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The impact of COVID-19 on apprenticeship markets

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E-mail: eac-unite-a4@ec.europa.eu

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B-1049 Brussels

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The impact of COVID-19 on apprenticeship markets

Samuel Mühlemann

Directorate-General for Education, Youth, Sport and Culture
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ABOUT EENEE

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Contractor:

PPMI

Gedimino pr. 50, LT - 01110 Vilnius, Lithuania
Phone: +370 5 2620338
E-mail: info@ppmi.lt
www.ppmi.lt

AUTHOR:

Samuel MÜHLEMANN, Ludwig Maximilian University of Munich (Germany)

PEER REVIEWER:

Miroslav BEBLAVÝ, EENEE Scientific Coordinator

LANGUAGE EDITOR:

Siobhán DENHAM, Copyeditor/Proofreader

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Introduction

COVID-19 strongly impacted society as a whole and led to a severe a recession in the 27 EU Member States, as their GDP fell by 6.1 % on average in 2020. As a consequence, unemployment rates increased rapidly, despite government efforts to stabilise their economies. To the extent that a recession is only temporary, firms will not immediately lay off their employees because of adjustment costs and make use of short-time work policies where possible, which dampens the number of dismissals. However, when firms expect a recession to last relatively long or expect structural changes because of the global pandemic (such as permanent changes in travel behaviour), then the size of the current workforce and expectations about a firm's future labour demand need to be adjusted. In several European countries, such as Germany, Austria, and Denmark, many firms train apprentices to fill their own future vacancies for skilled workers. Thus, to the extent that a training firm expects a lasting effect of COVID-19 on its business, it may no longer retain as many apprenticeship graduates as initially planned and take on fewer new apprentices.

This report focuses on the dual form of apprenticeship training in EU Member States, where a significant fraction of the training takes place in the workplace[1]. The pandemic strongly impacted apprenticeship training along different dimensions. First, workplace training became often more difficult due to social distancing rules or stopped taking place altogether in some sectors, such as gastronomy, where hotels and restaurants were forced to remain closed for an extended period. Thus, as acquiring practical skills in the workplace became more difficult, there was a shift towards more theoretical learning. Moreover, vocational schools largely moved to online teaching in spring 2020, which was particularly problematic in countries and regions without reliable broadband internet access and adequate devices to participate in distance learning. These developments negatively affected the skills development process of apprentices. Luckily, the first wave of COVID-19 eventually started to flatten out across Europe, allowing many apprentices to go back to school and the workplace after the initial lockdown. Before the summer of 2020, the final apprenticeship examinations could take place in many countries, ensuring that apprentices could graduate and receive their skills certificates.

The review reveals that taking on new apprentices in such trying times can be difficult, particularly when apprenticeship training constitutes a net investment for the training firm, as is the case in Germany and Austria. These two EU Member States have a quantitatively important dual apprenticeship system with a long tradition (Muehlemann, 2019). In both countries, the number of new apprenticeship contracts decreased significantly in 2020, and much of that decrease can be attributed to COVID-19. However, other factors such as a demographic change and declining business expectations of firms before the start of the pandemic would also have affected equilibrium outcomes in 2020 even in the absence of COVID-19.

Theoretical considerations and empirical studies reveal that the assessment of firms about the business climate matters when it comes to the provision of apprenticeships, particularly when training is costly on average (Muehlemann et al., 2020a). In that case, the initial training investment can only be recouped when firms can retain an apprentice as a skilled worker, which requires that firms expect that they will have vacancies to fill in the future. Thus, when a bleak business climate negatively influences a firm's future demand for skilled workers, their demand for apprentices will decrease accordingly.

[1] For a recent analysis of human capital accumulation during recessions for other types of training in Europe, see Brunello and Bertoni (2021).

Moreover, the demand for apprentices may fall even in firms where training does not constitute a net investment during 'normal times' (i.e. when apprentice wages are sufficiently low to offset training costs, or firms are reimbursed for part of their expenses with subsidies or transfer payments). The reason is that the expected benefit during training (i.e. the value of the apprentice's productive activities) may fall substantially during a recession, as tasks suitable for apprentices become scarce, and firms are left with training costs but no benefits.

Lastly, COVID-19 may affect not only the demand for new apprentices but also the retention rates and employment outcomes of apprenticeship graduates. To the extent that apprenticeship graduates are not retained by their training firm and are also not successful in finding a suitable position on the external labour market (which became more difficult as fewer job vacancies were advertised due to COVID-19), we might expect a corresponding increase in unemployment rates, wages losses or an increased mismatch of recent apprenticeship graduates in terms of their actual qualifications and the required qualifications of their jobs.

While no representative data for European countries is available yet on employment outcomes for apprenticeship graduates during the COVID-19 pandemic, a recent survey of German employers revealed that only a small minority of firms planned to adjust their plans to retain apprenticeship graduates (Bellmann et al., 2020). This is in line with the observation that Germany's youth unemployment level remained relatively low in 2020. In several EU-27 Member States, however, youth unemployment increased strongly in the aftermath of COVID-19, an outcome that, among other factors, likely depends on a country's labour and training market institutions, but also strongly on policies to stabilise its economy in response to COVID-19.

The remainder of this report is structured as follows. The next section discusses theoretical considerations of the role of the business cycle on outcomes related to apprenticeship training in general and regarding COVID-19 in particular. Subsequently, the relevant empirical studies on the effects of COVD-19 on apprenticeship markets are discussed, mainly focusing on the EU Member States. The final section concludes with a discussion of the main findings.

