

Growing Apart: Efficiency and Equality in the German and Danish VET Systems

Christian Lyhne Ibsen, Associate Professor, Michigan State University
Contributor, MIT Task Force on the Work of the Future

Kathleen Thelen, Ford Professor of Political Science, MIT
Member, MIT Task Force on the Work of the Future



Growing Apart:

Efficiency and Equality in the German and Danish VET Systems

Christian Lyhne Ibsen, Michigan State University

Kathleen Thelen, MIT

August 2020

Many American labor experts have looked upon Europe's vocational education and training (VET) systems with admiration. One of the great strengths of these systems has been the way in which they have fulfilled important economic objectives, such as furnishing firms with a steady supply of skilled workers, while at the same time performing critical social inclusion functions, such as opening a pathway for lower-income and non-academically inclined youth to acquire the training they need to find stable, well-paid employment. Contemporary changes—both in the mix of skills demanded by firms and a growing drift on the part of youth into higher education—are placing new pressures on these systems. This policy brief compares recent developments in Germany and Denmark, two of the hitherto most successful systems of firm-sponsored VET, documenting their divergent responses to these new challenges. Germany has pursued a firm-led strategy in which adjustments to VET reflect the needs of the country's largest and most sophisticated firms, emphasizing the economic objectives of training, but at the partial expense of its social inclusion functions. By contrast, Denmark has pursued a more state-led strategy; legislative reforms in the 1990s played an important role in shoring up the VET system's social inclusion functions, but these interventions may have also contributed to a deterioration in the public image of VET. An unintended result has been a decline in participation among the most advanced Danish firms, which in turn has reduced the attractiveness of VET for Danish youth—trends that the government has since struggled to reverse. The brief begins by situating these two cases within a broader comparative context, and ends with a reflection on the policy lessons for the United States.

INTRODUCTION

Vocational education and training (VET) systems occupy a central place in the literature on the comparative political economy of rich democracies. These systems provide a core point of contrast that distinguishes Europe's "social" market economies from the alternative "liberal" model of capitalism that prevails in the United States (Hall and Soskice, 2001; Thelen, 2004; Thelen, 2014). Robust VET systems in many European countries constitute a crucial competitive advantage for firms operating in rapidly changing markets, because they provide companies with a steady supply of workers who are well trained (and certified) in a wide range of so-called "middle-skill" occupations, from electricians and vocational nurses to industrial mechanics and technicians of all sorts. Occupational training in such systems typically starts at the upper-secondary level in programs that last between two and four years and that include extensive practical training at a workplace alongside more theoretical training in the classroom. VET systems are comprised of a range of actors—vocational schools, training providers, employers, government agencies, and labor unions—working together to fund, provide, monitor, and certify training.

In the influential varieties of capitalism (VOC) literature, Europe's VET systems form a crucial hub within a broader institutional ecosystem that supports competitive strategies based heavily on product diversity and quality rather than on price (see, especially, Streeck, 1992). These arrangements rely not just on a high degree of collective organization on the part of employers, but also on a broader institutional context in which employers confront what Streeck once called "beneficial constraints" that encourage firms to embrace strategies (including skill investments) that reflect a longer strategic time horizon than less regulated markets typically allow. This institutional ecosystem includes complementary industrial relations institutions (sectoral or, more rarely, national-level collective bargaining with strong and encompassing unions), strong employment protections (either formal or informal), and robust institutions for worker participation and voice at the firm level. Sectoral bargaining with unions organized on an industrial basis takes wages partly out of competition, and the associated wage compression holds back the wages of skilled employees while supporting a high-wage floor for low-skill workers. In such a context, employers face powerful incentives to invest in worker training to boost the skills—and thus the productivity—of their low-skill workers and to organize production in ways that take advantage of these skills (Acemoglu and Pischke, 1998; Acemoglu and Pischke, 1999; Thelen, 2004, especially chapter 1). In such a context, employers also have an interest in long-term employment to protect the investment they make in their workers' training, and they benefit from arrangements that reduce turnover (via employment protection) and support industrial peace (via worker voice). The bottom line of a large body of comparative research is that employer coordination in the area of VET facilitates the provision of crucial collective goods that enhance firm competitiveness while also supporting higher wages and more generous social policies. This is

the institutional context that underpins the kind of high-wage, high-skill, high-value-added production strategies for which countries such as Germany and Denmark are known.

Beyond their contributions to competitiveness (especially in manufacturing), the great strength of firm-sponsored VET systems has also been their ability to reconcile economic efficiency with social inclusion—furnishing firms with a steady and plentiful supply of skilled workers, while also opening a pathway for lower-income and non-academically inclined youth to acquire the training they needed to find stable, well-paid employment (Bonoli and Emmenegger, 2020; Carstensen and Ibsen, 2019; Thelen, 2004). In the era of Fordist mass production, the nature of employers' skill needs made this balance relatively easy to sustain due to significant demand on the part of firms for both high- and middle-skill workers in production (Iversen and Soskice, 2015). However, the new “knowledge economy” confronts VET systems in Europe with new challenges. The social inclusion functions no longer flow naturally from the interests and training behavior of firms. Alongside the decline of manufacturing employment, technological changes have resulted in widespread occupational polarization (Autor, 2019; Autor, Mindell, and Reynolds, 2019). Advanced manufacturing requires more technically sophisticated skills, even as a large share of semiskilled work has been automated. In the service sector as well, the introduction of information and communication technologies has simultaneously reduced the demand for middle skills and increased the demands on firms not just to train a smaller number of workers in traditional occupational skills, but also to equip them with more general theoretical education.

These changes pose special challenges to VET systems based on firm-sponsored training, because they heighten the tensions between the economic and social functions that these systems have served in the past (Durazzi and Geyer, 2019; Graf, 2018; Bonoli and Emmenegger, 2020; Bonoli and Wilson, 2019; Carstensen and Ibsen, 2019; Di Maio et al., 2019). Policymakers who have long relied upon VET's integrative functions face pressures to continue to secure training opportunities for weaker students, not least to prevent them from falling into dependency on state social supports. However, in contexts in which firms bear the costs of training, employers will resist having social inclusion functions foisted upon them, especially at a time when the skills they do still require are, if anything, growing more complex and demanding. Compounding these challenges, many countries have seen an increase in the share of foreign-born youth who face special difficulties (e.g., with respect to language) and for whom governments often hope the VET system can serve as a key mechanism for successful integration.

This policy brief compares recent reform trajectories in Germany and Denmark, two of the hitherto most successful systems of vocational education and training (VET). Our analysis shows that Germany has pursued a strongly firm-led adjustment strategy that prioritizes the economic efficiency functions of VET, but at the partial expense of social inclusion. Large firms, in particular, have played an important role in promoting an ongoing upgrading of skill profiles and in developing new hybrid training programs that combine traditional VET with higher education. These changes have succeeded in maintaining a relatively

high level of employer commitment to the system, as well as continued strong interest on the part of youth. However, firms have largely offloaded responsibility for the social inclusion functions onto the state. Training has become less inclusive and more stratified, as weaker, hard-to-place youth are shunted into a state-run transition system that is outside the regular VET framework and that does not confer certifiable skills.

It is precisely this outcome that the Danish state sought to avoid. Thus, in the 1990s, the Danish government intervened more directly to secure the social inclusion logic within the VET system itself. It did so by permitting students who failed to secure a firm-based apprenticeship to complete VET training and earn skill certification through an alternative publicly run school-based system. These reforms did, in fact, ensure training slots even for weaker students, and also offered multiple “second chance” opportunities for youth who had trouble completing programs. However, this success appears to have come at the expense of the public image associated with VET. The most advanced firms have largely withdrawn from the system, thus contributing to a decline in its attractiveness as an educational pathway for the most promising Danish youth. Once in motion, the marginalization of VET began to take on self-enforcing qualities that have made it difficult for Danish policymakers to reverse the trend.

This brief proceeds as follows. Section one lays out the logic of our comparative study of Germany and Denmark, reviewing the main features that define the two systems and that distinguish them from other VET systems, such as that in the United States. Section two shows how Germany and Denmark have diverged in recent decades. In sections three and four, we trace the different reform trajectories that Germany and Denmark have taken. A final section discusses the comparison and its implications for the politics of VET in the United States.

GERMANY AND DENMARK AS “MOST SIMILAR” CASES

Our analysis centers on the German and Danish VET systems, both of which in the past have been seen as successful cases of collectivist firm-based systems of VET. The comparative literature typically distinguishes VET systems on two dimensions (Busemeyer and Trampusch, 2012). The first dimension captures the extent to which the state supports VET as a viable alternative to academic higher education and a means to promote the integration of young people with weak academic qualifications into education and employment. The second dimension assesses the extent to which private-sector companies are directly involved in initial VET, notably by offering apprenticeships, distinguishing such firm-based systems from the alternative school-based training systems (see Table 1).

Table 1: Typology of Vocational Education and Training Systems

		INVOLVEMENT OF FIRMS IN VET	
		LOW	HIGH
PUBLIC COMMITMENT TO VET	HIGH	Collectivist, state-based Sweden, France, Finland, Norway	Collectivist, firm-based Germany, Denmark, Austria, Switzerland, Netherlands
	LOW	Liberal United States, UK	Segmentalist Japan

Source: Adapted, with minor modifications, from Busemeyer and Trampusch (2012: 12)

Summarizing briefly¹, we see that the Anglo-Saxon countries are clustered in the lower-left (“liberal” training regime) quadrant; in such countries, there is low public commitment to VET and also little firm involvement. Public schools provide general education; youth acquire vocational skills (if at all) subsequently and largely on the job. Japan, by contrast, exemplifies an alternative, so-called “segmentalist” system. As in the liberal systems, the state is not deeply involved in vocational education and training. Here, however, some large firms play a stronger role in skill formation in the context of company-based careers and long-term employment guarantees. Most of the Scandinavian countries (minus Denmark) cluster in the upper-left quadrant, characterized by high public support for VET but relatively low firm involvement. These cases are typically characterized by “comprehensive” schools that do not sort children into vocational tracks during high school, but that do support vocational training through publicly funded vocational schools. Most of the continental countries (plus Denmark), finally, cluster in the upper-right quadrant—characterized by high public commitment to training and strong firm involvement as well. These countries do more tracking at the high school level, channeling youth into either vocational or academic pathways. In these cases, firms play a central role in the provision of vocational training, often accompanied by a school-based component.

The United States fits squarely in the “liberal” model when it comes to education and training. Although higher education in the United States is the envy of the world, there is very little infrastructure for vocational training, and the quality of public education at the primary and secondary levels is highly uneven. As with other “liberal” systems, the United States is characterized by low firm involvement and low

public support for VET. Firms have traditionally been reluctant to involve themselves in initial vocational training due to the fear of poaching and the lack of collective governance and skill certification structures that European-style employers' associations offer. Accordingly, private-sector firm-based apprenticeships are offered mostly in an ad-hoc manner and are limited to few pockets of the economy, mostly the unionized construction sector and some manufacturing companies. Instead, vocational education usually takes place in community colleges and other specialized vocational schools. While there are multiple funding programs for apprenticeships, public financing is comparatively scarce given the high reliance on private providers in American education. The absence in the United States of an infrastructure in this vocational middle-skill space arguably has contributed to comparatively high labor market polarization (e.g., Autor, 2019).

