

Leveraging Regional Differences and Cross-border Collective Institutions: The Case of Skill Formation and Employment in the Border Region of France, Germany, and Switzerland

LUKAS GRAF 

Hertie School - The University of Governance in Berlin

Abstract: *European cross-border regions often display substantial political and economic activity. A key example is the French-German-Swiss Upper Rhine region, where three distinct national governance models come together. In this dynamic cross-border industry cluster, traditional political-administrative units often do not meet the functional needs of employers and (future) employees. This comparative institutional analysis refers to Varieties of Capitalism and Local Production Systems perspectives to explore the operations of this cluster. It finds two main patterns through which education and training are embedded in the cross-border context: on the one hand, the leveraging of distinct institutional advantages in the different parts of the region and, on the other, the creation of cross-border collective competition goods in the form of jointly provided educational institutions. Through these two strategies, local actors within the cross-border industry cluster can turn their peripheral location into an institutional advantage.*

Zusammenfassung: *In europäischen Grenzregionen findet vielfach rege politische und wirtschaftliche Zusammenarbeit statt. Ein zentrales Beispiel hierfür ist die deutsch-französisch-schweizerische Oberrheinregion. Am Oberrhein treffen drei unterschiedliche nationale Governance-Modelle aufeinander, wobei die jeweiligen politisch-administrativen Strukturen oftmals nicht den funktionalen Bedürfnissen der lokalen ArbeitgeberInnen und ArbeitnehmerInnen entsprechen. Die vorliegende vergleichende Institutionenanalyse arbeitet mit dem „Varieties of Capitalism“-Ansatz und der „Local Production Systems“-Perspektive, um die massgeblichen Koordinationsmuster innerhalb dieses Wirtschaftsraums zu untersuchen. Es zeigt sich, dass die Akteure des Bildungssystems in zweifacher Form in den grenzüberschreitenden Kontext eingebettet sind: Einerseits durch die Nutzung der komparativ-institutionellen Vorteile der jeweiligen Teile des Clusters und andererseits durch die Schaffung transnationaler kollektiver Wettbewerbsgüter in Form grenzüberschreitender Bildungsprogramme. Diese Einbindung ermöglicht es lokalen Akteuren, institutionelle Vorteile aus ihrer Grenzlage zu ziehen.*

Résumé: *Les régions transfrontalières européennes présentent souvent une activité politique et économique importante. Un exemple clé est la région franco-germano-suisse du Rhin supérieur, où se rencontrent trois modèles différents de gouvernance nationale. Dans cette zone transfrontalière, industrielle et dynamique, les unités politico-administratives ne répondent pas aux besoins fonctionnels des employeurs et des (futur-e-s) employé-e-s. Cette analyse comparative et institutionnelle s'appuie sur les perspectives des variétés du capitalisme et des systèmes de production locaux pour explorer les opérations de ce cluster. Elle identifie deux modèles principaux selon lesquels l'éducation et la formation s'inscrivent dans le contexte transfrontalier : d'une part, l'exploitation d'avantages institutionnels distincts dans les différentes parties du cluster et, d'autre part, la création de biens collectifs de compétition sous la forme d'établissements*

d'enseignement communs. Grâce à ces deux stratégies, les acteurs locaux de cette zone industrielle transfrontalière peuvent transformer leur situation périphérique en avantage institutionnel.

KEYWORDS: Local Production Systems, Varieties of Capitalism, Industry Clusters, Internationalization of Education and Training, Cross-border Labor Markets

Introduction: The Politics of Cross-border Regions

Large parts of the European continent are borderland, where two or more nations meet. Such regions are characterized by “contradictory meanings and diverse relationships” (Anderson and O’Dowd 1999: 594) that matter greatly for regional governance structures (Capelloa et al. 2018). In many cases, substantial political, economic, social, and cultural cross-border activity takes place in borderlands (Graf and Gardin 2018; Lundquist and Trippel 2013). This is reflected in the rising number of cross-border commuters in Europe (Frisch 2017). In recent years, interest in politically institutionalized cross-border regions has been rising within Europe, not least “because of their increasingly relevant role as implementation units for European regional policy” (Perkmann 2003: 153).