1. The economics of apprenticeship markets

In dual apprenticeship training systems, it is usually the firm that makes the upfront training investment (i.e. pays the salary of the instructor and covers the costs for machinery and other training equipment) and in addition pays a training wage to apprentices (see Muehlemann, 2019; Muehlemann & Wolter, 2020). In the EU, countries such as Austria, Czechia, Denmark, Estonia, and Germany have a VET system with an important workplace component. In addition, Switzerland has a large dual apprenticeship system[2]. However, except for Germany, Switzerland and to some degree Austria, the reallocation of funds between non-training and training firms or public reimbursement reduces the initial investment for training firms considerably (Table 1). Thus, from an economic perspective, Germany and Austria may be rather vulnerable to COVID-19, as the

[2] Even though Switzerland is not an EU Member State, I decided to include it in this report as Switzerland has strong ties to the EU, and several important empirical studies were conducted in recent years on the Swiss apprenticeship system that may be of interest to other EU Member States, as contrary to Germany or Austria, where unions and works councils are prevalent, Switzerland has a rather flexible labour market with low employment protection legislation, similar to countries like Estonia, Iceland, Ireland or Hungary (OECD, 2020).

average net investment in apprenticeship training (per apprenticeship) is highest among all EU Member States. The following subsections explain this reasoning in detail.

Table 1: Importance of dual apprenticeship training and firm investments

	Importance of investments by firms		
Share of dual/part-time VET to all pupils	**Low**	**Medium**	**High**
High (>30 %)	Czechia, Denmark, Estonia	Austria	Germany, Switzerland*
Medium (6-30 %)	Finland, Iceland, Norway, Slovakia	France, Hungary, Luxembourg, the Netherlands	
Low (<6 %)	Belgium, Ireland, Italy, Poland, Portugal, Slovenia, Spain, Sweden		

Note: Importance of training investments of firms in selected EU Member States in 2011. Adapted from OECD Education at a Glance, p. 235. *Switzerland is listed here as it has ties to the EU due to the bilateral agreements and because it is a country with a quantitatively important dual apprenticeship system.

1.1. Train to retain or train for short-run profit?

Although apprenticeship training may constitute a considerable cost for a training firm, apprentices also spend much of their time in the workplace and contribute to the production of goods and services. The value of an apprentice's productive work has been assessed in cost-benefit surveys in Austria, Germany, and Switzerland (for a recent review, see Muehlemann & Wolter, 2020). Interestingly, the cost-benefit ratio differs strongly by training occupations and firm size, but also across countries. While the value of an apprentice's productive work only covers between 51 % and 79 % of the training costs in Germany, the corresponding values are 83 % in Austria and 107 % to 110 % in Switzerland.

Moreover, there is a strong variation in the cost-benefit ratio across occupations within countries. Even in Germany, 28 % of apprenticeships (particularly in the crafts sector and in smaller firms) result in a net benefit from the perspective of the training firm (Schönfeld et al., 2020). Schlögl & Mayerl (2016) find for Austria that the share of firms with a net benefit in each year of training ranges from 21 % to 49 %. To the extent that the training benefits outweigh the costs in the short run, a company does not need to retain an apprentice to recoup the initial training investment.

However, the situation is rather different when a firm makes a substantial net investment in apprenticeship training. This is often the case in large firms and advanced apprenticeship in manufacturing, as well as in firms with separate internal training facilities. Average net training costs amount to EUR 28 000 per apprentice over a three-and-a-half-year period in the Austrian manufacturing sector (Schlögl & Mayerl, 2016), where the productive value of an apprentice only covers 71 % of gross training costs, and EUR 32,000 in MINT-occupations in Germany (Schönfeld et al., 2020), where the productive value of an apprentice only covers 57 % of gross training costs. Thus, a firm's willingness to make

such investments strongly depends on their expectations of whether they can retain apprenticeship graduates as skilled workers.

Retention rates reveal that training firms are indeed often very successful in retaining graduates. In Germany, the latest figures show that firms with more than 50 employees retain over 80 % of their apprenticeship graduates, and the largest firms with more than 500 employees still employ 70 % of graduates within five years after training (Schönfeld et al., 2020). In Austria, initial retention rates of graduates are also high, exceeding 70 % (76 %) in firms with more than 50 (250) employees, and 54 % (68 %) within three years after graduation (Schlögl & Mayerl, 2016).

1.2. Post-training benefits are key to recoup initial net training investment

Two key factors can explain why firms may recoup their initial training costs later on: i) savings on future hiring costs and ii) compressed wage structures in frictional labour markets (due to job search and mobility costs or information asymmetries, cf. Acemoglu & Pischke, 1999). Particularly when labour markets are tight, apprenticeship graduates facilitate successfully and quickly filling vacancies for skilled workers, which itself can be very costly (Blatter et al., 2012; Muehlemann & Pfeifer, 2016). Thus, depending on the expected costs of external hiring vs internal training and subsequent retention, a firm will decide to cover at least part of its future labour demand with apprenticeship graduates (Blatter et al., 2016).

