 30 thematic TAs, 8 regional and cross-disciplinary TAs, 49 public sector units, and 160 independent private firms. These are the units for which the county authorities make apprenticeship contracts. The second column of Table 1 presents the number of apprenticeship contracts within each type of contract, and the last column presents the yearly average of the number of contracts per unit. Even though there are relatively many independent firms, they include relatively few students (6.1%). On average, they make less than one contract per year. On the other hand, the thematic agencies have most of the contracts (62.3%) and make on average more than 30 new contracts per year.

Table 1. Apprenticeship contracts, 2018-2022

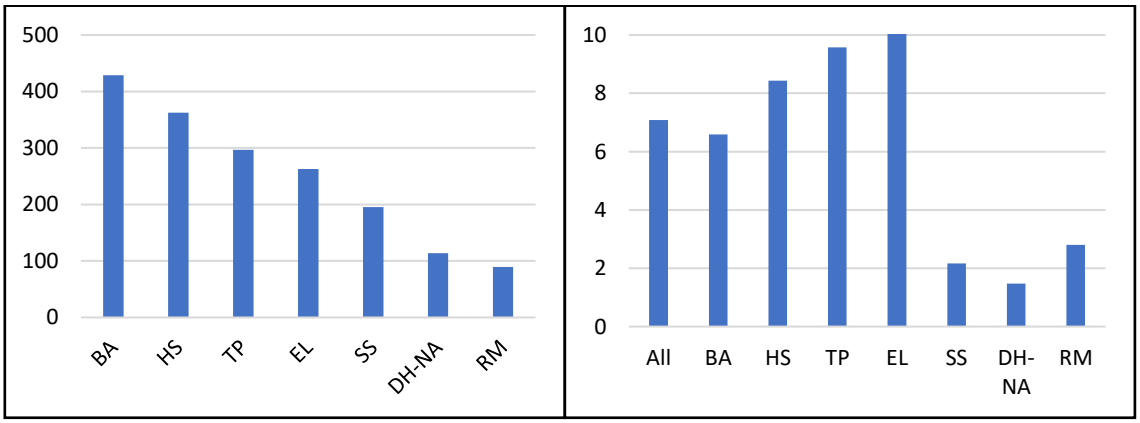
| Type of contract | Number of contracting units | Number of contracts | Yearly no. of contracts per unit |
|---|---|---|---|
| Thematic Training Agencies | 30 | 5,446 | 36.3 |
| Regional Training Agencies | 8 | 1,044 | 26.1 |
| Public sector units | 49 | 1,720 | 7.0 |
| Independent private firms | 160 | 535 | 0.7 |
| SUM | 247 | 8,745 | 7.1 |

[6] In a survey in Høst et al. (2014), the most common reasons for not being a part of a TA is "we are able to follow-up on our apprentices ourself" (35%), "not sure" (31%), "TA for our specialities does not exist" (15%) and "the TA keeps too much of the remuneration" (10%).

It is a large variation in the size of the contracting units. The three largest units make on average more than 100 new contracts each year. At the other end, the majority of independent private firms make less than one new contract yearly (79%).

The organization of TAs varies across study tracks. In the following, we will refer to the study track structure in 2018, at the start of the empirical period.[7] Two of the tracks are relatively small and are aggregated in the figures below.[8] The left panel of Figure 2 presents the yearly number of contracts for each study track, where the study tracks are ranked according to size. The track for "Building and construction" (BA) is largest, while "Restaurants and food processing" (RM) is smallest. The right panel of Figure 1 presents the yearly average of the number of contracts per contracting unit in the different study tracks. For "Technology and industrial production" (TP) and "Electricity and Electronics" (EL) it is close to 10, while it is below 3 for the three smallest study tracks. The size of the contracting units is largest in the traditional craftmanship occupations (BA, TP and EL) and for the public sector-dominated "Healthcare, childhood and youth development" (HS). For the small study tracks, training agencies are poorly involved, and a large share of the contracts are with independent private firms.

Figure 1. The number of contracts (left) and number of contracts per agency (right), yearly averages




Note. The acronyms for study track are defined in footnote 5.

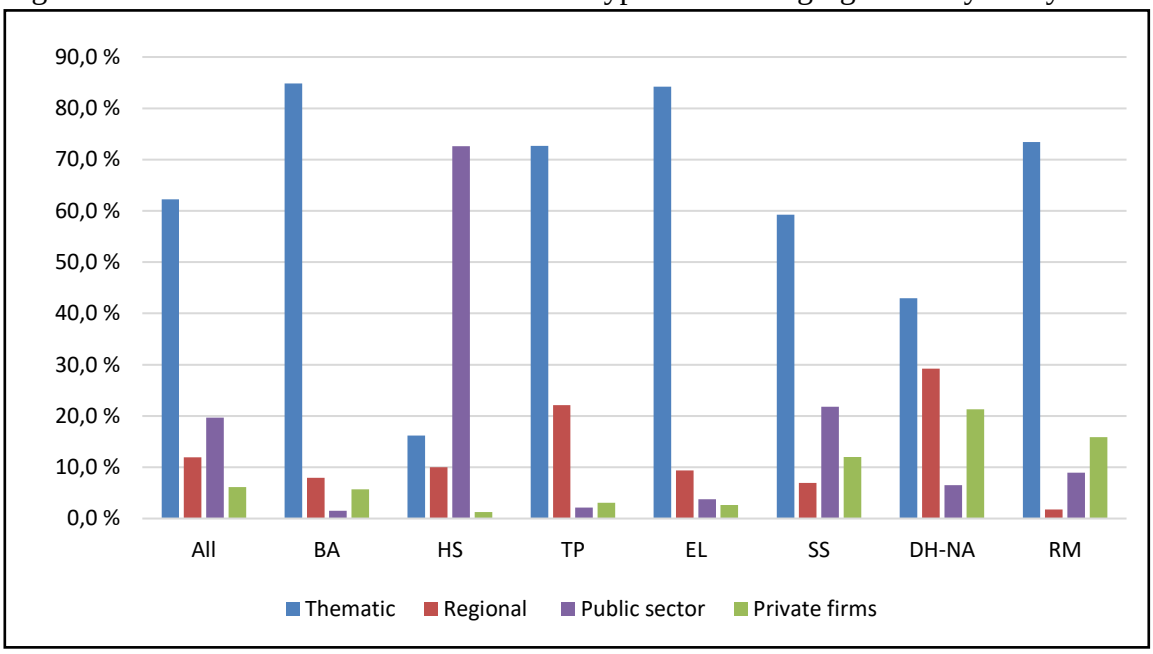
Figure 2 presents the type of contracts that is used for the different study tracks. The first grouping presents the average for all study tracks, reflecting the pattern in Table 1. The rest of the figure distinguishes between different study tracks. The "craftmanship" industries (BA, TP, EL) are primarily organised with thematic TAs. The public sector units mainly organise apprentices in the study track for health (HS). Organisation in