The two cases under examination here (Denmark and Germany), by contrast, both fall squarely within the firm-based, high public commitment quadrant. In this respect, Denmark differs from most of the other Scandinavian countries where school-based vocational training dominates. Instead, as in Germany, initial vocational education and training involves a combination of school-based training and firm-based experience. And, in both Germany and Denmark, the social partners (employer associations and unions) play a key role in the planning and administration of VET at the national level.

Based on these features², Germany and Denmark are typically treated as “most similar” cases, and for good reason. These two countries have traditionally had high average shares of vocational enrollment at the upper-secondary level. The basic features they share can be summarized as follows:

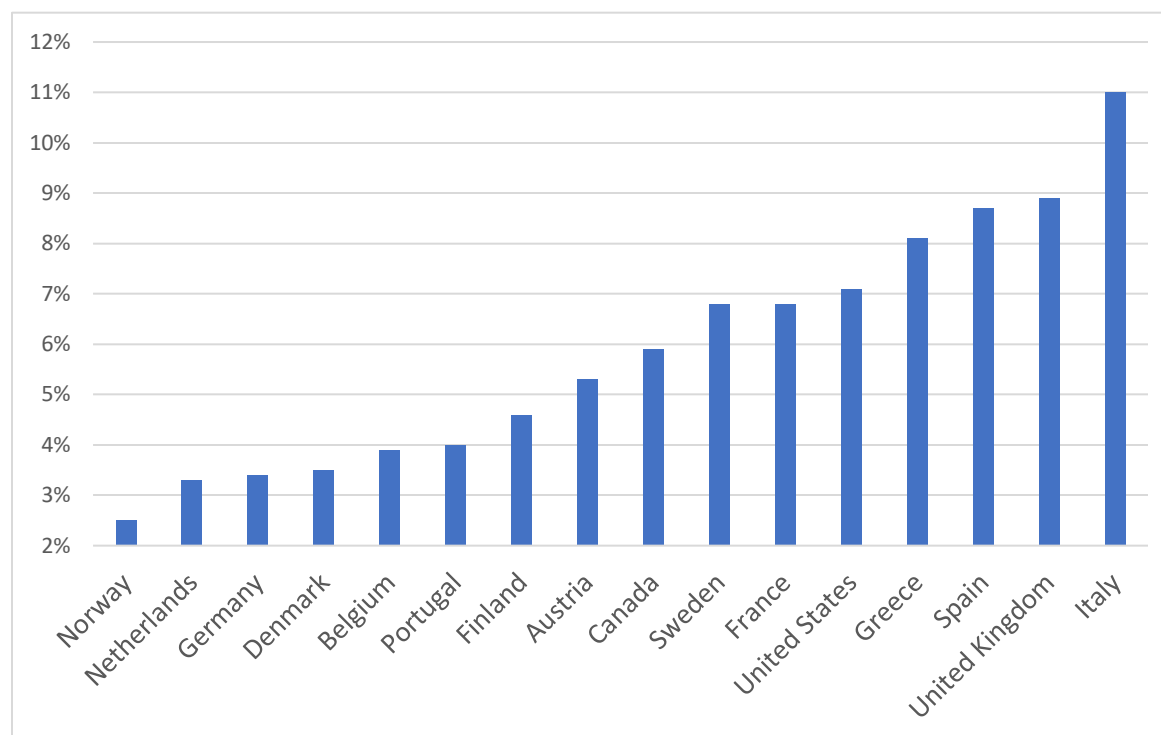
- Vocational education and training in both countries occurs mostly through **firm-sponsored** training (accompanied by a compulsory school-based component). Training occurs in companies, which means that the skills trainees acquire are very close to labor market needs.
- The fact that most training occurs in firms means that these countries **rely heavily on the private sector** to take on apprentices and to assume most of the costs of training. In the past, a rather wide range of firms (both large and small) have offered apprenticeships. However, participation is voluntary for firms; that is, no one can force companies to take apprentices.
- These systems are **strongly collectivist** in that the employers who do take apprentices cannot train narrowly (for their own needs), but rather are required to train broadly and to standards and according to occupational profiles decided nationally by committees composed of **representatives of business, unions, and the state**. (Germany today has 325 recognized occupations; Denmark has 102.)
- Finally, firm-based training in these systems is subject to monitoring and oversight to enforce nationally defined standards regarding the **content and quality** of training.

Taken together, these four characteristics have important functional and political implications. Functionally speaking, these attributes point to the very high demands placed on organized interests, such as employer associations and labor unions, in sustaining these systems. The demands on firms (which, after all, must produce the apprenticeships and train to collectively defined standards) are much greater than in “state-based systems” such as those in Sweden, and even more than in countries with “segmentalist systems” such as Japan, where (mostly large) firms train their employees but do not coordinate with other firms in doing so (Thelen, 2004). The overarching system of collective governance also means that these systems involve ongoing balancing on several fronts—between accommodating the needs of the most advanced (often largest) enterprises and the capacities of the smaller, less advanced firms; and between addressing the economic interests of firms and the social inclusion objectives of labor unions and the state.

The German and Danish systems have tended to earn the same praise and suffer the same criticisms. Both have been praised, deservedly, for the way in which their VET systems have traditionally provided opportunities for working-class youth to gain access to stable and well-paid jobs, in the past, especially in manufacturing. Firm sponsorship in secondary education has traditionally ensured a smooth school-to-work transition for non-academically inclined youth. The socially integrative function of firm-based VET is reflected, for example, in traditionally low youth unemployment rates in both countries compared not just to “liberal” market economies like the United States, but also to countries such as Sweden and France that have school-based VET systems. Figure 1 below provides the most recent Organization for Economic Cooperation and Development (OECD) statistics on the share of youth (ages 15–19) who are “not in employment, education, or training” (NEET). Among other things, it shows that the NEET rate in Germany and Denmark (3.4% and 3.5%, respectively) is less than half that of the United States (7.1%).

Figure 1: Youth Not in Employment, Education, or Training (NEET).

15- to 19-year-olds; data from 2018 or latest available



Source: OECD Education at a Glance, 2020

At the same time, however, both systems have been criticized for stratifying educational opportunities (and with that, subsequent employment prospects) along class lines, as students are sorted early on into either a vocational or an academic track with low permeability between the two (Pfeffer, 2008).³ Moreover, the heavy emphasis on practical skills in these systems arguably renders them less suited than university training (or even school-based VET) in the provision of more general theoretical skills that increasingly figure prominently in the new knowledge economy (Hanushek et al., 2017).

GERMANY AND DENMARK DIVERGING

The German and Danish systems differ in some important details, the most important of which date back to the 1970s, a period of economic turmoil in which both countries faced chronic shortages of firm-sponsored training opportunities for youth. At that time, Denmark introduced a publicly run, school-based VET system that provided an alternative entry point into the VET system for pupils who initially failed to secure an apprenticeship within a firm. This alternative access point (*Erhvervsfaglige Grunduddannelser – EFG*)

consisted of a one-year basic introduction to VET (Bøndergaard, 2014). This measure was designed not to replace firm-based training, but to shore it up by addressing what was seen as a temporary shortfall in training slots. Germany faced a similar shortfall in training slots during that period, but that country's political economy is strongly inflected with a Christian democratic tradition that is less congenial to direct state involvement, relying instead on institutions of collective self-governance. In Germany, then, employers succeeded in heading off policy proposals similar to those in Denmark by voluntarily increasing the number of apprenticeships on offer (for an extended discussion, see Busemeyer and Thelen, 2020).

Despite the many other similarities in the German and Danish systems in terms of starting points, the types of firms and youth who participate in the two VET systems are diverging. The German system remains robust in the sense that large firms, including in the most advanced sectors, remain committed to the system, which in turn has contributed to the system's continued attractiveness to German youth. In Denmark, VET continues to do better than Germany on measures of social inclusion, but the overall prestige of the system has declined since the 1990s. The largest and most advanced firms have largely abandoned the VET system, and increasingly recruit their employees from universities. Consequently, the Danish VET system has lost its attractiveness to the country's most promising youth, who are now far more likely than their German counterparts to opt for university than to enter the VET system.

In the sections that follow, we document the divergent trajectories that lie behind these differences and trace their political roots. Germany's firm-led adjustment strategy has prioritized the economic functions of VET. Training in Germany has become more sophisticated (also more costly) in response to the needs of the larger (often more technologically advanced) firms, while issues of social inclusion have been left to the state. By contrast, reforms to the Danish system of VET have prioritized social inclusion functions, but these interventions appear to have come at the expense of the social prestige of VET, as in-firm training has lost traction among top firms and Danish teenagers alike.

GERMANY

The German training system remains one of the most robust in Europe (alongside the Swiss). As elsewhere, there has been a steady drift on the part of youth away from the vocational track and into university. However, compared to other countries, the trend in Germany has been moderate, due largely to the continued attractiveness of the training system. Figure 2 shows that, in any given year, more German youth are still entering the VET system than are initiating university studies. In 2017, more than half of the school-leaving cohort embarked on vocational training in one of the country's 325 recognized occupations (BIBB Datenreport, 2019: 9).