For Austria, recent research shows that expected post-training benefits from successfully retaining apprenticeship graduates, rather than having to hire from the external labour market, are sufficiently high to cover a training firm's initial training investment on average (Moretti et al., 2019). Two factors are particularly relevant: first, hiring costs to successfully fill a position in Austria average 4.4 monthly skilled worker salaries, which is substantially higher compared to Switzerland (3.1 monthly salaries). Second, the probability of mismatch is more important in Austria, where one in four newly hired employees leave a firm within a year (compared to only 13 % in Switzerland). Thus, being able to retain apprentices additionally has the potential to reduce bad hiring decisions, as firms and apprentices learn about the quality of their match during an apprenticeship programme.

Classical human capital theory (Becker, 1964) predicts that firms would never finance investments in general human capital (i.e. skills and knowledge useful in many different firms) because a worker would reap the benefits of their increased productivity when labour markets are competitive. However, empirical evidence overwhelmingly shows that firms are in fact paying for general human capital. German training firms, for example, make substantial net investments in apprenticeship training (see e.g. Muehlemann, 2019 for a discussion). Frictions in labour markets, such as information asymmetries about worker productivity and the content of training as well as mobility and job search costs, however, enable firms to offer wages below the values of a worker's productivity (Acemoglu & Pischke, 1999). To the extent that the difference between productivity and wages (i.e. a firm's rent) increases with the level of training, firms have an incentive to finance general training that is useful in other firms. As a result, training firms may retain apprenticeship graduates as skilled workers that are more productive than other candidates in the labour market while not having to pay a wage premium.

In summary, post-training benefits may allow firms to recoup their initial training investment. However, to do so, it is crucial that firms must not only be able to retain apprentices after graduation but also have the corresponding need to fill vacancies. The

demand for skilled labour, however, may suddenly decrease in times of a large unanticipated economic crisis.

1.3. Business cycle effects in a market for apprentices

This section briefly discusses how business cycle fluctuations affect both a firm's demand and the individual supply of apprentices.

1.3.1. Demand for apprentices

Business cycle fluctuations affect a firm's current production because market demand for goods and services increase during a boom period and decrease in a recession. As business cycle fluctuations are frequent and often of a rather short duration (in comparison to a typical three or four-year apprenticeship programme), such fluctuations may not have a strong influence on a company's training decision at first sight, particularly if the main motivation for training is the intention to retain apprenticeship graduates to fill future vacancies. However, when product demand is low, firms will have to decrease production, which negatively impacts training benefits because there is no longer enough productive work for apprentices. During the COVID-19 pandemic, apprentices were not productive at all in companies that were forced to shut down. Thus, unless government interventions (such as short-time work programmes) compensate for such losses, firms only bear the costs but generate no benefit in the short run. As a result, firms that do not train to retain apprentices as skilled workers may no longer find it worthwhile to hire new apprentices during a recession. Moreover, a large economic shock may introduce uncertainty about business expectations and thus affect a firm's commitment to invest in apprenticeship training that lasts several years. Furthermore, a recession often impacts firms financially, resulting in cost savings programmes. To the extent that apprenticeship training is associated with a large initial investment and uncertain returns several years later, some firms may decide (or are forced) to reduce the number of apprenticeship positions to cut expenditures in the short run.

Table 2: Effect of an economic downturn on the costs and benefits of apprenticeship training

Training costs	Short-run training benefits	Post-training benefits
Apprentice wage costs	Value of an apprentice's productive work	Savings on hiring costs
Instructor wages		Savings on mismatch costs
Other costs (material and infrastructure for training, exam fees, etc.)		Rent from paying a wage to apprenticeship graduates below their productivity due to compressed wage structures

Notes: Positive effects of an economic downturn on a firm's cost-benefit ratio are marked in green, negative effects in red.

In case of an economic crisis, three main factors of a firm's cost-benefit ratio are affected (Table 2): First, the opportunity costs of training decrease if part-time instructors are not able to carry out productive tasks due to a low work volume when training apprentices

instead, so that instruction costs tend to be lower during a recession, although only in firms where apprentices are in fact trained by part-time instructors (cf. Muehlemann et al., 2019 for a detailed exposition of that argument). Second, short-run benefits decrease, because fewer opportunities are available during a crisis to make use of apprentices in the production process. Third, savings on hiring and mismatch costs decrease as it becomes easier (and thus cheaper) to recruit suitable skilled workers from the external labour market as the number of job seekers (and thus applicants per vacancy) increases during a crisis. Finally, because firms might no longer need to fill skilled worker vacancies in the first place and decide not to retain apprenticeship graduates, it will not be able to generate any post-training benefits in the first place. Thus, while the impact of a recession on the short-term training costs and benefits are ambiguous in theory, the impact on post-training benefits is clearly negative. This means that the cost-benefit situation for training firms that rely on post-training benefits may be affected more strongly by a large economic crisis (see also Muehlemann et al., 2020a for a more detailed discussion). However, this is only true in the case when a recession is expected to last for several years. To the extent that a recession is short-lived, training firms might again have an advantage in filling skilled worker vacancies with apprenticeship graduates during the subsequent economic boom period. Thus, much of the firm's training decision depends on its expectations about the severity and duration of the crisis (cf. Muehlemann et al., 2020a).