[7] The study track structure reform in 2020 was initially only for the first year in VET. These students became qualified for apprenticeship training from 2022.

[8] The definitions of the acronyms for the study tracks are as follow: BA = Building and Construction; HS = Healthcare, Childhood and Youth Development; TP = Technology and Industrial Production; EL = Electricity and Electronics; SS = Service and Transport; DH = Design, Arts and Crafts; NA = Agriculture, Fishing and Forestry; RM = Restaurant and Food Processing.

independent private firms is in the minority for all tracks, but most common for DH, NA, and RM.

Figure 2. The share of students in different types of training agencies by study track



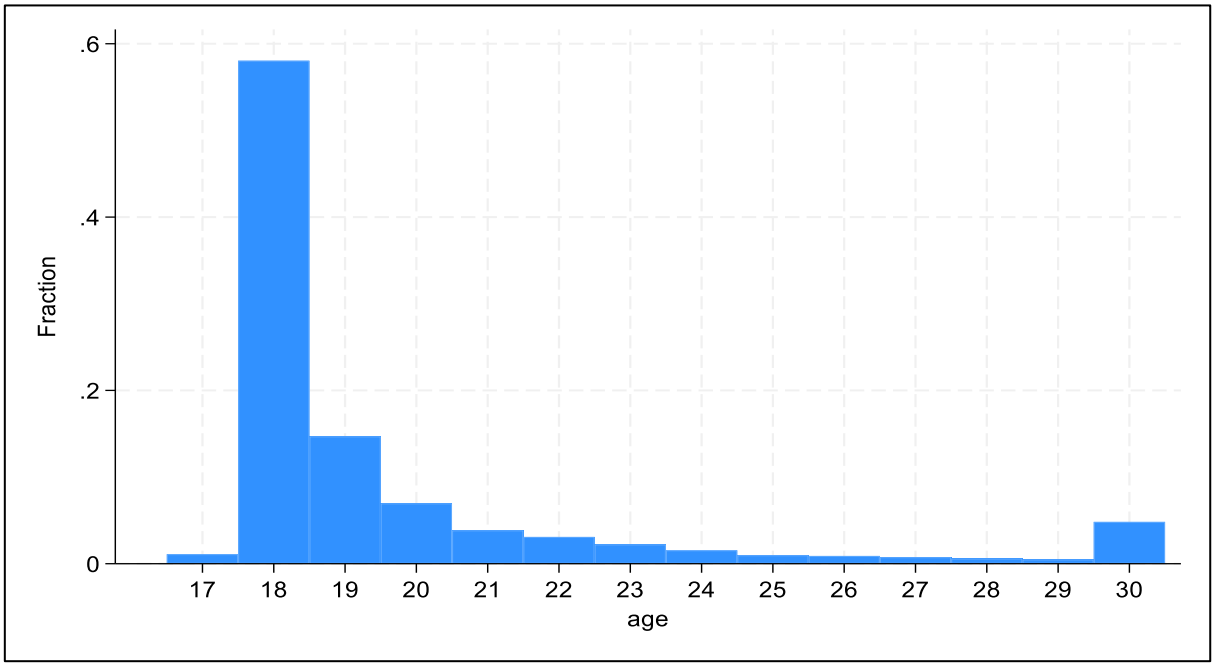

Note. The acronyms for study tracks are defined in footnote 2.

Overall, this section has illustrated a large variation in the organization of the transitions from school to apprenticeship. The types of contracts differ, the contracting units have different profiles and different sizes, and several firms recruit apprentices directly without using a TA.