Yet, little is known about the governance of skill formation in such regions – even though skill formation represents one of the major institutional spheres in socio-economic production models (Busemeyer and Trampusch 2012; Emmenegger et al. 2019) and is central to successful industry clusters (Schröder and Voelzkow 2016). It is particularly interesting to analyze the case of skill formation in the context of cross-border regions because the political economy of skill formation has thus far focused on the analysis of education and training within national frameworks (Streeck 2012). As much of this literature emphasizes distinct national models of skill formation, the question arises how industry clusters transcending national borders handle the respective institutional differences. This question is even more salient as some of these cross-border industry clusters (CBIC) are among Europe’s economically most successful regions (Leftris et al. 2005), suggesting that firms can derive some form of institutional advantage from settling in a cross-border context (Lundquist and Trippel 2013).

The related research puzzle is how governance in skill formation is configured in contexts where the political-administrative units do not meet the functional needs of employers and (future) employees within an industry cluster. The comparative political economy literature has not yet analyzed how such CBICs provide the pool of skilled workers required for the competitiveness of an industry cluster. We approach this research gap through addressing the following question: In which ways can actors benefit from their location in a CBIC and, related to this, how do the subnational parts of a CBIC relate to each other and to the respective national model of capitalism?

For this purpose, we juxtapose the literature on national varieties of capitalism (VoC) (e.g., Hall and Soskice 2001) and the literature on local production systems and industry clusters (or: regional VoC) (e.g., Crouch and Voelzkow 2009; Ebner 2016). None of these two approaches has yet been applied explicitly to the case of CBICs. Thus, the present analysis contributes to these two literatures by extending them to cross-border regions. The VoC and LPS perspectives are usually presented as antipodes. However, this paper shows that, in the case of borderland regions, both competing perspectives can be relevant to explaining the competitiveness of the cluster. Neither the national VoC perspective nor the local production system (LPS) perspective alone can predict the whole set of available

institutional characteristics and comparative advantages in CBICs. Rather, CBICs display different institutional strategies depending on the specific policy field, which are either better accounted for by the VoC or by the LPS perspective. In the case at hand, we show that a distinction must be made between the fields of vocational education and training (VET) and higher education (HE).

As a case study we focus on the Swiss part of one of Europe's most dynamic CBICs and wealthiest areas: the French-German-Swiss Upper Rhine region (FGS region), known especially for its chemical, pharmaceutical, and life sciences industries (Walther and Reitel 2013). It boasts an intense concentration of firms, global headquarters, R&D institutions, and high-end production facilities in these industries that is "unique in the world" (Zeller 2001: 27). The FGS region is sometimes considered a role model and forerunner for other cross-border regions owing to its long tradition of regional integration (Richardson 2017). Due to its high level of cross-border activity, here the effects of the cross-border context on skill formation should be particularly sizable. The region is characterized by institutional creativity in terms of cross-border activities, reflected also in cross-border governance agencies such as the Upper-Rhine-Conference or the EUCOR network of five leading universities (Muller et al. 2017). The cluster comprises Northwestern Switzerland (cantons Basel-City, Basel-Country, Aargau, and Solothurn), Baden in Germany, and Alsace in France. Importantly, each of these three bordering countries displays specific governance modes, both regarding their respective national model of capitalism and their skill formation systems.

We conduct a comparative institutional analysis based on expert interviews with relevant stakeholders, document analysis, and the limited available secondary literature. The study identifies two main patterns through which education and training is embedded in the cross-border context: in the case of VET, cross-border leveraging of comparative advantages between distinct educational institutions in each part of the cluster takes place (in line with the VoC perspective), which mainly works through a system of cross-border mobility of (prospective) skilled workers. In the case of HE, the construction of cross-border collective competition goods (CCG) can be observed (in line with the LPS perspective). In the latter case, we identify a cross-border skill formation regime, linked, for instance, to the joint development of curricula and study programs.