1.3.2. Supply of apprentices

While the demand for apprentices is likely to be the main driver of changes observed in the number of apprenticeship contracts, there are several reasons why the supply of apprentices is also affected by business cycle fluctuations. People may adjust their educational choice when the preferred training occupation is strongly affected by the crisis due to an increased risk that the training firm might experience bankruptcy during an apprenticeship (Fersterer et al., 2008), and because of possibly worse labour market outcomes after graduation (see discussion in the next section). Specifically, individuals with higher educational qualifications, such as a high school diploma, may more often opt to enrol in a school-based educational track during a crisis. In contrast, individuals with lower-level educational qualifications or poor grades may not qualify for certain school-based options (e.g. enrolling in a university or university of applied sciences).

Moreover, when apprenticeship positions are scarce, search costs increase because individuals will have to send out more applications and attend more job interviews (all other things being equal) to successfully obtain a training position[3]. Thus, individual expectations about the success probability in the application process matter as well. Opting for a school-based education may be a more sensible option for individuals who believe they will unlikely succeed in the apprenticeship market.

1.3.3. Graduating in a crisis

While firms may revise their decision to take on new apprentices during a crisis, a second important aspect is a firm's decision to retain apprentices as skilled workers. Similar reasoning to that discussed above applies here: to the extent that a firm no longer needs to fill vacancies because of an economic downturn, retention rates are expected to be lower

[3] For Germany, Protsch and Solga (2015) apply a correspondence test method and show that call-back rates for apprenticeship applicants are substantially lower for individuals with poor grades and behavioural reports that are based on subjective teacher evaluations during compulsory schooling. It is likely that such differences are even more pronounced during an economic crisis when firms can choose among more applicants per advertised vacancy.

during a recession. Moreover, as labour market tightness decreases (i.e. more applicants per vacancy) wages for those lucky enough to find a job decrease because more individuals apply for a vacancy, which puts downward pressure on wages.

A second and possibly even more important reason for the observed wage decrease of labour market entrants during a recession is that graduates often must accept jobs for which they are overqualified or jobs that are not related to their recently acquired education[4]. The severity of wage losses for graduates who enter the labour market during an economic downturn also depends on labour market institutions. To the extent that minimum wages or collective bargaining agreements prevent downward wage adjustment, a recession might affect employment rates of recent graduates relatively more than wages[5].

In summary, much depends on the firm's expectations about the severity and duration of a recession, but also on measures that stabilise the economy and labour markets (such as short-time work policies, which are used extensively in countries such as Germany and Austria). When firms expect that the economy will recover soon, they will train and retain apprenticeship graduates to avoid future staff shortages, particularly in industries with a high level of labour market tightness before a crisis.

Recent empirical research shows that the number of school graduates is positively associated with the number of apprenticeship contracts concluded in Germany and in Switzerland (Muehlemann et al., 2020b; Lüthi & Wolter, 2020), an outcome that is particularly relevant in Germany where the number of school-leavers has dropped continuously since 2007. As a result, the number of apprenticeships has declined and the number of unfilled apprenticeship positions has increased significantly, as firms faced more and more difficulties in finding suitable apprentices. At the same time, labour market tightness increased due to a continuously growing economy, making it more costly and time-consuming to fill skilled worker vacancies. Skilled worker shortages will likely become more pronounced in the future in countries with an ageing population (cf. Klinger & Fuchs, 2020), thereby incentivising firms to keep offering apprenticeship training positions.

2. Empirical evidence on the effects of COVID-19 on the apprenticeship market

The empirical literature on business cycle effects on apprenticeship markets in general is rather scarce. However, the few existing studies consistently show that the number of new apprenticeship contracts is procyclical (i.e. firms hire fewer new apprentices during a recession or when the situation in the labour market worsens[6]). However, even less

[4] Brunner & Kuhn (2014) find for Austria that a 1pp increase in unemployment was associated with a 0.9 % decrease in starting wages and a 1.3 % lower life-time income for new labour market entrants, which they explain with a lower quality of a worker's first employer. Van der Berge (2018) finds for the Netherlands that a 1 %-point increase in the unemployment rate is associated with an initial 6 % decline in starting wages of graduates from vocational training, and who still earn 1 % less in the first 8 years after graduating. He explains this finding with an increased probability of a mismatch and employment with lower-paying firms. He also finds that academic graduates find it easier obtain a suitable job within 4 years, while vocational graduates remain mismatched because they appear to be locked-in in atypical occupations.

[5] In the aftermath of the Great Recession, youth unemployment rates in Europe increased sharply in many European countries (Dietrich & Möller, 2015).

[6] Some studies use labour market indicators such as unemployment and the availability of skilled workers, as well as GDP growth as a measure for business cycle fluctuations, while others use data on business expectations. For Germany, see Baldi et al. (2014), Bellmann et al. (2014), Dietrich and Gerner (2007), and Muehlemann et al. (2020). For Norway, see Askilden and Nilsen (2005) and

information is available about how COVID-19 impacted apprenticeship markets across Europe, and the relevant statistics for the apprenticeship market in 2020 have not yet been published for many countries.

The distinction between yearly changes and the causal impact of COVID-19 is important, as many other factors, particularly demographic change, affect the number of new training positions. In Germany, for example, the number of new apprenticeship contracts was predicted to fall by 2 % even without COVID-19, largely due to a decrease in graduates from the lower secondary level and grammar schools and a slowdown in economic growth (Maier 2020). Thus, attributing the entire yearly change in training contracts to COVID-19 would overestimate the effect of the pandemic (and vice-versa in countries such as Switzerland, where school-leavers increased from 2019 to 2020).