### *4.3. Characteristics of the apprentices*

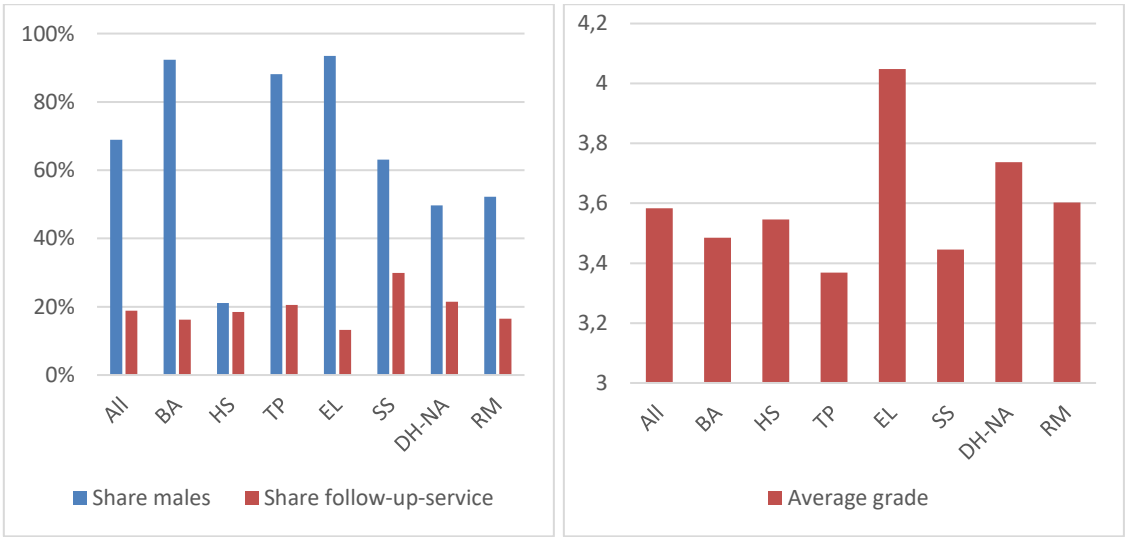
Figure 3 presents the age distribution of the apprentices. We report the turning age in the year of the start of the contract. All students above 30 years of age are truncated in the last bin in the figure. The figure shows that almost 60% of the contracts are made with students turning 18 in the calendar year of the start of the contract, which is the normal progression, while 15% of the contracts are with students 19 years of age. The average age at the start of apprenticeship training is 19.6 years.

Figure 3. The age distribution of the students, new contracts 2018-2022




The left panel of Figure 4 presents the gender composition of the apprentices in each study track. On average 69% are males, which reflects that females are overrepresented in the academic study tracks in upper secondary education. The traditional craftmanship tracks (BA, EL and TP) are heavily male dominated, with about 90% males in each track. The care-giving oriented study track (HS) has, on the other hand, only 21% males.

Figure 4. The share of males and use of follow-up-services, and the average grade




Note. The acronyms for study tracks are defined in footnote 2.

The counties have a specific service for students struggling in some way in their upper secondary education, for example large absence. This follow-up service should approach each student with some specific challenges. The left panel of Figure 4 presents the share of the students that have been in contact with the follow-up service prior to the year of

the apprenticeship contract. On average, 19% of the students have received support from the service, varying from 13% in EL to 30% in "Services and transport" (SS).

The right panel of Figure 4 presents the average grade from compulsory lower secondary education in the different study tracks. The students get teacher-set grades in 12 subjects, common for all students. The scale is from 1 (very weak) to 6 (excellent). The average grade is clearly highest for EL, which also is the study track with the least use of the follow-up service. The average grade is lowest for TP and SS, which also have the largest use of the follow-up service.

### *4.4. Empirical approach*

The probability of completing the apprenticeship training successfully and passing the final examination is expected to be affected by a range of different factors. There are differences between training agencies, study tracks, and students.

In order to reduce the empirical noise in the analyses, we first restrict the sample to the prime age group, that is, students who start apprenticeship the year they turn 18 or 19. Figure 3 shows a large variation in the age of new apprentices.[9] Older students are expected to have different histories of why enrolling at a higher age. One typical path is that individuals struggling in the labour market some years invest in qualifications via the vocational training system, including apprenticeship. We do not, however, have any information on why they are delayed. The limited information on the group of older students might introduce unknown noise to our analysis. A closer investigation on older apprentices is relegated to another study.

Second, to study the outcome of apprenticeship, we need to follow the students until the end of the apprenticeship period. The contracts are typically for two years. Thus, our analytical sample only includes contracts made during the three years 2018-2020. The last date of examination in the data is June 2023, which implies that the latest contracts in the sample have 2.5 years to complete.

Overall, the analytical sample consists of 18 and 19 years old who start apprenticeship in the country of Trøndelag in the years 2018-2020, a total of 3,758 contracts.

Third, Figure 4 shows that the study track for Electricity and Electronics (EL) electricians enrols students with higher GPA from lower secondary education than the other tracks, and Figure 2 shows that these students have contracts with a large thematic training agency to a larger extent than students from other study tracks. These differences might affect the probability of completion. Thus, we will present results where we condition on observable factors. We compare average completion rates across training agencies that

[9] The prime age group, students starting apprenticeship the year they turn 18 or 19, accounts f 74% of the full sample.

take into account differences in the recruitment of apprentices. The variables included in the analysis, in addition to the type of training agency, are indicators for the study track of the student, the year of the start of the contract, the age at the start of the contract, gender, contact with the follow-up services in the county prior to the year of the contract, and the grade point average from lower secondary education (GPA). We estimate linear probability models in order to facilitate comparison across TAs.[10]

## 5. Completion of apprenticeship training and training agencies

### *5.1. Measurement of completion*

We use two different measures of completion.

(1) Passing the final exam related to the contract – "Grade on contract completed"
(2) Passing the final exam during the empirical period, independent of contract – "Grade completed"

The first measure is at the contract level, while the second measure is at the student level. The second measure excludes all contracts without passing the exam when the student passes on a later contract. Thus, the analytical sample at the student level is slightly smaller than at the contract level, and the average completion rate is accordingly higher. In total, 3.9% of the students pass the final examination on another contract than the initial one.

### *5.2. Training agency and completion*

The left panel of Figure 5 presents the completion rates for the four different contract types. The figure distinguishes between the two measures of completion. The completion rate on the initial contract is by definition smaller than the completion rate at the student level, but the difference is small (79% vs. 85% on average).

The differences between the average completion rates in thematic TAs, regional and cross-disciplinary TAs, and public sector units are small, although the completion rate is highest for public sector units and lowest for thematic TAs.