Employers and other (intermediary) organizations in the Swiss part of the FGS region build on both patterns depending on the policy field (VET or HE) – leading to institutional innovations especially in the case of HE and joint cross-border CCGs. Thus, the paper shows that actors in the CBIC are able to derive benefits from their peripheral location.

The next section outlines the analytical framework. Subsequently, the empirical analysis and the findings are presented. The paper concludes with a discussion and an outlook.

Analytical Framework: Applying VoC and LPS to Cross-Border Regions

Industry Clusters, VoC, and LPS

Industry clusters can be defined as "geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions (e.g., universities, standards agencies, trade associations) in a particular field that compete but also cooperate" (Porter 2000: 15). Such clusters can be expected to provide institutional conditions facilitating cooperation between the various involved actors. However, as Schröder and Voelzkow (2016) and Crouch and Voelzkow

(2009) have argued, the political economy literature offers two opposing views on the institutional link between regional industry clusters and the national models of capitalism. The classical *VoC literature* (e.g., Hall and Gingerich 2009) suggests that the key to success for a sector or region is that its governance mode is coherent with that of the national model of capitalism in which it is embedded. Hall and Soskice (2001: 18) state that “[...] nations with a particular type of coordination in one sphere of the economy should tend to develop complementary practices in other spheres as well”. In their understanding, complementarity derives from similar (coherent) institutions on different governance levels (here: national model of capitalism and industry cluster). From this point of view, productive institutional complementarity between the industry cluster and the national model of capitalism essentially builds on the coherence between the respective governance modes.

The *LPS perspective* (or: regional VoC) argues that industry clusters rely on the construction and maintenance of local CCGs. Schröder and Voelzkow (2016) point to the importance of local CCGs, such as a well-qualified workforce, know-how, or an efficient distribution system, for the competitiveness of a cluster. They state that “[CCGs] have to be provided collectively; companies either have to cooperate directly to provide them or the state or associations have to do so. In any case, a collective action problem must be overcome as each company of a cluster has an interest in these goods, while none can provide them alone without other companies being able to exploit this effort” (Schröder and Voelzkow 2016: 12). Hence, these goods are *collective* regarding their production and usage, yet *competition goods* since they increase firms’ competitiveness in a specific locality (Crouch et al. 2001).

In contrast with the classical VoC literature, the literature on LPS (Crouch et al. 2001; Crouch and Voelzkow 2009) holds that the incoherence between the governance mode related to the CCGs of an industry cluster and the governance mode of the national model of capitalism creates productive institutional conditions for the cluster. From this perspective, a successful industry cluster is likely to develop a governance mode and related institutions that are dissimilar to the respective dominant mode of governance in the national model, and therefore will be able to offer the specific institutional conditions that the regional industry requires (Schröder and Voelzkow 2016). As Amable (2005: 372) states, “[i]nstitutional isomorphism and institutional complementarity are totally independent notions that may or may not coincide depending on the case considered. [...] Complementarity may also exist where very different ‘logics’ operate in different institutional areas”. While the VoC literature here relates to the concept of institutional isomorphism, the LPS literature stresses the usefulness of different logics for the successful operation of an industry cluster. In the LPS perspective, productive institutional conditions are assumed to mainly derive from productive incoherence: industry clusters are expected to develop institutions dissimilar (incoherent) to their national governance mode, in this way yielding productive institutional conditions.