Due to data limitations, most studies focus on apprenticeship contracts – which are, however, equilibrium outcomes determined by the demand for and the supply of apprentices. Ideally, we would like to identify the effects of COVID-19 separately on the demand for and the supply of apprentices and not only look at the number of new apprenticeship contracts.7 Such information would be helpful when it comes to designing policies aimed at stabilising apprenticeship markets during a crisis (i.e. to know whether to focus more on the demand or the supply side of the market).

2.1. Effect of COVID-19 on new apprenticeship contracts

This section focuses on the development of the market for first-year apprentices in Germany and Austria for two reasons: first, detailed statistics are available for Germany and partially for Austria but are not available (yet) for other countries. Second, as indicated in Table 1, Germany and Austria are the two EU Member States with the quantitatively most important dual apprenticeship systems where firms make significant (net) training investments in their apprentices. Thus, we can expect that these two countries would be most at-risk regarding any adverse effects of the pandemic on relevant apprenticeship market outcomes.

2.1.1. Germany

In Germany, the number of dual apprenticeship positions decreased by 11 % in 2020 (Figure 1), whereas the demand for apprentices, as measured by the sum of apprenticeship contracts and the number of unfilled positions that were registered by the German employment agency (Bundesagentur für Arbeit), decreased by 8.8 % (Oeynhausen et al., 2020)[8]. Interestingly, the number of unfilled vacancies was at a record high in September 2020, and 12.8 % higher than in the previous year. At the same time, the number of unsuccessful applicants registered with the employment agency and still looking for a training position in September 2020 increased by 6.1 % (Oeynhausen et al. 2020). Thus, the results suggest that the pandemic had, as could be expected, a strong and negative effect on the firm's demand for apprentices. However, the substantial increase in unfilled vacancies also suggests that matching problems arose due to COVID-19, likely caused by the lockdown measures, and contact limitations that made it more difficult and costly for

Brunello (2009). For Denmark, see Westergaard-Nielsen and Rasmussen (1999). For Switzerland, see Muehlemann et al. (2009) and more recently Lüthi and Wolter (2020).

[7] To the best of my knowledge, such data is only available for Germany, and in part for Austria (although registered unfilled positions and unsuccessful applicants are only a fraction of the universe of positions and applicants).

[8] In Germany, almost all apprenticeship vacancies are registered with the employment agency (98 % of all vacancies in 2019, cf. Maier, 2020, p.8).

apprentices and training firms to meet. Moreover, job fairs and trial days in training firms often did not take place (or only virtually), which again may have contributed to the observed matching problems. In comparison to 2019, the number of filled vacancies registered with the employment agencies in Germany decreased substantially from April (-12.9 %) to June (-13.5 %), and then slightly recovered until September (-9 %), indicating that the lockdown measures indeed had a strong adverse effect on the matching process in the German apprenticeship market[9].

However, identifying the causal effects of COVID-19 rather than focusing on descriptive statistics is of obvious interest. Muehlemann et al. (2020a) find that much of the fluctuation in demand for apprentices in the period 2007-2019 was in fact driven by changes in business cycle expectations (as measured by the ifo Business Climate Index for Germany). In contrast, changes in the supply of apprentices are also affected by the number of school-leavers and the overall trend in educational choices[10]. The point estimate of the out-of-sample prediction of the change in the firms' demand for apprentices due to observed changes in the business climate between January and June 2020 was -8.1 %. Thus, more than 90 % of the observed change in the firm's demand for apprentices could be predicted (out-of-sample) based on how the apprenticeship market reacted to previous macroeconomic shocks in the period from 2007 to 2019. In line with these results, Table 3 shows a list of the most affected training occupations in 2020. Occupations in industries that were hit particularly hard by COVID-19, such as tourism and gastronomy, but also manufacturing, show the highest decrease in training positions. Conversely, occupations in the construction industry were hardly affected on average, and some occupations such as carpenter even experienced growth compared to the previous years, which is again in line with observed business expectations of German firms. Moreover, the surge in bicycle sales in the spring and summer 2020 was also reflected in an almost 13 % increase in the number of new apprenticeships in the occupation 'motorcycle and bicycle mechanics' in 2020.

[9] A recent study for Switzerland (Goller and Wolter 2021) shows that they daily search queries for apprenticeship vacancies decreased significantly during the lockdown period in 2020 and was strongly and inversely related to the stringency index that measures the intensity of restrictions related to COVID-19. Unlike Germany, however, the apprenticeship market recovered fully in the German-speaking part of Switzerland, where even more apprenticeship contracts were signed in 2020 compared to 2019, while fewer contracts were signed in the French and Italian-speaking part of the country despite several cantons offering direct training subsidies to firms. It is also important to note that the number of Swiss school leavers was increasing from 2019 to 2020, and there was an excess demand for apprentices before the start of the global pandemic. Thus, the results showing that the overall number of apprenticeship positions was even slightly higher than in 2019 (see Figure 1) should not be interpreted in the sense that COVID-19 had no adverse effect on the Swiss apprenticeship market.

[10] In Germany, the share of individuals who graduate with a high school diploma has increased steadily in recent years, while at the same time the share of apprentices with a high school qualification increased as well. This is relevant, as such individuals have the option to enrol in a university or a university of applied sciences when they are unsuccessful in finding an apprenticeship position.