However, independent firms stand out as clearly lower competition rates than the other types of contract partners. At the contract level, the difference is 16 percentage points compared to the other contract types, which is 20% of the average completion rate in the sample. This is a large difference and statistically significant at conventional levels. All

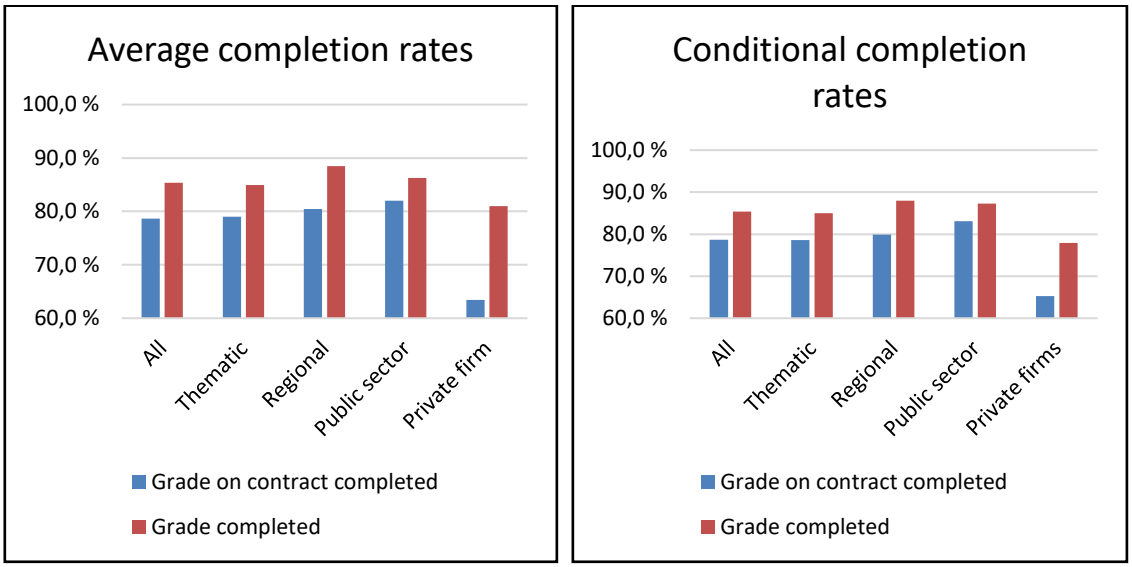
[10] The estimated influence of the different variables of the model, at average values of the variables, is very close for the linear probability model and nonlinear alternatives such as the logit model and the probit model. The coefficients of the linear probability model can readily be interpreted as an effect on completion in percentage points.

else equal, entering an apprenticeship contract with an independent firm instead of a TA reduces the probability of completion considerably.

At the student level, the difference is much smaller. The probability of completion is 4 percentage points lower in independent firms, and the difference is statistically significantly lower than for regional TAs and public sector units at the 10% level.

These findings illustrate that student starting their apprenticeship organised in independent private firms change their contract to a larger extent than others. They tend to start on a contract and complete on another contract. There are more disturbances during the training, which might be the reason why the completion rate is lower also at the student level and not only at the contract level. At independent firms, 37% of the contracts do not lead to a successful final examination. The majority of the students on these contracts enter another contract (60%), and these contracts are to a small degree in independent firms (22%). These students are typically transferred to a TA, and they have a probability of completion similar to other students starting directly on a contract with a TA.

Figure 5. Completion rates and training agencies, averages (left panel) and conditional (right panel)




Note. Grade completed is measured at the student level, don't taking transitions between multiple contracts into account. The conditional completion rates are based on the regression models in columns (1) in Appendix Tables A1 and A2.

The finding of a lower completion rate in independent firms might be because they recruit different kinds of students than others. Likewise, the similarities between the different types of training agencies might mask other differences. The right panel of Figure 5 presents the conditional completion rates.[11] Taking other factors into account, the

[11] The conditional measures are based on linear probability models. The independent variables in the models are indicators for the study track, indicators for the year of the start of the first contract, the age at the start

differences between the contract types are qualitatively similar as above. The negative association of having a contract with an independent firm becomes slightly smaller, but at the student level, the difference becomes slightly larger.

### *5.3. Heterogeneity between contracting units*

This section presents evidence of the variation across the individual contract partners. Because some firms and public sector units have few apprentices, we present results from the conditional models.[12] The performance across the contracting units is comparable to the extent that we are able to include the relevant individual characteristics in the model. In this way, the estimates can be considered the value added of each contracting unit. The estimates are the completion rate for the contracting unit, given that all have the same composition of apprentices. In order to illustrate the differences, we relate the expected probability to agency size. We define agency size as the yearly average of the number of new apprenticeship contracts during the period 2018-2022. The estimates are, per definition, uncertain for small units, and only agencies and firms with at least three contracts (students) in the analytical sample (2018-2020) are included in the figures below.

The upper panel of Figure 6 presents results for the contract level. The large training agencies, with more than 50 new contracts each year, have completion rates close to the mean of 79%. Among smaller units, the variation is large. In particular, a large number of small independent private firms (yellow dots) have a low value-added on the students. This is why the average completion rate is low on average for independent private firms. Some firms have a completion rate above the average for the whole sample, but they are relatively few.

Regarding regional and cross-disciplinary TAs (red dots), they perform relatively equal. None of this kind of agency are doing badly, which might be because none of them are very small. Among public sector units (green dots), the variation is larger. Most of them er performing above average, but a couple of the units stand out with very low value-added for the students.