Figure 2: Number of German youth entering into VET and into university studies, 2005–2019

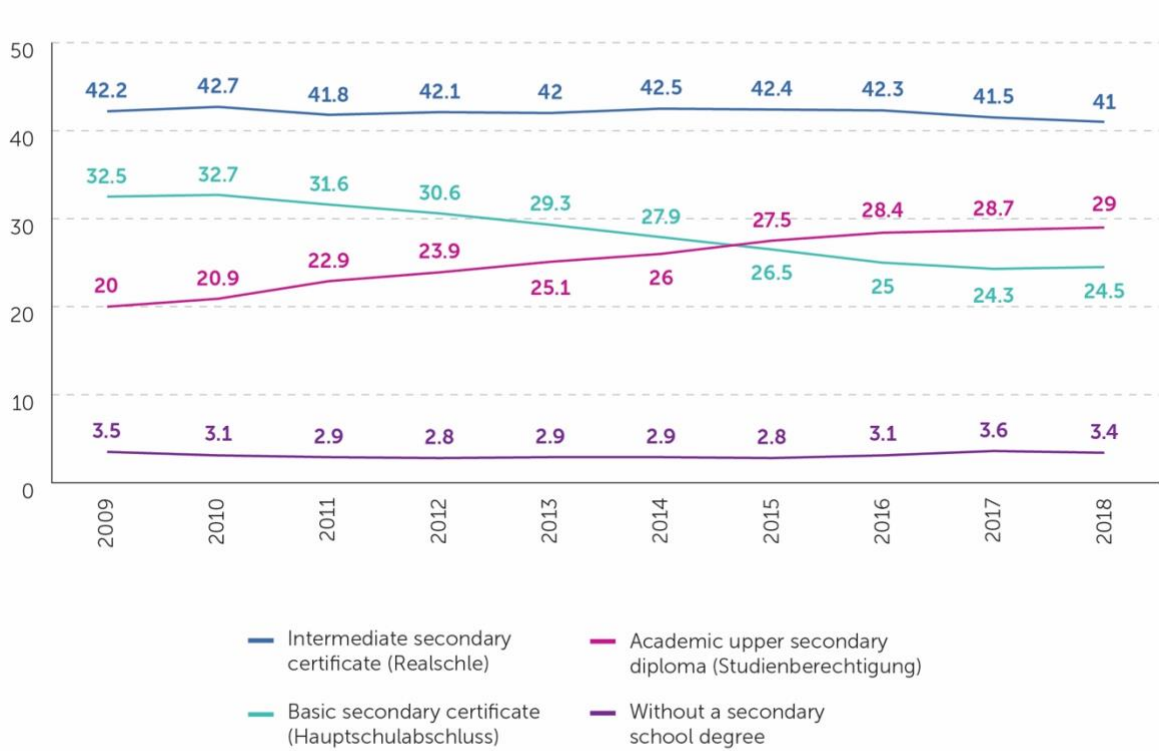


Source: BMBF, 2020

Source: BMBF: <https://www.datenportal.bmbf.de/portal/de/Tabelle-2.3.43.html>

Moreover, the German VET system attracts even high-achieving students, including a significant—and growing—number of youth who have earned an academic upper-secondary diploma, many of whom now go on to enter the VET system either in place of or in addition to pursuing a university degree. Figure 3 shows that the intermediate secondary school track (*Realschule*) remains the biggest feeder into the VET system. However, since 2015, the second biggest group comprises youth who completed the academic secondary track and who in the meantime outnumber those with a basic secondary certificate (*Hauptschulabschluss*) as the second largest group entering the system. Thus, we see that nearly 30% of German youth who are now starting apprenticeships could have opted for attending university. Part of this trend is a function of an overall decline in the number of German youth with only the *Hauptschulabschluss* and an increase in the share of children in the academic upper track in secondary school.⁴ However, it is clearly also a function of interest on the part of youth who have the upper-secondary credential to acquire a vocational certificate (Kroll et al., 2016).⁵

Figure 3. Share of new apprentices by secondary academic track



Source: BMBF 2020

Source: <https://www.datenportal.bmbf.de/portal/de/Tabelle-2.4.27.html>

One of the reasons for the continued relative popularity of VET is that it is still a gateway to some of the best jobs, including in Germany’s top firms. Table 2 gives the profile of German firms that offer apprenticeships, by firm size. While firms of all sizes participate in the system (and the system still relies heavily on small firms to provide training), large firms are clearly heavily invested in VET. Over 80% of firms with 250 or more employees take apprentices, and the number is even higher (85.5%) for Germany’s largest firms (with 500 or more employees).⁶

Table 2: Participation of German Firms in VET by Firm Size

FIRM SIZE (# EMPLOYEES)	# SUCH FIRMS (ABSOLUTE)	OF WHICH, TRAINING FIRMS	SHARE OF FIRMS OFFERING APPRENTICESHIPS
SMALLEST (1-9 EMPLOYEES)	1,674,337	192,157	11.5
SMALL (10-49)	379,505	161,952	42.7
MIDDLE-SIZED (50-249)	91,162	59,880	65.7
LARGE (250 AND ABOVE)	16,403	13,238	80.7

Source: BIBB Datenreport, 2019: 9

Large firms are playing an increasingly important role in the governance structures of the German VET system, and ongoing changes in occupational profiles and qualifications reflect the increasingly complex skills they need (Busemeyer and Thelen, 2020). Thus, for example, successive waves of reform have integrated previously separate (narrow) occupations into ever-broader profiles that call for longer training programs. In 2008, there were 350 recognized occupations, 37 of which took just two years to complete, and two of which took only 18 months.⁷ By 2017, the shortest programs had vanished. Since then, the trend has been toward an overall smaller number of broader occupational profiles (325), the vast majority of which require three or more years of training (BIBB Datenreport, 2019: 81).⁸

These changes in the character and length of training, in part, reflect the ongoing modernization of occupational profiles and the creation of new occupations. Over the 10-year period from 2008 to 2017 alone, 11 new occupational profiles were developed at the national level and 114 occupations were updated, which is more than a third of the total number of recognized occupations (325). New or modernized training programs have been developed in a range of sectors—media, consulting, IT, market research, social and health services, financial services. All of these are sites of rapidly growing occupations that are also very popular with youth. Newly created skill profiles include occupations such as photo media expert, media technician in print processing, vending machine service technician, and production technician. Among the occupations that were modernized are: technical production designer, music retailer, bio lab

technician, electronics technician for machine and drive technology, among others.⁹ So-called “MINT” (the equivalent of STEM) occupations attract an especially large number of youth.¹⁰ In 2017, apprenticeship contracts in these occupations accounted for 33.5% of all training contracts (see BIBB Datenreport, 2019: p.132, Table A5.4-2).

Traditionally, the VET system was especially well anchored in the manufacturing sector. However, in Germany, as elsewhere, employment in industry has declined steadily, leading some to wonder about the future of the VET system. In general, however, worries about whether the system would take root in the service sector have abated somewhat. Service-sector firms in many areas have expanded VET training, even if at lower levels of firm participation than in manufacturing. Already in 1980, apprenticeship contracts in services accounted for almost 50% of all training contracts (Protsch and Solga, 2016: 650); and by 2017, this had risen to over 60% (62.8%) (BIBB Datenreport, 2019: 129, Table A5.4-1). While the share of training contracts in services still lags behind its share of total employment, training in service occupations is clearly well established. In short, the German VET system is under constant construction and reconstruction, and many of these changes reflect the more sophisticated skills that large firms desire.

Beyond the changes within the traditional VET system itself, Germany’s most technically sophisticated firms (Industry 4.0 firms such as Siemens, Lufthansa, Daimler, and Bosch) have engaged in further innovations at the intersection of the VET system and higher education (see especially Graf, 2018). These firms have been at the forefront of “dual study” programs in which firms partner with higher education institutions (typically universities of applied sciences, *Fachhochschulen*) to create “hybrid” apprenticeships that allow students simultaneously to earn a VET certificate and a university degree (typically a BS) (see also von Weitershausen, 2020).

These dual study programs are among the most competitive and demanding forms of training on offer in Germany. Competition for these slots is intense, and they tend to attract students who have the top scores in university entrance exams. These programs are popular with both parents and youth because they confer a dual credential (bachelor’s degree + VET certificate) and typically segue directly into a job at the firm. They also carry the advantage that apprentices earn a wage while studying. Germany’s largest and most technologically sophisticated export firms are willing to make these investments because dual study programs provide the theoretical training typically associated with university education while at the same time establishing a close connection to the firm and its production processes. These features allow top firms to recruit the best students as early as possible in their educational careers (Graf, 2018: 190).

The absolute number of students in dual study programs is still small as a share of all apprentices (such programs currently enroll ~100,000 students, or ~4% of all apprentices). However, these programs are only offered in a limited number of specific fields—especially engineering, business, and computer science—and in those fields, they make up a much larger share. As von Weitershausen (2020) shows, this

form of apprenticeship has grown dramatically over the past 15 years, both in terms of the number of students enrolled in such programs and the number of firms that participate in offering this type of apprenticeship.

In short, the ongoing upgrading of training has done a great deal to adapt to new technologies and to the increasingly complex vocational skill needs that Germany's dynamic sectors seek. Both developments have shored up traditional firm-based VET—sustaining its attractiveness both to Germany's leading firms and to German youth. In fact, an emerging problem in Germany has been an undersupply of training slots in the new occupations that youth are most eager to take up. The German VET system currently features a mismatch problem: There is too little interest in traditional occupations—bakers, plumbers, shop assistants—and an overabundance of interest in the new and more technologically advanced occupations, such as visual marketing, media, and IT (Sponholz and Ulrich, 2019).¹¹ Large firms offering attractive apprenticeships have their pick of qualified candidates, and students with university entrance credentials are thus laying claim to many of the most attractive training slots.¹² For example, in 2017, almost half (41.8%) of training slots for the newly created occupations discussed earlier went to apprentices with university-entrance credentials. An even larger share (45.5%) of the more demanding (higher-level) service-sector occupations went to this group as well (BIBB Datenreport, 2019: 145; Table A5.5.1-4).

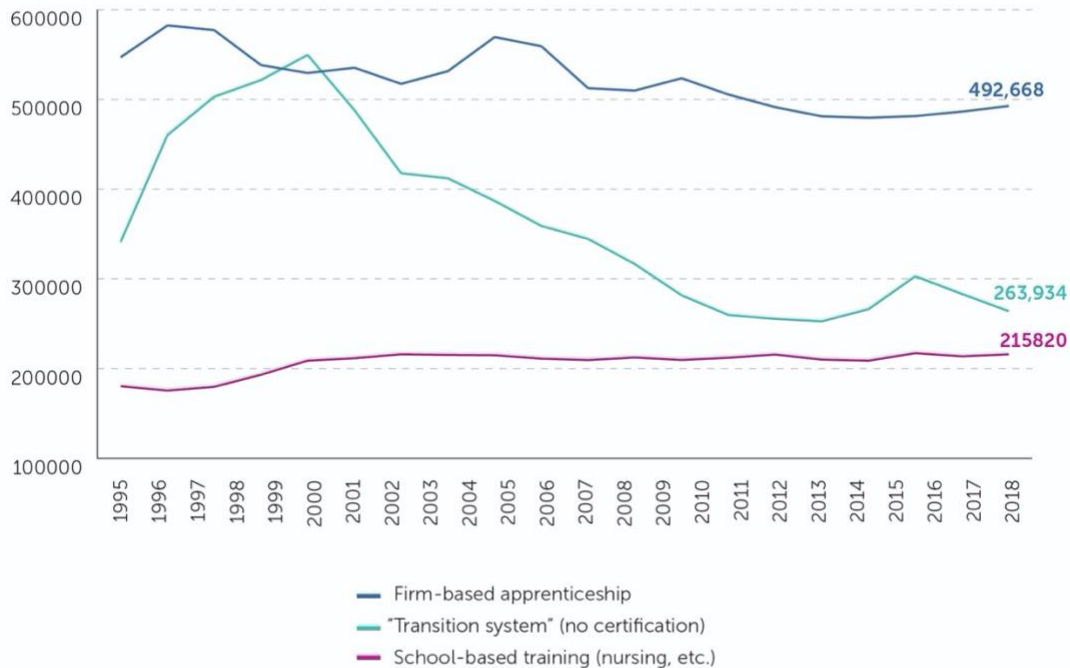
THE PERSISTENT PROBLEM OF THE HARD-TO-PLACE YOUTH: THE TRANSITION SECTOR

There is, however, another, more problematic side to Germany's mismatch problem at the other end of the training market. Even as demand for high-quality apprenticeships has grown, interest in “traditional” occupations—and with that, in apprenticeships in Germany's smallest firms—has waned. These small firms, which have historically played a central role in the VET system (especially its social inclusion functions), increasingly complain of a shortage of “qualified” apprentices. Indeed, a growing number of training slots in such companies are now going unfilled. The failure to fill all the training slots in these smaller firms does not mean that all youth seeking an apprenticeship find a place. On the contrary, Germany continues to face a chronic problem of placing the lowest-achieving youth, who are being passed over by all firms.