Table 3: Change in the number of new apprenticeship contracts in Germany from 2019 to 2020 (selected occupations)

Training occupation	Change in new apprenticeship contracts from 2019 to 2020
Management Assistant for Tourism and Leisure	-58.8 %
Event Technician	-37.4 %
Event Management Assistant	-36.2 %
Metal Cutting Mechanic	-30.5 %
Hotel Industry Expert	-29.9 %
Process Technician for Plastics and Rubber Engineering	-29.7 %
Technical Product Designer	-28.0 %
Precision mechanic	-26.5 %
Tool Engineer	-25.5 %
Hotel and Catering Industry Expert	-24.0 %
Industrial Mechanic	-23.7 %
Management Assistant for Freight Forwarding and Logistic Services	-22.4 %
Restaurant Expert	-22.3 %
Carpenter	10 %
Motorcycle and Bicycle Mechanic	12.60 %

Source: Adapted from Oeynhausen et al. (2020).

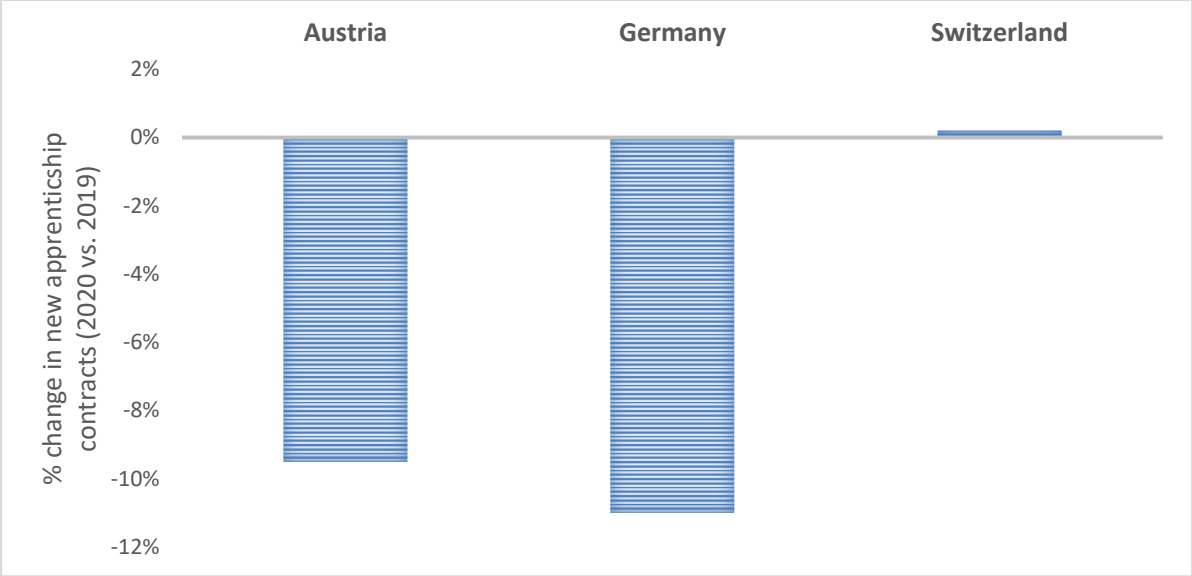
2.1.2. Austria

In Austria, the number of first-year apprentices in 2020 was 9.5 % lower than in 2019 (Dornmayer and Nowak, 2020, see Figure 1). As Austrian firms can hire apprentices anytime during the year, it is interesting to note that this decrease was mainly due to a strong decline in the signing of new apprenticeships in September 2020 (-2 000 contracts compared to 2019), and not due to significantly fewer contracts being signed in spring or early summer. Even though by September 2020 a total of 8 400 individuals were registered with the employment agency as actively looking for an apprenticeship position, a total of 8 800 apprenticeship vacancies were advertised by training firms. Since the numbers were similar to autumn 2019, it appears that COVID-19 did not significantly increase the number of unsuccessful applicants who were still looking for an apprenticeship in autumn 2020 but

made it considerably more difficult for firms to fill their vacancies during the summer months[11].

Similar to the situation in Germany, significant matching problems arose on the apprenticeship market that could not be resolved by the start of the new training year in the autumn of 2020. To ensure enough training places, Austria increased the capacities for apprenticeships that are not firm based but rather take place in training centres (Überbetriebliche Lehrausbildung) by 30 % compared to the previous year (AMS 2020).

Figure 1: Change in new apprenticeship contracts (2020 vs 2019)



Source: Adapted from Dornmayr and Nowak (2020), Oeynhausen et al. (2020) and Goller and Wolter (2021).

2.2. Effect of COVID-19 on apprenticeship graduates

To the extent that firms train apprentices intending to retain them as skilled workers after graduation, it can be expected that firms offer a permanent employment contract to all suitable apprentices. However, an unexpected macroeconomic shock may reduce a firm's labour demand and consequently the observed retention rates. Thus, the decision of a training firm to retain apprenticeship graduates in 2020 largely depended on their assessment of the business climate. Firms that believed the pandemic would be over soon most likely did not change their plans to retain all suitable apprentices. Moreover, as discussed above, empirical analyses of prior recessions reveal that graduating in times of a crisis is associated with lower entry wages, lower employment rates, or both. Average retention rates in Germany decreased on average by about 10 % after the Great Recession but remained at a high level, with 60 % of the apprenticeship graduates being retained as skilled workers by their training firm (BIBB, 2020). Using firm-level data from 2008 to 2013, Bellmann et al. (2016) find that the retention of apprenticeship graduates is

[11] However, the number of registered apprenticeship vacancies and registered individuals actively looking for a position are only an unknown fraction of the total demand for and the supply of apprentices in Austria.

significantly associated with a firm's business expectations[12]. Thus, it is likely that similar outcomes will be observed for apprentices who graduate during COVID-19.