The lower panel of Figure 6 presents the value-added at the student level. Some of the students not completing the apprenticeship on the initial contract, which are observations included in the upper panel, transfer to another contract. The implication is that less independent firms are included in the lower panel than in the upper panel. Some of the small units with at least three contracts have students transferring to other contracts and

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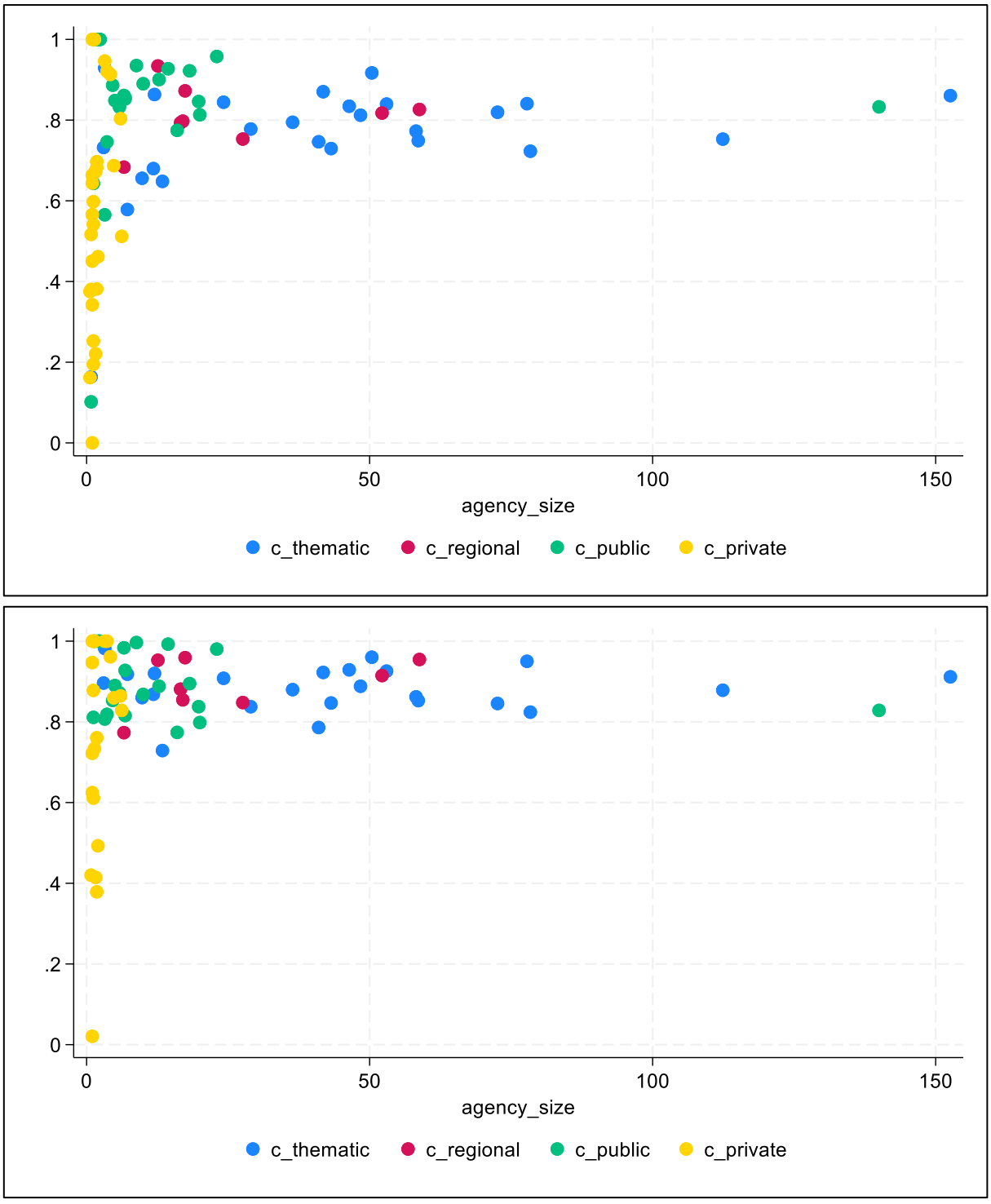
of the first contract, gender, the grade point average from lower secondary education, and an indicator for contact with the follow-up services prior to apprenticeship training. The model results are presented in columns (1) in Appendix Tables A1 and A2. The predicted completion for each type of contracting unit is the coefficients in the table, synchronized to the average value of completion in the sample.

[12] We use the same model formulation as above, except that the models include a full set of fixed effects of each contracting unit. Thus, we do not include indictors for type of contracting unit because they are saturated by the fixed effects.

are thus not included in the lower panel.[13] This is the reason why much fewer contracting units have a value-added below 50%. Otherwise, the pictures are similar for completion at the contract level (upper panel) and completion at the student level (lower panel).

Figure 6. Average predicted completion rate for individual contractors related to size, at the contract level (upper panel) and student level (lower panel)




[13] The upper panel includes 26 thematic TAs, 8 regionaland cross-disciplinary TAs, 23 public sector units, and 30 independent private firms. The corresponding numbers for the lower panel are 25, 8, 22 and 21.

### *5.4. Heterogeneity between apprentices*

Some types of individuals might be more suited for different types of contracting units. In this section, we consider whether the importance of individual characteristics differs across contracting units. In this regard, the appendix presents results from linear probability models estimated separately for the four different types of contracting units and separately for completion at the contract level and the student level.

The baseline includes all types of contract types, which are the conditional models used in the figures above. Compared to the study track for Building and Construction, the completion rate is significantly lower in Restaurant and Food Processing and Electricity and Electronics. The relatively small differences across the tracks seem to be in contrast to the findings for the UK by Gambin and Hogarth (2016), who find significant differences across apprenticeship programmes.