This is a problem that the unions and employers have largely offloaded onto the state. The solution has been to create a separate state-based prevocational training sector—the so-called “transition sector” (*Übergangssektor*). This sector consists of a cobbled-together cluster of training measures (most of them just one year in duration) supplied by the state to compensate for shortfalls in training places or to “sweep up” lower-achieving youth who fail to land an apprenticeship in a firm. The key feature of this set of programs, however, is that they do not lead to full vocational qualification, but instead serve merely as a holding pattern while youth try to secure a “real” training slot in a company.

Originally conceived as a short-term measure, the transition sector has in the meantime become “a *constitutive, third institutional sector*” of the German training regime (Jacob and Solga, 2015: 167; italics in original), but one that fulfills neither of the two goals for which the German VET system is otherwise so admired—providing the high-quality skills that firms need and conferring the full credentialing that youth seek. While the size of the transition sector varies over time in response to business cycles, it accounts for a rather large share of youth even in periods of labor market and skill shortages (see Figure 4). Thus, for example, in 2018, a year in which more than 700,000 youth entered the VET system, another 270,000 went into the transition system (BIBB Datenreport, 2019: 100, Table A4.1-2). The young people entering this system are predominantly coming out of the lower-secondary education tracks, and many of them lack a school leaving certificate (BIBB Datenreport, 2019: 100, Table A4.1-2).¹³ This number includes large numbers of refugee youth who have entered the transition system since 2015. Almost half (44.3%) of youth leaving school after 9th grade and who came to Germany in the last six years were in the transition system in 2016–2017 (BIBB Bildung, 2018 in Deutschland P. 140, Figure E4-1).¹⁴

Figure 4: Distribution of Youth Entering into Vocational Education and Training System, 1995-2018



Source: BIBB Datenreport 2020, page 86, table A4.-1

In principle, many of the stakeholders in the German VET regime are concerned about the transition system, but so far no politically viable policy alternatives have emerged. Debate over this issue was particularly intense in the 2000s, when the number of youth in the transition sector grew rather sharply. Since that time, concern has subsided somewhat as demographic changes (smaller cohorts) reduced the number of youth entering the system, and as indeed some youth were able to move on from it into firm-sponsored training slots. Although German unions remain critical of the transition system, some other observers have come to view it in a more positive light, as part of Germany's active labor market policies and, in any event, better than unemployment. None of this, however, changes the fact that the system remains unintegrated into the regular training regime, and continues to consist of a hodge-podge of different measures that in themselves do not lead to a vocational certificate.

Other debates surrounding the transition system center on the immigrant population and newly arrived refugees. For these groups, reforms have been undertaken in the past several years to allow some of them to receive "credit" for training acquired abroad (see especially Aerne and Laudenbach, 2020). For example, reforms in 2012 eased the process through which credentials earned outside the European Union

(EU) and the European Free Trade Association (EFTA) could be recognized (through a process that involves an evaluation of training certificates and a confirmation of occupation-specific work experience acquired abroad). Beyond this, since 2015, other procedures have been adopted for recognizing skills acquired informally (this process involves a practical test and an expert assessment of the candidate's skills). These new avenues provide alternative pathways for those with a migration background to achieve either partial or full certification through the German chambers (Aerne and Laudenbach, 2020). While important, these reforms are rather limited in coverage.¹⁵ In general, the consensus in Germany still holds that firm-based apprenticeship acquired within the country's own VET system is the surest ticket to labor market integration.

In summary, contemporary dynamics within the German VET system illustrate the dilemmas associated with firm-based training in a period of rapid technological change. Ongoing modernization of training profiles and innovations at the intersection of VET and higher education have clearly succeeded in maintaining the attractiveness of the system—both for youth and for firms. But the system is characterized by persistent and in some ways increased stratification—with multiple options for high-achieving youth who can either enter higher education or VET or increasingly, both—either sequentially or simultaneously through a dual study program, but fewer and worse options for lower-achieving youth who are more often shunted into the state-run transition sector where they are unable to earn a credential.

DENMARK

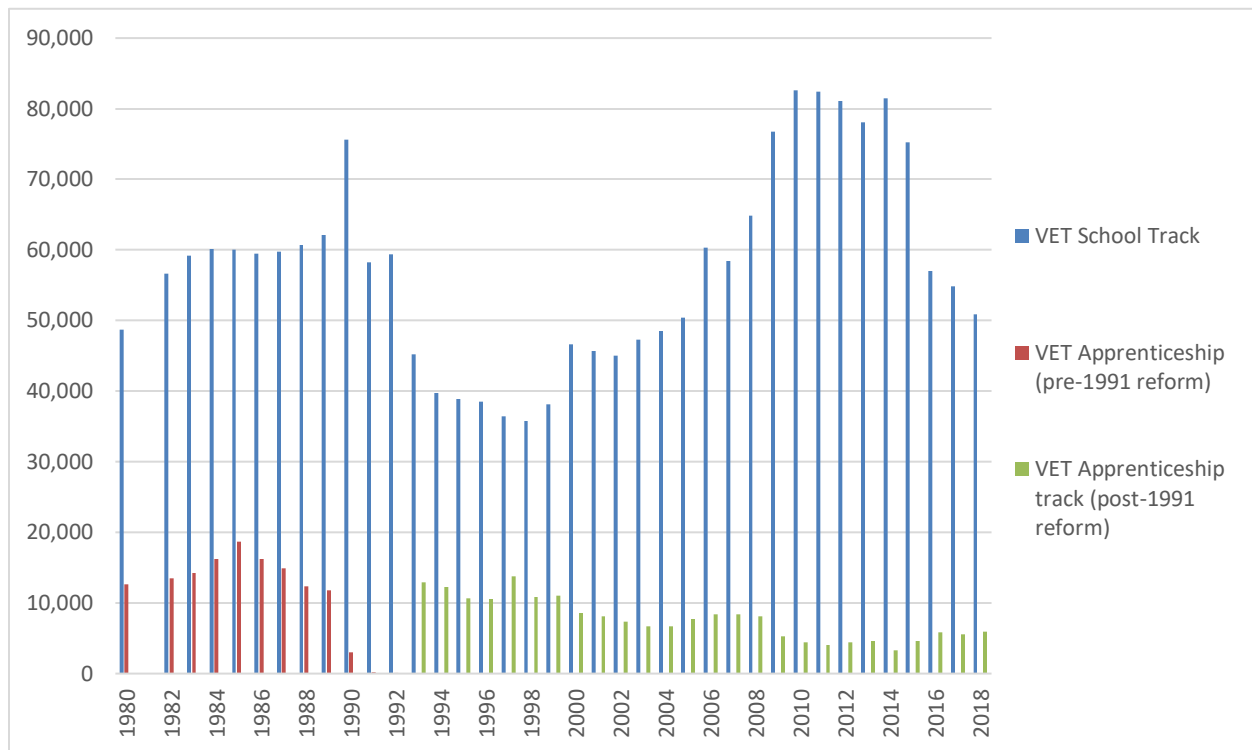
The reform trajectory in Denmark has been very different. Here, state interventions in the 1990s prioritized shoring up the social inclusion functions of the system, but these interventions appear, in retrospect, to have come at the expense of the social status attached to VET. Prior reforms (mentioned above) form the backdrop to the growing difference to Germany. The alternative school-based entry point into the VET system created in the 1970s, on its own, might not have disrupted the balance between efficiency and inclusiveness. However, ongoing difficulties in finding placements for the weakest learners prompted the state to expand the school-based option in the 1990s.

In 1993, the incoming social democratic government launched an “Education for All” initiative, with the goal of ensuring that at least 95% of young cohorts would complete at least upper-secondary education (Jørgensen and Juul, 2009). To fulfill this goal, a provisional full-time school-based training program (*skolepraktik*, or SKP) was established in 1993 for students who were unable to obtain a regular training placement.¹⁶ Combined with the school-based entry, it was now possible to finish the entire program in the school.¹⁷ Very different from Germany's transition system, the alternative school-based training system was fully integrated into the VET regime as a whole, in a parallel track overseen by the state rather than employers and trade unions. While students were required to continue to apply for firm apprenticeships

throughout the program, those who failed in securing one could also complete their training and earn their certification in the SKP program.

Originally intended as a temporary measure in times of unemployment and apprenticeship shortages, the SKP program nonetheless grew in importance over time. In 2013, it became a permanent institution, the so-called “practice centers” (*praktikcentre*). These centers offer work-based training at the school and coordinate “patchwork” apprenticeships in which students receive training in multiple companies and their school. The centers are operated by the state and are under the auspices of the vocational schools; employers play a very marginal role in their activities. The school-based entry system began as a trial alternative to the apprenticeship entry in 1972 with just over 1,000 students compared to over 14,000 apprentices (Christensen, 1985). However, in only five years it had grown to over 7,000 students and was made permanent in 1977. The number of students entering through apprenticeships stagnated during this period, and soon the school track took over as the most important entry point in the 1980s and 1990s. Figure 5 shows how the school-based entry has come to dominate VET since 1980.

Figure 5: Number of new VET students by entry, 1980–2018



Sources: Danmarks Statistisk – Statistiske Efterretninger 1981–1997; Styrelsen for IT og Læring

Note: The 1991 reform integrated the EFG and the apprenticeship entrance into a Basic Year that could be either school-based or apprenticeship-based (VET Apprenticeship Track in the figure (post-1991 reform)). Accordingly, there is a break in the data in the years before and after the reform.