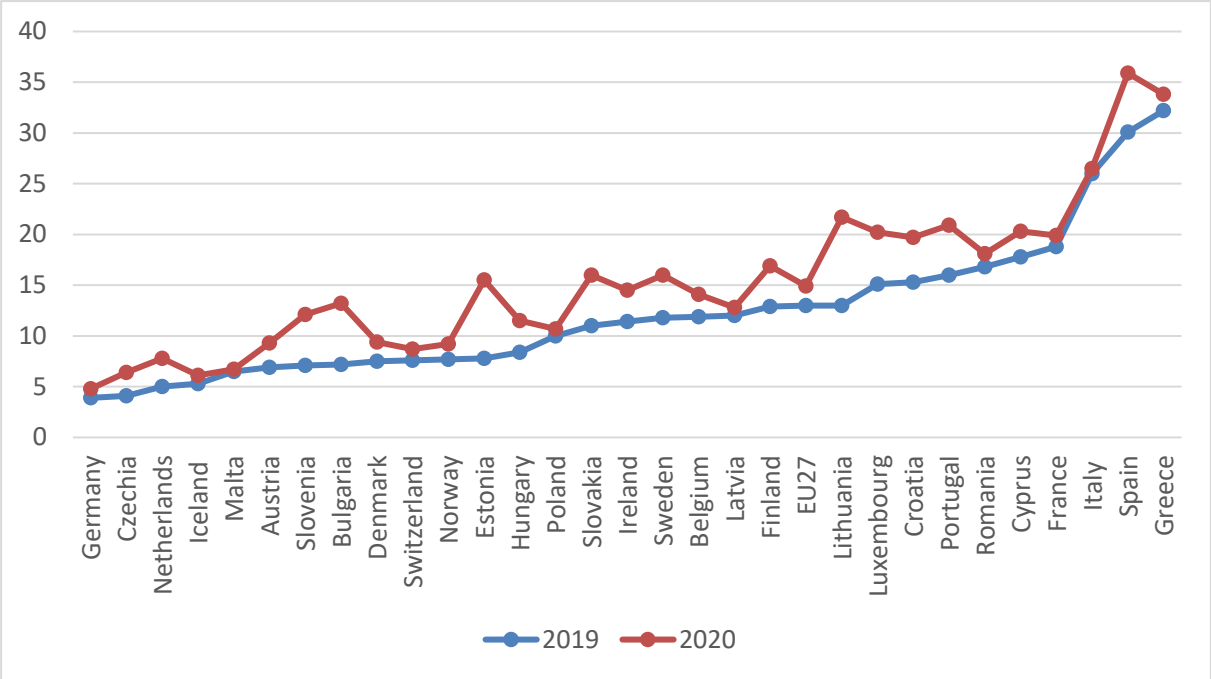
To the best of my knowledge, no administrative data for apprenticeship graduates is available yet for European countries with a dual apprenticeship system. However, a recent representative survey of German firms by Bellman et al. (2020) revealed that only 7 % of firms retained fewer apprentices than planned in the year 2020. Thus, at least in the German context, it appears that apprenticeship graduates were not severely affected by COVID-19. This may, however, not be the case in countries with different institutions – collective bargaining agreements (some of which have clauses that require firms to retain apprentices for a certain period after graduation) and work councils are positively associated with retention rates in Germany (cf. Kriechel et al., 2014).

In the absence of data about the impact of COVID-19 on apprenticeship graduates, another indicator often associated with apprenticeship systems is the youth unemployment (ratio)[13]. The youth unemployment ratio of individuals (age 15-24) increased in European countries with a dual apprenticeship system in 2020, including Austria (+1.1 %-points or 23 %), Czechia (+0.5pps or 29 %), Denmark (+0.9pps or 15 %), Estonia (+2.8pps or +57 %), Germany (+0.7pps or 23 %). In comparison, the youth unemployment ratio in the EU-27 Member States only increased by 0.5pps from 5.9 to 6.4 % (Eurostat, 2021). However, a detailed analysis as to how many apprenticeship graduates became unemployed, ended up in occupations that are not (or only partially) related to their education and/or suffered substantial wage losses on their first job is currently not available. Moreover, there are a number of important factors that affect youth unemployment which cannot be linked directly to a dual apprenticeship system, first and foremost the overall macroeconomic performance of a country, documented by the strong correlation between youth and adult unemployment rates (cf. Dietrich & Möller, 2016). Furthermore, in some dual apprenticeship systems, such as Estonia (Musset et al., 2019), but increasingly also in the German-speaking apprenticeship countries, many apprentices are older than 25 years.

Figure 2 shows the development of the youth unemployment rate (age 14-25) by educational attainment, focusing on individuals at ISCED levels 3 and 4. As previously documented, youth unemployment is particularly low in countries with a sizeable dual apprenticeship system or a substantial workplace component in school-based VET programmes. However, the difficulty is to separate the effects of a strong macroeconomic performance from the effects of a high share of individuals in a vocational training programme with a significant workplace component (as outlined in Table 1) on youth unemployment. Moreover, both youth and adult unemployment rates typically fluctuate more strongly in countries with a low employment protection legislation and no short-time work policies that discourage firms from immediately laying off a substantial part of their workforce in times of strong negative macroeconomic shocks.