The completion rate is 4-5 percentage points lower for apprentices starting their apprenticeship in 2020 than the previous years, all else equal. This might be because of the pandemic, but it is most likely because they have a shorter time for completion in our data since the data are capped in June 2023.[14] Nevertheless, the pandemic seems to have had a small impact on completion, which is in accordance with national statistics.

Regarding individual characteristics, the probability of completion is higher for males than for females, and there is a highly significant relationship with the average grade from lower secondary education (GPA). One grade point higher than average (that is, 1.3 standard deviations) is associated with 12.1 and 10.1 percentage points higher probability of completion at the contract and student level, respectively. This is a large difference. Finally, being in contact with the follow-up service, which is an indication of struggling in school, is associated with substantially lower completion rates.

When we split the sample and estimate the models separately for the different apprenticeship contract types, some of the results must be interpreted with care because of small sample sizes. Overall, however, the results are qualitatively similar across contract types but with some interesting differences. In particular, while males have a significantly higher completion probability in general, that is not the case in public sector units. The public sector mainly enrols apprentices in the study track Healthcare, Childhood and Youth Development, see Figure 2. Thus, we cannot discriminate between whether it is the public sector units or characteristics by the specific study track that explains the findings. Interestingly, the gender composition differs markedly between this

[14] A further complication is that the pandemic could have different effects in different industries. Some industries were more severely affected than others. We have investigated this issue by using a more flexible modelling approach where we allow the effects of study track to change over time. The differences across the study tracks are stable across years, which indicate that the pandemic did not have different effects across types of apprenticeship training.

study track and the other study tracks, see Figure 4. The sizeable impacts of GPA and being in contact with the follow-up services are independent of the type of training agency. No one is more able to compensate for initial disadvantages than others.

## 6. Discussion

Access to in-firm training is crucial for successful transitions in VET (Gambin & Hogarth, 2016; Bonoli & Wilson, 2019; Aerne & Bonoli, 2021). However, dual vocational training systems can be selective, making it challenging for all students to secure apprenticeships (Bonoli & Wilson, 2019). In Norway, students from lower socioeconomic backgrounds and with weak secondary education performance face difficulties transitioning to apprenticeships. TAs play a crucial role in maintaining the quality of apprentice training and reporting on it (Høst et al., 2014; Michelsen et al., 2023). TAs can be viewed theoretically as bridging the gap between education and work (Luhmann, 2002; Rapp et al., 2023).

In our research, we find that there is a considerable variation in the organisation of the transition from school to apprenticeship. The TAs have many different profiles. For example, some TAs manage apprenticeship contracts and follow up on the apprentices in more than 100 member firms. On the other hand, several firms act independently of any TA and are themselves responsible for the training and reporting to the county authorities. Even if the Norwegian model is standardised at the national level and governed by the state, it needs to adapt to the environment (Luhmann, 1995), and the design of TAs needs to be differentiated to be able to tackle all the different apprentices and the specific skills they need to learn in training at work. For example, TAs adapting to the national labour market become specialised (thematic) in their form, while TAs adapting to the local labour market (regional) need to be more general and are, therefore, often cross-disciplinary.

As our results show, the share of apprentices differs among study tracks and industries. Most apprenticeship contracts are within the Building and Construction industry, including two study tracks, followed by the study track Healthcare, Childhood and Youth Development. In Norway, there is still a gender-segregated labour market, and the level of gender segregation in VET is high (Lorentzen & Vogt, 2021). Naturally, this is reflected among apprentices, where most men are in Construction, Technics, and Electricity, while women are in Healthcare, Childhood and Youth Development. Overall, we find that the probability of completion is higher for males than for females. However, this is not the case for apprentices having a contract with a public sector unit, which mainly enrol apprentices in the study track Healthcare, Childhood and Youth Development. In this way, the VET system, including the TA system, can be seen as autopoietic because it produces what it already has: a gender-differentiated workforce (Luhmann, 2002).

Individuals might get follow-up service from the County for various reasons. Drop out of upper secondary education automatically leads to registration in the follow-up service. In addition, large absences and troublesome transitions are cases for the follow-up service. For example, students who fail to get an apprenticeship position shortly after the two regular years of studies at school get follow-up service. It is the students with lowest grades that are most often in contact with the follow-up service, indicating that this is an essential service in the VET system. Since the follow-up service, in contrast to the TAs, has the responsibility to help the individual find an apprenticeship place, a job or move on to another educational track, it can be seen as a crucial part of the skills ecosystem (Buchanan, et. al. 2017; OECD, 2013). Moreover, research shows that the integration between TAs and the follow-up service may be influential in finding solutions for especially individuals at risk of marginalisation within the VET system (Rapp & Knutas, 2023). Our finding is that the probability of successful apprenticeship training is negatively related to both GPA and being in contact with the county's follow-up service.

Our empirical analysis finds give considerable variation across TAs and firms in how they are associated with the probability of their apprentices passing the final examination, which gives them the certificate of apprenticeship. We find that TAs that are thematically oriented or regional cross-disciplinary oriented, as well as apprentices in the public sector, are, on average, similarly successful in terms of apprentice completions. However, independent firms have significantly lower apprentice completion rates. These results indicate that the TAs are essential elements within the skills ecosystem as they work to secure quality in VET. Moreover, the little research that earlier has been carried out on TAs suggests that their quality control interaction contributes to integrating education, apprenticeships, and work (Høst, 2014; Michelsen et al., 2023; Author, 2023).