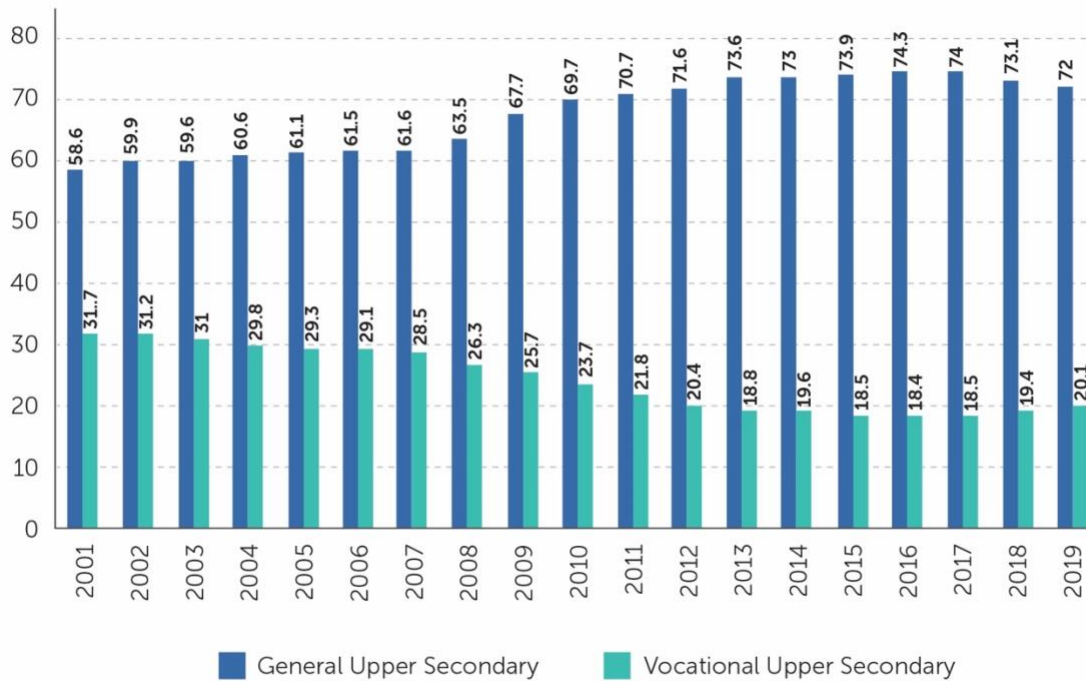
These interventions have provided an avenue for weaker students to acquire a training credential. However, the pursuit of inclusionary goals appears to have come at the expense of marginalizing VET, which over time came to be seen as a placeholder for weaker students to realize the state’s 95% completion goal (Carstensen and Ibsen, 2019). The school-based entry and the school-based alternative to apprenticeships (SKP and later practice centers) thus suffer from low status among students and employers alike—leading stronger students to refrain from entering VET to avoid the stigma (Juil and Jørgensen, 2011).¹⁸

Taken together with the fact that VET in Denmark does not give immediate access to tertiary education, youth and their parents increasingly began to prefer the general upper-secondary track as the safest educational choice in times of rapid technological and economic change. The difference to Germany is reflected in a recent representative survey on opinions about VET, in which respondents in each country were asked if they would recommend general education or vocational training to a young person about to decide on their upper-secondary education. While about half of respondents in both countries indicated

that the choice would depend on the person, for those who ventured a less qualified response, a clear majority of Danes recommended general education while Germans were more likely to recommend the vocational path (Cedefop opinion survey on VET 2017).¹⁹

These attitudes are reflected in the waning interest among Danish youth in the vocational upper-secondary track. Figure 6 shows that, in 2019, around 20% of students finishing 9th or 10th grade chose VET against more than 30% in 2001. Conversely, the share of students choosing general upper secondary has increased from 59% to 72% in the same period. In an effort to counteract these trends, the government (in 2011) introduced a new program at the upper-secondary level (the EUX program). This new track was designed to redress the negative attitudes by offering a combination of VET journeyman’s certification and a general upper-secondary diploma (Jørgensen, 2017). EUX does indeed attract higher-achieving students—just over 10% of VET students in 2019—but studies suggest that a large majority of these students would have chosen VET rather than general upper-secondary anyway (DEA, 2019).

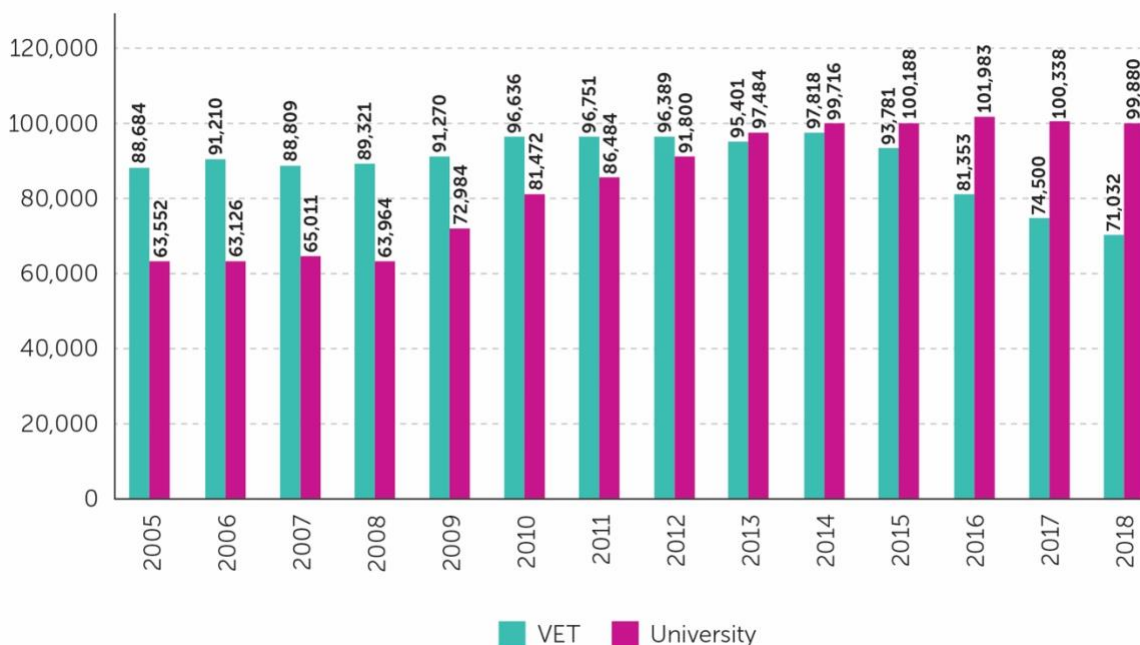
Figure 6: Share of Youth Entering VET or General Upper Secondary after Lower Secondary, 2001-2019



Source: Danmarks Statistik, 2019

Thus, in Denmark, VET enrollments have steadily lost ground as more youth now opt for university education. Figure 7 shows that in 2013 university enrollments surpassed enrollments in VET and that the gap is increasing. In fact, there has been a substantial 27% decline in VET students since 2014, whereas the number of university entrants has plateaued at around 100,000 students.

Figure 7: Danish Vet, Number of Youth Entering into VET and into University Studies, 2005-2018

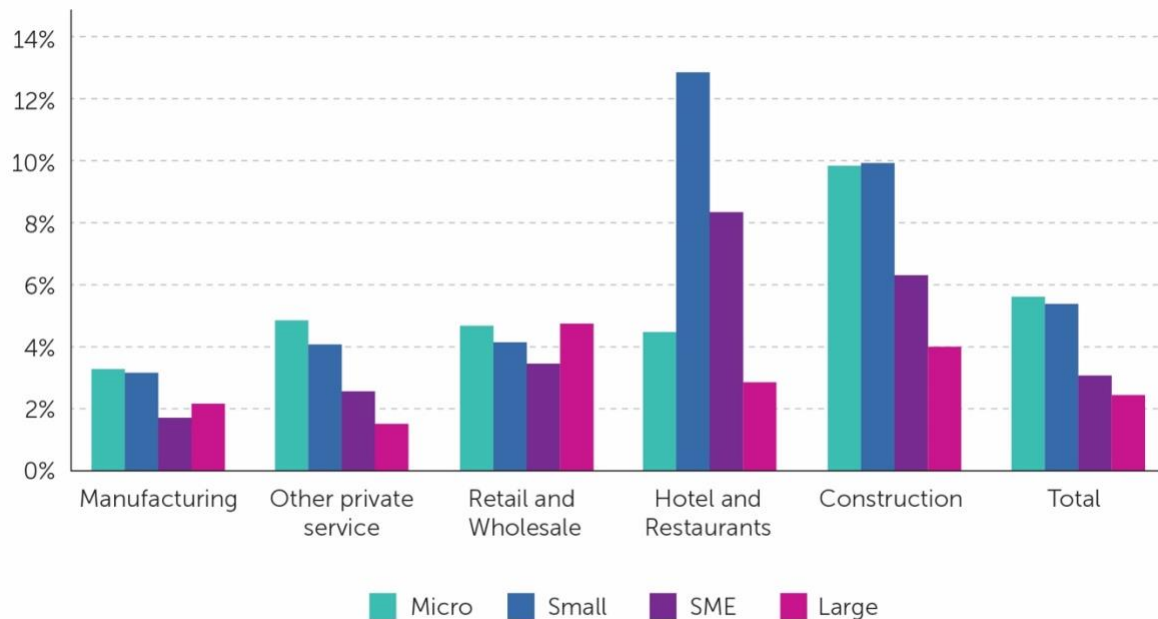


Source: Danmarks Statistik, 2019

Declining interest on the part of Danish youth and their parents both reflects and reinforces trends in firm participation in VET. Unlike in Germany, Denmark’s premier firms are unlikely to offer apprenticeships and increasingly recruit exclusively from universities. Studies show that it is the smaller and less capital-intensive companies that provide most of the apprenticeships (DEA, 2012; AE-Rådet, 2018). For example, capital intensity (measured as the value of physical capital per full-time employee) is more than twice as high in non-training companies as it is in training companies (DEA, 2012: 2). And, while the statistical data is not directly comparable to the German data due to different ways of registering companies and training activity, it is clear that small companies in Denmark train a lot more than in Germany. Seen against the future need of companies—the so-called “apprentice quota”—apprentices constitute a larger share in smaller companies compared to larger companies. As shown in Figure 8, except for retail, all other

industries exhibit a negative relationship between apprentice quota and company size. Moreover, large advanced manufacturing companies are far below the national average.²⁰

Figure 8: Apprentice Quota Across Industries and Firm Size, 2018



Source: AE-Rådet, 2018:3

Micro: <10 employees, Small: 10-49 employees, Medium: 50-250 employees, Large: >250 employees.

The withdrawal of the country’s largest and most technically sophisticated firms has meant that innovations in training to accommodate the need for more advanced skills have mostly developed outside the traditional system, rather than—as in Germany—within it. Denmark lacks an equivalent to Germany’s dual study program that combines higher education with firm-based vocational training. Eight state-run vocational academies (*Erhvervsakademier*) and the School for Machinists in Aarhus come closest to the kind of hybrid institutions found in Germany. These academies, however, have gradually separated themselves from the VET system; and, in 2013, they became entirely independent of it. Denmark’s vocational academies are now more integrated with the tertiary education system than with the traditional VET regime; thus, unlike Germany’s dual study program, attendance in the vocational academy does not lead to a journeyman’s certificate (Jørgensen, 2017). These programs also no longer recruit VET-track students—itsself a reflection of the diminishing status of VET. Instead, they draw on students with general

upper-secondary degrees (albeit from the lower ranks of such students). Thus, the tight connection to large advanced companies—as seen in Germany—does not exist to the same extent in Denmark.