[12] Moreover, Fitzenberger et al. (2015) analysed the mobility of apprenticeship graduates in Germany for the period 1992-1997 and find that the probability that apprenticeship graduates leave the training firm increases significantly during times when labour market conditions worsen.
[13] see also Dietrich and Möller (2016) for an extensive discussion of youth unemployment in Europe following the Great Recession.

Figure 2: Youth unemployment in 2019 and 2020 (age 15-24, ISCED levels 3 and 4)



Source: Eurostat (2021).

3. Discussion

Although there is still a lack of empirical studies that identify the effects of COVID-19 on an apprenticeship market, it appears that the observed outcomes are similar compared to other recent macroeconomics shocks, such as the Great Recession. First, it can be observed that the number of new apprenticeship contracts decreased substantially in Germany and Austria, and much of that decrease can be attributed to COVID-19 and its effect on the economy. However, there appears to be important heterogeneity across countries, as Switzerland did not experience a decrease in the number of concluded apprenticeship contracts. While identifying the reason for such heterogeneity is challenging, potential explanations are a more beneficial cost-benefit ratio of training firms in labour markets with higher levels of worker mobility and lower levels of employment protection legislation, combined with policies that stabilise the economy in times of crisis (such as short-time work policies). To the extent that apprenticeship training does not require a large net investment from the training firm, a firm's willingness to train does not exclusively depend on its future need to fill skilled worker vacancies. Thus, even in times of uncertainty, firms may hire new apprentices, as committing to training an apprentice is not associated with a high financial risk. Moreover, firms will be more likely to train apprentices without the explicit motivation to retain them as skilled workers if filling future vacancies during from the external labour market is expected to be relatively unproblematic. A prerequisite for such an outcome, however, is that firms train a sufficiently high number of apprentices in 'normal times' (i.e. when the economy is not in a recession), so that there is no (or less of a) skilled worker shortage during economic boom periods. However, in countries with a high degree of employment protection legislation, such as Austria and Germany, it can be observed that a high fraction of apprentices remains with the training firm, so that the supply of skilled workers for non-training firms (or training firms who need to fill additional vacancies) becomes more limited during a prolonged period of economic growth. Second, youth unemployment increased strongly in several EU-27 Member States, although data

on how labour market outcomes for the specific group of apprenticeship graduates were affected by COVID-19 are not (yet) available. A survey of German training firms, however, reveals that only a small minority of training firms retained fewer apprentices in 2020 than initially planned, even though in the past (following the Great Recession) changes in business expectations had a statistically significant association with the retention behaviour of training firms.

Governments took different measures to stabilise apprenticeship markets after the start of COVID-19. In Germany, training firms with less than 250 employees could apply for subsidies of EUR 2 000 if they offered the same number of training positions as in the previous year, and EUR 3 000 for additional positions or for taking over apprentices from firms that went bankrupt. Moreover, 75 % of the apprentice wage costs were reimbursed for firms that did not apply for short-time work for apprentices or their instructors. As pick-up rates for these subsidies were rather low, the subsidy amount was doubled for the year 2021. While it is very difficult to evaluate the effectiveness of such subsidies, previous subsidy schemes in Germany proved not to be very effective due to large windfall gains (Bonin et al., 2014). Similarly, apprenticeship wages were subsidised in Denmark in response to the pandemic, allowing firms to cover 75 % of the salary costs for apprentices for the remainder of 2020 (Cedefop, 2020). Austria took a different approach and increased the number of training opportunities for apprentices in external training centre by 30 %. Data on take-up rates, however, are not yet available at this point.

Even though the number of concluded apprenticeship contracts was negatively affected by COVID-19, severe mismatch problems arose as the number of unfilled apprenticeship positions reached a record high in Germany and was also substantial in Austria. The main reason for this outcome was a delay in the search process for apprenticeship contracts during the lockdown in 2020 and during the subsequent contact restrictions, which reduced the probability of successful matches between training firms and interested apprentices.

In summary, isolating how exactly COVID-19 affected apprenticeship markets is challenging because governments took many measures to stabilise the economy and apprenticeship markets. It is also not clear which measures, if any, were effective in improving the situation on the apprenticeship market. Thus, while COVID-19 would likely have more adverse effects on apprenticeship markets in the absence of any stabilising policies, cross-country differences in the development of apprenticeship markets should be interpreted with caution. Both labour and apprenticeship market institutions may affect how certain outcomes, such as the number of new apprenticeship contracts or retention rates, develop over the business cycle. For example, training firms may have to pay binding minimum wages to apprentices in some countries, which may affect the rate of return to training and thus possibly a firm's willingness to take on apprentices during a crisis. Conversely, collective bargaining agreements may also require training firms to retain apprenticeship graduates for a certain period regardless of the business climate (as is the case in Germany). Similarly, work councils may be able to ensure that a higher share of apprentices is offered permanent employment compared to otherwise similar firms. Nonetheless, the available empirical evidence clearly shows that the business cycle matters and is an important factor to consider when analysing apprenticeship markets. Future research will likely uncover more fine-grained associations between apprenticeship market outcomes and the business cycle in general, and COVID-19 in particular.

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