There may be several reasons why individual firms acting with the same responsibility as a TA do not have the same success regarding apprentice completion. One possibility is that individual firms often consist of few employees, which can lead to one-sided guidance of the apprentice. Høst (2015) and Michelsen & Høst (2013) write that their impression is that the follow-up the Counties provide to private firms is not of the exact nature and frequency as the follow-up conducted by the TAs, and it seems like the Counties have little capacity to provide individualised follow-up to private firms (Michelsen & Høst, 2013). It appears important that VET does not become a closed, autopoietic system (Luhmann, 2002) but rather adapts to and interacts with its surroundings (Brunsson, 2006; Luhmann, 2018). The more information the TAs have about competency needs and opportunities in the labour market, the greater the chance that the apprentice will also benefit from such information.

In the case of dual VET education, the students have limited information about apprentice alternatives and need to search for acceptable alternatives. There are "frictions" in the relationships between the schools and the workplaces because the information sets of the involved actors are limited. The firms do not have complete information about potential apprentices, and the students do not have full information about potential apprenticeship

relations. The skills ecosystems will reduce the challenges enforced by the frictions and improve search and matching. It might inform firms about qualifications and candidates for apprenticeships, and it might inform students about potential firms for their in-firm training. Our quantitative evidence is consistent with the hypothesis that including TAs in the skills ecosystem reduces coordination challenges and improves the search and matching process of students and firms.

Second, the amount of matching is related to the composition of different types of VET and the labour market demand for different types of skills. The labour market might demand a different composition of skills than those provided by the schools. In particular, the track structure of the schools might not perfectly match labour demand, and students might prefer different specialisations than those demanded by firms. Such skill mismatch, denoted horizontal skill mismatch by McGuinness et al. (2018), has implications for the relevance of the VET systems and the transitions in the system (Béduwé and Giret. 2011). A related type of mismatch is that firms might consider potential apprentices to lack some basic and necessary skills. They are not capable of an apprenticeship position.

A third form of mismatch is the lack of apprenticeship positions. There are more students in VET applying for apprenticeship positions than positions available, a kind of excess demand for apprenticeships. In reality, it is difficult to distinguish this kind of mismatch from the types above, and the situations are expected to vary across VET systems. Some quantitative studies have used variations in youth unemployment and other aspects of the labour market for young adults to disentangle different kinds of matching challenges. In recessions, firms employ less and are expected to provide fewer apprenticeship positions. Thus, the amount of apprenticeship and completion rates in VET decline. On the other hand, for young people, alternatives to education become restricted, which increases the demand for VET and apprenticeship places. The empirical studies tend to find that the latter effect dominates. Reiling and Strøm (2015) find higher completion rates and less dropout from VET when the business cycle improves, and Bensnes and Strøm (2018) find that extending opening hours in retail, improving labour market opportunities for young people increases dropout. At least in the Norwegian setting, these studies indicate that the lack of apprenticeship positions is not the main matching challenge in the VET system.

According to OECD (2013), to promote VET, it is important to create networks bringing together stakeholders like public/private training providers, employers, industry representatives, unions, training agencies, government agencies, and community representatives. Governments can act as catalysts by providing policy context, support, resources, infrastructure, and institutional frameworks. Our results indicate that the Norwegian TAs, governed by the state and County, have an essential role in integrating and overseeing these networks.

## 7. Conclusion

Vocational education and training involves a myriad of actors, working together in many subsystems as a skills ecosystem. This paper focuses on the role of training agencies (TAs) in this system. The TAs interrelate both with the school authorities, the schools, the apprentice's workplaces, and the apprentices themselves. Their main task is the quality of the apprenticeship training.

Using data from one Norwegian county and prime-age apprentices, we find a large variation in completion rates across TAs and contract types. One main finding is that apprentices having a contract directly with an independent private firm have a significantly lower probability of passing the final examination and achieving the trade certificate than apprentices with a contract with a TA. They also change their contract more often than others. We conclude that TAs have an essential role in the VET skills ecosystem.

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## Appendix. The regression models

Table A1. Regression results, separate for types of agencies. Dependent variable is completion at the contract level

| | (1) All | (2) Thematic TAs | (3) Regional TAs | (4) Public sector units | (5) Independent private firms |
|---|---|---|---|---|---|
| *Public sector unit, reference* | - | - | - | - | - |
| Thematic Training Agency | -0.0361 | - | - | - | - |
| | (0.0242) | | | | |
| Regional Training Agency | -0.0253 | - | - | - | - |
| | (0.0280) | | | | |
| Independent private firms | -0.174*** | - | - | - | - |
| | (0.0372) | | | | |
| *Building and Construction, reference* | - | - | - | - | - |
| Electricity and Electronics | -0.0339* | -0.0312 | -0.0789 | 0.362** | -0.292** |
| | (0.0194) | (0.0211) | (0.0656) | (0.178) | (0.128) |
| Healthcare, Childhood and Youth | 0.0248 | 0.0320 | 0.0356 | 0.255 | 0.109 |
| Development | (0.0312) | (0.0480) | (0.0857) | (0.175) | (0.208) |
| Restaurant and Food Processing | -0.0706** | -0.0139 | -0.764*** | 0.113 | -0.127 |
| | (0.0351) | (0.0400) | (0.103) | (0.206) | (0.0957) |
| Service and Transport | -0.0255 | -0.0629* | 0.0581 | 0.246 | 0.222*** |
| | (0.0262) | (0.0321) | (0.0960) | (0.178) | (0.0853) |
| Technology and Industrial Production | 0.00995 | 0.0135 | -0.0404 | 0.405** | 0.117 |
| | (0.0198) | (0.0223) | (0.0521) | (0.184) | (0.131) |
| Design, Arts and Crafts, and Agriculture, | 0.00325 | -0.0242 | 0.0786 | 0.0624 | 0.0462 |
| Fishing and Forestry | (0.0290) | (0.0406) | (0.0531) | (0.210) | (0.105) |
| *Contract in 2018, reference* | - | - | - | - | - |
| Contract in 2019 | -0.0102 | -0.0159 | 0.0410 | 0.000919 | -0.0626 |
| | (0.0151) | (0.0186) | (0.0404) | (0.0360) | (0.0699) |
| Contract in 2020 | -0.0357** | -0.0393** | -0.0568 | 0.00386 | -0.0912 |
| | (0.0154) | (0.0191) | (0.0436) | (0.0354) | (0.0738) |
| *Contract made at 18 years of age, reference* | - | - | - | - | - |
| Contract made at 19 years of age | 0.00936 | -0.00778 | 0.0274 | 0.0426 | 0.121 |
| | (0.0179) | (0.0226) | (0.0624) | (0.0388) | (0.0778) |
| *Female, reference* | - | - | - | - | - |
| Male | 0.0676*** | 0.0784*** | 0.135** | -0.0321 | 0.148* |
| | (0.0200) | (0.0274) | (0.0597) | (0.0385) | (0.0796) |
| GPA from lower secondary education | 0.121*** | 0.128*** | 0.0969*** | 0.101*** | 0.162*** |
| | (0.0106) | (0.0135) | (0.0271) | (0.0235) | (0.0469) |
| *Not been in contact with the follow-up services prior to the contract, reference* | - | - | - | - | - |
| Been in contact with the follow-up services | -0.176*** | -0.168*** | -0.254*** | -0.161*** | -0.132 |
| prior to the contract | (0.0255) | (0.0317) | (0.0768) | (0.0612) | (0.0908) |
| Observations | 3,995 | 2,596 | 476 | 666 | 257 |
| R-squared | 0.074 | 0.071 | 0.125 | 0.073 | 0.126 |