The vocational academies certainly play an important role in the Danish educational system generally. The number of newly admitted students has increased from 7,232 in 2009 to 12,728 in 2018 (Danske Erhvervsakademier, 2013; 2018), constituting a stable share of approximately 15% of all newly admitted students in tertiary education.²¹ However, in the present context, the point is that they are largely disconnected from (and if anything, are competing with) the traditional VET system. Although these programs can involve short firm-sponsored internships, the practical training component is typically very limited (around three months over the entire two years) and does not lead to a secure job at the workplace afterwards. So while the vocational academies had the potential to become the kind of hybrid institution found in Germany (Graf, 2016), they have instead become specialized, short-duration tertiary education programs with limited workplace training (Jørgensen, 2017).

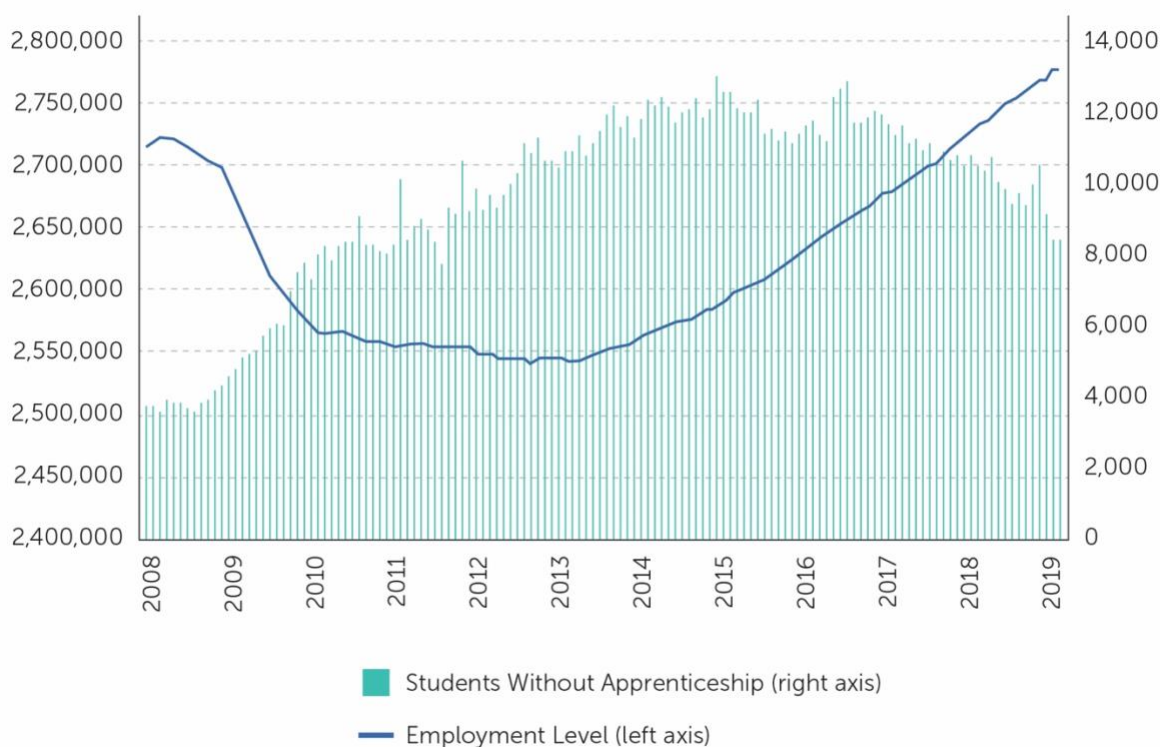
The deterioration of VET's public image has not been lost on policymakers. Skilled worker unions and those employers who continue to depend on the VET system to provide traditional skills have become increasingly worried that VET will not recover. The political climate on education has also changed as policymakers began to realize that a college degree by itself is not necessarily a ticket to a well-paid job (Carstensen and Ibsen, 2019). This realization has been fueled by increasing university completion times and rising unemployment rates among college graduates. Based on extensive consultation with peak employer associations and unions, the most recent VET reform (in 2014) sought to upgrade VET's image and reverse the chronic dropout rates that had come to plague the system. Most importantly, the reform introduces grade requirements (in Danish and math) for admission to VET training and seeks to attract strong students with so-called “talent tracks” that provide selected high-performing youth with extra skills and exposure to companies.

In these ways, policymakers, employers, and trade unions have explicitly sought to change the image of VET from being a social policy measure to constituting an attractive career option that can compete with tertiary education. Believing that attracting better students would be a “silver bullet,” the reform sought to make apprenticeship more attractive to advanced employers by filtering out so-called “weak learners.” The reform did not challenge the regulatory framework of occupational self-governance through trade councils and apprenticeship contracts, nor did it attempt to integrate VET with higher education (Carstensen and Ibsen, 2019). Instead, it simply imposed minimum standards for students to enter the VET system. Access to any vocational track (whether school- or firm-based) now requires that students' grades in math and Danish not fall below a specified threshold.

Subsequent developments have revealed how hard it is to reverse these trends, however. It appears that previous policies have set in motion feedback effects that are difficult to halt. While it was expected that

the number of apprenticeships would drop due to the financial crisis in 2008–2009, the economic recovery did not bring back the number to pre-crisis levels, as seen in Figure 9.

Figure 9: Monthly Employment Level (left axis) and Students without Apprenticeship (Right Axis)



In light of continued anemic interest on the part of youth and advanced firms alike, the government has now turned to financial incentives to encourage firms to take trainees. Therefore, in response to the continued apprenticeship shortage, employers, trade unions, and the government reached a tripartite agreement on apprenticeships in 2016. The goal of the agreement is to create 8,000 to 10,000 more apprenticeships before 2025. Companies that take on apprentices are reimbursed by the AUB-foundation, which is funded by employer contributions and public money. This fund will now give bonuses and penalties, respectively, to companies that take apprentices based on their current number of skilled workers. The idea is to redistribute funds from companies that undertrain to companies that overtrain. The cut-off point was set at 3% (i.e., a company should have at least three apprenticeships for every 100 skilled workers). While the agreement seems to be having some effect, the number of apprenticeships is still far below the target. There were 5,514²² yearly agreements in 2016, the year of the agreement. This number had only increased by 354 in 2019 to 5,867 (Styrelsen for IT og Læring, 2020: 3).

To sum up, the trajectory of the Danish VET system is to a large extent a mirror image of the German one. The knowledge economy disrupted the inherent balance between efficiency and equality, and the Danish state has intervened directly into the system. For decades, it emphasized social inclusiveness objectives and used the VET system to fulfill the goal of getting 95% of all cohorts through upper-secondary education.²³ These interventions, however, produced serious negative feedback effects for the system and its ability to adapt to the knowledge economy and changing skills demands. While Danish VET programs are being upgraded and the governance of the system seems responsive, the advanced firms and high-achieving students are dropping out of the system. Danish firms are dissatisfied with the quality of students, while youth and their parents are worried about the social status and career opportunities in VET. Thus, increasingly, it is the less advanced and smaller companies providing apprenticeships, and it is students with lower grades and less potential to enter university who opt for VET. So far, the effects of policies aimed at reversing these trends have been disappointing.

CONCLUSIONS

This comparison of Germany and Denmark's diverging VET reform trajectories illuminates the trade-offs that firm-based VET systems face in the new knowledge economy. They must strike a delicate balance between providing firms the autonomy they seek to select apprentices and train in ways that serve their own economic objectives and finding ways to avoid social marginalization and welfare dependency by offering support and training to the weakest youth who are being passed over by firms. The balance Germany has struck favors the first objective, allowing the VET system to remain strongly employer led and market driven. As firms adapt to rapidly changing economic and technological conditions, benefits increasingly accrue to higher-achieving youth to whom multiple educational paths are available and for whom a vocational certificate can lead to choice jobs in the largest and most advanced firms. These mutual gains from efficient matching allow the VET system to maintain a strong reputation among both job-seekers and employers, creating a virtuous cycle of skill upgrading and adjustment at the national level. On the downside, this firm-led model does not mitigate the social stratification that results from allowing weaker candidates to fall through the cracks of the training system (and later labor market), a problem that reinforces existing cleavages based on ethnicity or refugee or immigrant status.

Denmark's VET system bears the imprint of the country's stronger social democratic influence. Here, a stronger state presence in VET has strengthened the social safety net for the weakest youth in the labor market, and has shored up the groups in society that are least able to gain employment. However, while these interventions have reduced marginalization at the entry stage, they seem to have backfired by removing the gatekeeper role and signaling value inherent to a more competitive VET system overseen by firms. When the state intervenes to level the playing field, the entire system can suffer from adverse

selection on the part of youth and corresponding attrition on the part of firms, which downgrades the overall quality of the skill-upgrading program in a self-reinforcing vicious cycle.

The comparison shows the difficulties even historically successful skill formation systems have in fulfilling both economic and social inclusion functions in the knowledge economy. However, panning out again to situate these two countries within the broader context of the rich democracies, it is clear that both Germany and Denmark continue to compare favorably to more “liberal” training regimes, which tend to perform worse on both the skill provision and social inclusion fronts. We close, therefore, with some reflections on how the two cases we have considered fit within a broader context and the lessons they may hold for the United States.

LESSONS OF THIS STUDY FOR THE UNITED STATES

In recent years, VET has attracted rare bipartisan support in the United States. There has been a big push by both the Obama and Trump administrations to increase the number of apprenticeship programs. For example, in 2016, Congress allocated \$90 million toward apprenticeship programs. The political focus could produce progress. According to the Department of Labor, the number of active apprentices in the United States increased from just under 400,000 in 2010 to over 600,000 in 2019. Furthermore, over 250,000 people entered into new apprenticeships in 2019, representing a 128% increase in yearly new entrants since 2009. In a similar vein, over 3,000 new programs were established in 2019, representing a 115% increase in new programs since 2009 (Dept. of Labor, 2020).

These positive developments notwithstanding, apprenticeship programs are still comparatively underdeveloped in the United States. As indicated at the outset, strong collectivist VET systems such as those in Germany and Denmark are not stand-alone structures; rather, they are deeply imbricated in a broader institutional ecosystem that incentivizes firms to invest in worker training and that encourages non-academically inclined youth to seek out vocational skills. The United States currently lacks many of the institutional preconditions for the successful introduction of firm-based VET, and constructing them would clearly require significant political will.

The structure of the American labor market—featuring weak labor and employment protections and low levels of collective organization on both sides of the class divide—is a key barrier to progress in this area (see Thelen, 2019, for an extended comparison of American labor market institutions to European systems). In a context characterized by weak employer associations, highly fluid labor markets (defined by the “employment at will” doctrine and non-existent employment protections), and individualized wage bargaining, it is irrational for most firms to make costly investments in training workers who can easily abscond to, or be recruited by, other firms. The weakness of American unions and the lack of coordinated

collective bargaining contribute mightily here. Where labor representation is weak, and the average firm's attachment to its employees is minimal, training is often viewed as just another labor cost to be minimized.

Based on our study of European systems, we would argue that policy proposals to increase the minimum wage and strengthen collective bargaining and union voice in the United States (e.g., Kochan, 2020) could help propel employers into great collective action on training again. In sectors such as automotive, construction, transportation, and retail, increased productivity through training could offset unit labor cost increases from collective bargaining. Co-investment by employers and workers in skills would need to be complemented with human resource practices that ensure long-term returns on investment for both. As other scholars have argued (Kochan and Dyer, 2017), such effects could be more easily achieved through a transition away from the shareholder maximization ideology (and the extremely short strategic time horizons with which this is associated) currently practiced in many U.S. companies (Lazonick and O'Sullivan, 2000).

The structural deficits that stand in the way of a more systematic and sustainable approach to worker training in the United States are exacerbated by the "College for All" emphasis in the country's educational policies and the associated stigma often attached to vocational training.²⁴ Governments at the federal and state levels could do a great deal more to assist firms in overcoming the collective action dilemmas they confront by offering incentives to invest in training and by supporting the development of national or state-level standards and skill certification procedures. Policymakers or educational institutions might also forge institutionalized cooperation with employers on a broad regional or state level to produce a more robust infrastructure for the kind of training found in European countries.

To be sure, one can find isolated cases of successful local innovations and adaptations of firm-sponsored VET in the United States (Remington, 2018). For example, CareerWise, launched in Colorado in 2016 and now supporting affiliate programs in New York, Indiana, and Washington, D.C., looked to the Swiss VET system and began building partnerships between local educational providers and corporations to offer more apprenticeships for current high school students in high-wage, high-growth, middle-skilled occupations. The initiative is intended to produce tens of thousands of youth apprenticeships in the coming decade, across employers large and small, particularly in industries that have not traditionally participated in apprenticeship. Likewise, in Western Massachusetts, nanotechnology and biotechnology firms formed the Massachusetts Advanced Manufacturing Collaborative. In this initiative, the curriculum of VET institutions is aligned with the needs of member firms and pilot apprenticeship programs are created (Remington, 2018; Reynolds and Uygun, 2018). Beyond these programs, single large companies such as IBM or Volkswagen can set up their own training programs that might spill over into other companies in the community.

Common to all these initiatives, however, is strong leadership by individual firms and politicians, rather than the broader institutional infrastructure that underpins VET systems such as those in Germany and Denmark. As laudable as these American efforts have been, our analysis suggests that without these institutional supports, such initiatives are likely to remain “islands of excellence” in an overall context characterized by low training investment and the associated cycle of low-skill, low-wage employment that characterizes the bottom end of the American labor market.

Based on this study and other research, we know that successful state interventions can perform six important functions:

1. Ensure that VET leads to well-paid jobs (vocational wage premium). This could entail strengthening minimum wages through support for collective bargaining (especially sectoral bargaining), statutory minimum wages, prevailing wage laws, and/or job certification.
2. Ensure participation on the part of firms by providing financial incentives for apprenticeships on a collective basis (e.g., by industry or region). Due to the absence of strong employer associations in the United States, government at the state or federal level may need to introduce additional measures (e.g., collective training funds) to increase firm participation.
3. Create and support an infrastructure through which VET training and certificates are valid beyond the individual firm in which apprentices received their training.
4. Ensure that VET certificates give access to higher education (so-called “permeability”). This requires strengthened integration with institutions of tertiary education, including, of course, community colleges.
5. Deploy positive and negative incentives to encourage firms to invest in worker skills, while granting them the autonomy to select their own trainees.
6. Link public procurement, investment, and recovery funds to training obligations for contracting companies.

In the absence of nationwide coordination among unions, employer associations, and government, we find that local/statewide programs such as CareerWise provide promising models for re-energizing firm-based training in the United States. Partnerships among business, educational institutions, and government that are fueled by public funding and extensive information-sharing might be the best alternative to the European institutional ecosystems that are difficult to copy. Community colleges are especially important for the partnership approach as they provide the nationwide web of educational institutions that have enough scope and scale to broadly promote VET as an attractive alternative to an academic college degree (Osterman and Weaver, 2016). Moreover, their double-function of providing vocational education and entry into four-year degrees is vital for success, because—as we have seen in this analysis of Germany and Denmark—access to four-year degrees is important for youth who are afraid of ending up in educational “dead-ends.” Local partnerships such as CareerWise should receive as much government

support as possible to spread and fortify the connections between employers and community colleges. At the national level, community colleges should work together with the Department of Labor to further integrate and promote national standards for vocational credentials. Recent studies suggest that the potential for raising awareness and building connections is sizeable. For example, Osterman and Weaver (2016) report that less than a quarter of the surveyed firms use the community college either to train potential recruits/new hires or to train incumbent workers.

However, government can do more than support local partnerships, promote national credentials, and raise awareness. Our sixth point above underlines another, even more direct way for the government to promote firm-based training in the United States. Public investments in infrastructure, clean energy, and climate change mitigation provide an opportunity to oblige companies that win contracts with federal and state government to invest in workforce training. Procurement policies attached to training obligations exist in other countries such as Belgium, Denmark, Germany, Ireland, Norway, Switzerland, and the United Kingdom (Leiser and Wolter, 2015). Similarly, federal and state governments in the United States might consider training obligations as a condition for receiving economic recovery funds when this is feasible, especially for larger companies.

In this brief, we have emphasized the political choices that have driven the German and Danish VET systems in different directions, and we have shown that the choices came with trade-offs between efficiency and equality. Difficult political choices are also needed in the United States. As technological change continues to challenge middle-skill jobs, it is crucial that VET is upgraded in a way that serves both firms and students. The six suggestions for reforms above strike us as particularly important for a successful upgrade, and one that seems increasingly important in light of two structural trends in the U.S. economy. The first of these is the aging and retirement of skilled workers in some sectors that is creating shortages of skills that are often written off as “traditional” but that, in fact, remain critical to the economy. This development could itself serve as an incentive for employers to rethink their role in skill formation (Autor, Mindell, and Reynolds, 2019). The second concerns the options available to youth. As student debt becomes an increasing problem for college graduates who do not obtain well-paid professional jobs, youth might begin to consider high-quality vocational programs that confer portable skill certification as an attractive alternative to college (Holzer and Baum, 2017). The confluence of these two structural trends could encourage reforms that can revitalize vocational training as a valued skill set for the future.

Bibliography

- Acemoglu, Daron and Jörn-Steffen Pischke. 1998. "Why Do Firms Train? Theory and Evidence." *Quarterly Journal of Economics*, Vol. 113, No. 1 (February 1998): 79–119.
- Acemoglu, Daron and Jörn-Steffen Pischke. 1999. "Beyond Becker: Training in Imperfect Labour Markets." *The Economic Journal*, Vol. 109, No. 453, Features (February 1999): F112–F142.
- AE-Rådet. 2015. *Store virksomheder tager ikke nok ansvar for fremtidens faglærte*. København: AE-Rådet.
- AE-Rådet. 2018. *De store virksomheder kryber uden om ansvaret for lærlinge*. København: AE-Rådet.
- Aerne, Annatina and Franziska Laudenbach. 2020. *How Do Collective Skill Formation Systems Adapt to Migration: A Comparison of Germany and Switzerland*. Unpublished manuscript; University of St. Gallen.
- Autor, David H. 2019. "Work of the Past, Work of the Future." *AEA Papers and Proceedings*, 109: 1–32.
- Autor, David, David A. Mindell, and Elisabeth B. Reynolds. 2019. *The Work of the Future: Shaping Technology and Institutions*. MIT Task Force on the Work of the Future. Cambridge, MA: MIT.
- BIBB. 2018. Bildung in Deutschland, Kapitel E: Berufliche Ausbildung
<https://www.bildungsbericht.de/de/bildungsberichte-seit-2006/bildungsbericht-2018/pdf-bildungsbericht-2018/kapitel-e-2018.pdf> (accessed August 27, 2020)
- BIBB. 2019. Bundesinstitut für Berufsbildung (Hrsg). *Datenreport zum Berufsbildungsbericht 2019*. Informationen und Analysen zur Entwicklung der beruflichen Bildung. Bonn.
- BMBF. 2019. Berufsbildungsbericht 2019. Bonn: Bundesministerium für Bildung und Forschung.
- Bonoli, Giuliano and Patrick Emmenegger. 2020. "The Limits of Decentralized Cooperation: Promoting Inclusiveness in Collective Skill Formation Systems?" *Journal of European Public Policy* (January 2020).
- Bonoli, Giuliano and Anna Wilson. 2019. "Bringing firms on board. Inclusiveness of the dual apprenticeship systems in Germany, Switzerland, and Denmark," *International Journal of Social Welfare* Vol. 28, No. 4: 369–379.
- Bøndergaard, Gudmund. 2014. *The Historical Emergence of the Key Challenges for the Future of VET in Denmark*. Roskilde: Nord-VET – The future of Vocational Education in the Nordic countries.
- Busemeyer, Marius R. and Kathleen Thelen. 2020. "Institutional Sources of Business Power." *World Politics*, Vol. 72, No. 3: 448–480.
- Busemeyer, Marius R. and Christine Trampusch. 2012. *The Political Economy of Collective Skill Formation*. Oxford: Oxford University Press.

- Carstensen, Martin B. and Christian Lyhne Ibsen. 2019. "Three Dimensions of Institutional Contention: Efficiency, Equality and Governance in Danish Vocational Education and Training Reform." *Socio-Economic Review*.
- Cedefop. 2017. *Cedefop European Public Opinion Survey on Vocational Education and Training*. Luxembourg: Publications Office of the European Union.
- Christensen, Erik. 1985. *Konflikter Mellem Faglærte Og Ufaglærte Arbejdere*. København: Lindhardt og Ringhof.
- Collins, Lois M. 2019. "Is college really the only pathway to success? Here's what some states are doing to help young people." *Deseret News*. January 19, 2019.
- Danmarks Statistik. 2019. *Uddannelse og arbejdsmarkedet 2019*. København: Danmarks Statistik.
- Danske Erhvervsakademier. 2013. *Danske Erhvervsakademier Årsberetning 2013*. København: Danske Erhvervsakademier.
- Danske Erhvervsakademier. 2018. *Danske Erhvervsakademier Årsberetning 2018*. København: Danske Erhvervsakademier.
- DEA. 2012. *DEA Notat: De Mindst Produktive Virksomheder Tager Det Største Praktikansvar*. København: DEA.
- DEA. 2019. *EUX-Elever: Fremtidens Faglærte?* København: DEA.
- Dept. of Labor (2020). "Registered Apprenticeship National Results Fiscal Year 2019," U.S. Dept. of Labor: Washington, D.C. Available at: <https://www.dol.gov/agencies/eta/apprenticeship/about/statistics> (accessed 8.18.2020)
- Di Maio, Gina, Lukas Graf, and Anna Wilson. 2019. "Torn between Economic Efficiency and Social Equality? Short-Track Apprenticeships in Denmark, Germany and Switzerland." *European Educational Research Journal* Vol. 18, No. 6: 699–723.
- Durazzi, Niccolo and Leonard Geyer. 2019. "Social Inclusion in the Knowledge Economy: Unions' Strategies and Institutional Change in the Austrian and German Training Systems." *Socio-Economic Review* Vol. 18, No. 1 (January 2020): 103–124.
- Graf, Lukas. 2016. "The Rise of Work-Based Academic Education in Austria, Germany and Switzerland." *Journal of Vocational Education & Training* Vol. 68, No. 1: 1–16.
- Graf, Lukas. 2018. "Combined Modes of Gradual Change: The Case of Academic Upgrading and Declining Collectivism in German Skill Formation." *Socio-Economic Review* Vol. 16, No. 1: 185–205.