Note. The models are estimated as linear probability models. Heterogeneity robust standard errors in parentheses. *, ** and *** denote significance at 10%, 5% and 1% level, respectively.

Table A2. Regression results, separate for types of agencies. Dependent variable is completion at the student level

| | (1) All | (2) Thematic TAs | (3) Regional TAs | (4) Public sector units | (5) Independent private firms |
|---|---|---|---|---|---|
| *Public sector unit, reference* | - | - | - | - | - |
| Thematic Training Agency | -0.0204 | - | - | - | - |
| | (0.0215) | | | | |
| Regional Training Agency | 0.00378 | - | - | - | - |
| | (0.0247) | | | | |
| Independent private firms | -0.0588* | - | - | - | - |
| | (0.0337) | | | | |
| *Building and Construction, reference* | - | - | - | - | - |
| Electricity and Electronics | -0.0441** | -0.052*** | -0.00789 | 0.174 | -0.285* |
| | (0.0180) | (0.0197) | (0.0566) | (0.188) | (0.148) |
| Healthcare, Childhood and Youth | -0.00285 | 0.0127 | 0.0529 | 0.0939 | 0.0955 |
| Development | (0.0280) | (0.0432) | (0.0787) | (0.187) | (0.164) |
| Restaurant and Food Processing | -0.0601* | -0.0360 | -0.921*** | -0.0243 | 0.0228 |
| | (0.0337) | (0.0383) | (0.0718) | (0.215) | (0.0848) |
| Service and Transport | -0.0257 | -0.0551* | -0.0183 | 0.170 | 0.101 |
| | (0.0246) | (0.0309) | (0.0945) | (0.187) | (0.0834) |
| Technology and Industrial Production | 0.0260 | 0.0295 | -0.00101 | 0.231 | 0.110 |
| | (0.0175) | (0.0198) | (0.0467) | (0.195) | (0.115) |
| Design, Arts and Crafts, and Agriculture, | 0.0169 | 0.0177 | 0.0529 | -0.138 | 0.120 |
| Fishing and Forestry | (0.0249) | (0.0333) | (0.0476) | (0.220) | (0.0967) |
| *Contract in 2018, reference* | - | - | - | - | - |
| Contract in 2019 | -0.00915 | -0.00573 | 0.0349 | -0.0328 | -0.0405 |
| | (0.0134) | (0.0168) | (0.0330) | (0.0320) | (0.0652) |
| Contract in 2020 | -0.051*** | -0.050*** | -0.0638 | -0.0516 | -0.0596 |
| | (0.0141) | (0.0177) | (0.0389) | (0.0320) | (0.0687) |
| *Contract made at 18 years of age, reference* | - | - | - | - | - |
| Contract made at 19 years of age | 0.0226 | 0.00587 | 0.0119 | 0.0830** | 0.0751 |
| | (0.0167) | (0.0215) | (0.0569) | (0.0344) | (0.0745) |
| *Female, reference* | - | - | - | - | - |
| Male | 0.0270 | 0.0429* | 0.0771 | -0.0640* | 0.0927 |
| | (0.0181) | (0.0249) | (0.0530) | (0.0351) | (0.0744) |
| GPA from lower secondary education | 0.101*** | 0.113*** | 0.0655*** | 0.0755*** | 0.132*** |
| | (0.00986) | (0.0126) | (0.0242) | (0.0214) | (0.0452) |
| *Not been in contact with the follow-up services prior to the contract, reference* | - | - | - | - | - |
| Been in contact with the follow-up services | -0.179*** | -0.174*** | -0.220*** | -0.200*** | -0.144 |
| prior to the contract | (0.0258) | (0.0322) | (0.0807) | (0.0600) | (0.0986) |
| Observations | 3,631 | 2,373 | 425 | 633 | 200 |
| R-squared | 0.068 | 0.073 | 0.125 | 0.085 | 0.102 |

Note. The models are estimated as linear probability models. Heterogeneity robust standard errors in parentheses. *, ** and *** denote significance at 10%, 5% and 1% level, respectively.