- Hall, Peter A. and David Soskice (eds.). 2001. *Varieties of Capitalism: The Institutional Foundations of Comparative Advantage*. Oxford: Oxford University Press.
- Hanushek, Eric A., Guido Schwerdt, Ludger Woessmann, and Lei Zhang. 2017. "General Education, Vocational Education, and Labor-Market Outcomes over the Lifecycle." *Journal of Human Resources* Vol. 52, No. 1: 48–87.
- Holzer, Harry J. 2017. "The Role of Skills and Jobs in Transforming Communities." *Cityscape* Vol. 19. No. 1: 171–190.
- Holzer, Harry J. and Sandy Baum. 2017. *Making College Work*. Washington, D.C.: Brookings Institution Press.
- Iversen, Torben and David Soskice. 2015. "Democratic Limits to Redistribution: Inclusionary versus Exclusionary Coalitions in the Knowledge Economy." *World Politics* Vol. 67, No. 2: 185–225.
- Jacob, Marita and Heike Solga. 2015. "Germany's Vocational Education and Training System in Transformation: Changes in the Participation of Low- and High-Achieving Youth Over Time." *European Sociological Review* Vol. 31, No. 2, 161–171.
- Jørgensen, Christian Helms. 2017. "From Apprenticeships to Higher Vocational Education in Denmark—Building Bridges While the Gap Is Widening." *Journal of Vocational Education & Training* Vol. 69, No. 1: 64–80.
- Jørgensen, Christian Helms and Ida Juul. 2009. *Bedre Samspil Mellem Skolepraktik Og Ordinær Virksomhedspraktik*. København: Undervisningsministeriet.
- Juul, Ida and Christian Helms Jørgensen. 2011. "Challenges for the Dual System and Occupational Self-Governance in Denmark." *Journal of Vocational Education & Training* Vol. 63, No. 3: 289–303.
- Kochan, Thomas A. 2020. "Worker Voice, Representation, and Implications for Public Policies." MIT Task Force on the Future of Work, Research Brief. July 2020. Cambridge: MIT.
- Kochan, Thomas A. and Lee Dyer. 2017. *Shaping the Future of Work: A Handbook for Action and a New Social Contract*. Cambridge, MA: MIT Press.
- Krekel, Elisabeth. BIBB. Personal interview. January 2020.
- Kroll, Stephan, Lydia Lohmüller, and Joachim Gerd Ulrich. 2016. *Erstmalig mehr Ausbildungsinteressierte mit Studienberechtigung als mit Hauptschulabschluss* (Bonn: BIBB).
- Lazonick, William and Mary O'Sullivan. 2000. "Maximizing Shareholder Value: A New Ideology for Corporate Governance." *Economy and Society* Vol. 29, No. 1: 13–35.

- Leiser, M.S. and S.C. Wolter. "Public Procurement Can Promote Apprenticeships." *EENEE Policy Brief No. 1/2015*. Munich: European Expert Network on Economics of Education (EENEE).
- Osterman, P. and A. Weaver. 2016. "Community Colleges and Employers: How Can We Understand Their Connection?," *Industrial Relations: A Journal of Economy and Society* Vol. 55, No. 4: 523–545.
- Pfeffer, Fabian T. 2008. "Persistent Inequality in Educational Attainment and Its Institutional Context." *European Sociological Review*, Vol. 24, No. 5 (December 2008): 543–565.
- Protsch, Paula and Heike Solga. 2016. "The Social Stratification of the German VET System." *Journal of Education and Work* Vol. 29, No. 6: 637–661.
- Remington, Thomas F. 2018. "Public–Private Partnerships in TVET: Adapting the Dual System in the United States." *Journal of Vocational Education and Training* Vol. 70, No. 4: 1–26.
- Reynolds, Elisabeth B. and Yilmaz Uygun. 2018. "Strengthening Advanced Manufacturing Innovation Ecosystems: The Case of Massachusetts." *Technological Forecasting and Social Change* Vol. 136(C): 178–191.
- Sponholz, Dirk and Joachim Gerd Ulrich. 2019. Passungsprobleme beim Zugang in die duale Berufsausbildung. In Christian Lindmeier, Helga Fasching, Dirk Sponholz, eds. *Inklusive Berufsorientierung und berufliche Bildung – aktuelle Entwicklungen im deutschsprachigen Raum*.
- Streeck, Wolfgang. 1992. *Social Institutions and Economic Performance: Studies of Industrial Relations in Advanced Capitalist Economies*. Sage Publications.
- Styrelsen for IT og Læring. 2020. *Praktikpladssituationen February 2020*. København: Styrelsen for IT og Læring.
- Thelen, Kathleen. 2004. *How Institutions Evolve: The Political Economy of Skills in Germany, Britain, the United States, and Japan*. Cambridge: Cambridge University Press.
- Thelen, Kathleen. 2014. *Varieties of Liberalization and the New Politics of Social Solidarity*. Cambridge: Cambridge University Press.
- Thelen, Kathleen. 2019. "The American Precariat: U.S. Capitalism in Comparative Perspective." *Perspectives on Politics*, Vol. 17, No. 1: 5–27.
- von Weitershausen, Inez. 2020. "Training the 'Workforce of the Future': Insights from Work-Based Higher Education Programs in Germany and the United States." MIT Task Force on the Work of the Future Working Paper Series (April 2020). Cambridge: MIT.

Woisch, Andreas, Hanna Mentges, and Laura Schoger. 2019. Bildungsintentionen und Informationsverhalten von Studienberechtigten des Abschlussjahrgangs 2018. DZHW Brief 05/2019.

Endnotes

- 1 See Thelen, 2014: 72ff, on which we draw here.
- 2 While the two countries are very similar with respect to initial VET (or IVET, for youth), their systems for adult education and lifelong learning (continuing vocational education and training, or CVET) are rather different. Denmark is renowned for extensive and free adult education; adult learners can join a wide variety of courses at all educational levels; and they can join them either as employed or unemployed. Courses are free and students receive financial aid by the state (Statens Uddannelsesstøtte – SU) or an apprentice wage depending on their specific VET track. Germany, by contrast, lacks a strong collective framework for CVET to match its enviable system of IVET. Firms, of course, sometimes offer their employees opportunities to acquire new skills that the firm needs, but there is no framework for certifying such skills, and individuals who seek training to move jobs, for example, would be on their own. However, the current German government recently launched an initiative to bolster CVET, including proposals to expand entitlement to retraining.
- 3 In both Germany and Denmark, students typically decide on either a vocational or an academic track, in the past, after the 9th grade, or, more commonly now, after the 10th grade.
- 4 The share of young people (ages 20–29) who have only the lower school certificate (*Hauptschulabschluss*) has declined steadily over the past decade, from about 30% of all young people in 1991 to well under 20% today. The number of those leaving with *Realschulabschluss* has also declined (see BMBF Berufsbildungsbericht, 2019, p. 30, figure 3).
- 5 A recent survey was conducted of academic-track students in their last semester before leaving school. Twenty-three percent reported that they were either “sure” or “probably” going to enter the vocational training system. An additional 15% were considering this (Woisch, Mentges, Schoger, 2019: 5).
- 6 Indeed, the balance between small and large firm participation has been tilting over the past two decades. Between 1999 and 2017, the share of small firms (1–9 employees) that participated in the VET system dropped by 32%, while the share of large firms engaged in VET training rose by 14% (BIBB Datenreport, 2019: 9).
- 7 This starting point already reflects significant consolidations over previous decades. In 1950, there were 901 separate occupations (Protsch and Solga, 2016: 642).
- 8 247 occupations involve 36 months of training, 52 require 42 months, and only 26 occupations require just two years of training.
- 9 A full list of new and modernized occupational profiles can be accessed here: https://www.bibb.de/de/berufeinfo.php/new_modernised_occupations_by_year
- 10 MINT occupations are defined as all tasks that “require a higher level of knowledge and competence in math, computer science, and technology”—and this includes both “high” and “medium” skilled occupations with those characteristics (BIBB Datenreport, 2019: 131–132). A list of these occupations can be found here: <https://www.ausbildung.de/berufe/themen/mit-mint/>
- 11 BIBB Datenreport, 2019: 23 Table A1.1.1-3 provides a list of occupations in which the demand for the training is either below or above the supply of training slots.
- 12 Of all the applicants who failed to land an apprenticeship in 2018, almost as many of them (27.5%) had an academic upper-secondary certificate as the number who had only the primary certificate (*Hauptschulabschluss*) (28.5%) (BIBB Datenreport, 2019: 24).
- 13 For example, in 2017, 38.4% of youth entering the transition system had a lower-secondary school certificate (*Hauptschule*), another 20.6% had an intermediate-secondary school certificate (*Realschule*), while 30.5% had no school leaving certificate at all (BIBB Datenreport, 2019: p. 100, Table A4.1-2).
- 14 By contrast, students with academic credentials who fail to land an apprenticeship in their preferred field would almost certainly not enter the transition system. According to Elisabeth Krekel of BIBB (personal interview,

January 2020), they would more likely decide to go to university after all, or enter the school-based VET system, or go abroad for a year.

- 15 As a practical matter, these measures do not apply to youth, only to adults who have either already acquired some kind of training or credential abroad or who have some significant work experience.
- 16 This possibility was originally set up in 1991 as a temporary measure to help students without apprenticeships.
- 17 In practice, very few students would end up doing this, as students were required to continue to apply for firm-based apprenticeships throughout the program—and during this period, most did succeed in landing a slot in a company, though often for a shorter period of time.
- 18 Studies have shown that the students who do find an apprenticeship spot are typically the strongest and do best in terms of employment and earnings after completing their program (DEA, 2019).
- 19 Thirty percent of Danes recommended a university track, as against 21.1% recommending vocational; in Germany, the numbers were the reverse, with 30.5% recommending a vocational track, as against 24.1% suggesting that university was the better option.
- 20 The quota measure is relatively new, and we are therefore unable to detect trends. However, a previous analysis from 2015 (using 2013 data) using the same measure does suggest that the larger companies are training less than before (AE-Rådet, 2015).
- 21 In 2018, 41% of these are in technical programs (Danske Erhvervsakademier, 2018); the remaining students are in commercial programs.
- 22 These numbers exclude agreements for health and social workers, and childcare assistants. These groups have special policies and were not part of the tripartite agreement.
- 23 In 2017, this goal was reduced to 90% of any cohort. Moreover, upper-secondary education should be finalized before students turn 25 years of age (instead of previously 40 years of age).
- 24 Even community colleges and other educational providers that do offer vocational degrees often compete for students by emphasizing the possibility to go on to academic degrees (Holzer, 2017; Remington, 2018).