Modes of Governance in Switzerland, France, and Germany, and Research in Cross-Border Regions

As is well-established in the comparative capitalism literature, France, Germany, and Switzerland represent distinct models of capitalism. Germany represents an ideal type of a coordinated market economy (Hall and Soskice 2001). While Hall and Soskice (2001) initially placed Switzerland in the group of coordinated market economies, subsequent

research established that the Swiss model represents a hybrid model, as it combines coordinated elements (e.g., strong role of employers' associations in labor markets and skill formation) and liberal elements (e.g., weak trade unions and flexible labor market arrangements) (Bonoli and Mach 2001; Mach and Trampusch 2011). France is a typical case of state-led capitalism (Amable 2003; Schmidt 2002). Due to its dirigist regime, France held an ambiguous position in the original VoC framework (Hall and Soskice 2001: 21, 35). Furthermore, the governance of skill formation – especially regarding VET – differs in these three neighboring countries. In Germany and Switzerland, there is a strong tradition of collectively governed dual apprenticeship training. However, Germany represents a social and Switzerland a liberal collective skill formation system: in Germany, the role of the unions is stronger than in Switzerland. While in Switzerland we find a highly complex configuration of hybrid organizations of the world of work that play a key role in the governance of apprenticeship training, the responsible German chambers are less fragmented and build on compulsory membership (Emmenegger et al. 2020). The French VET system, on the other hand, is based primarily on full-time school-based VET and far more centralized (Bosch and Charest 2008; Busemeyer and Trampusch 2012; Powell et al. 2012).

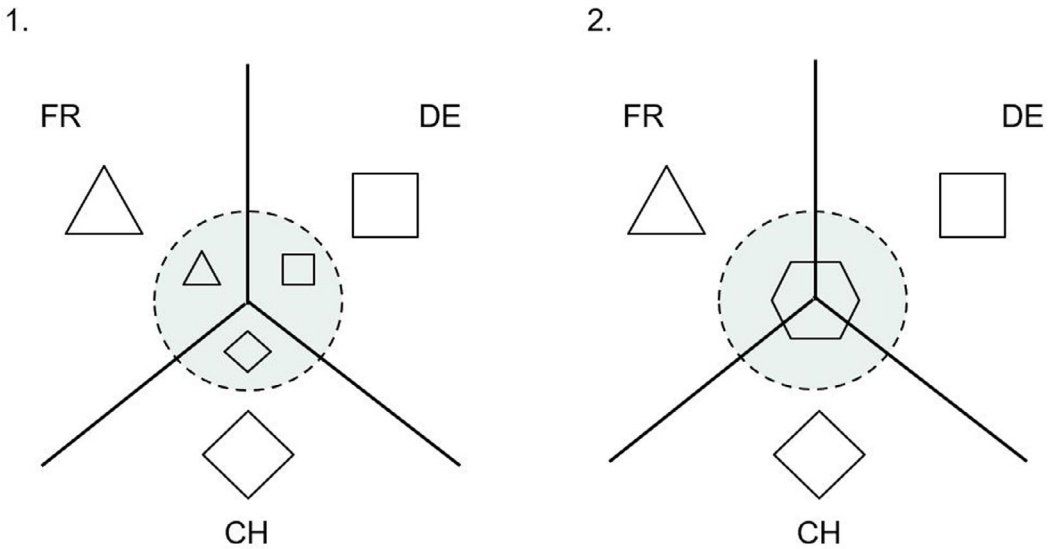
Research into cross-border regions is naturally drawn to conceptualizations that go beyond the study of education and training within national analytical frameworks. According to Walther and Reithel (2013: 218), “cross-border governance thus results from the subtle and delicate balance between the heterogeneity of the border situation and the common concerns”. Regional cross-border governance takes place when state actors and non-state actors from different regions cooperate voluntarily across different levels (local, regional, national) (Plangger 2018). Thus, “cross-border regions are even more multi-actor and multi-level spaces than institutionalized regions in decentralized states” (Zumbusch and Scherer 2015: 502). A key example are cross-border employment catchment areas and related cooperation projects in education and training (Lezzi 2000). More generally, “cross-border governance can take different levels of intensity, ranging from a causal co-operation for specific purposes to the development and implementation of a coherent strategy for the cross-border arena” (Trippel 2006: 13). Research on cross-border regions points to these regions' capacity to link institutional structures in creative ways.

In the FGS region, the first initiatives for cross-border cooperation came from civil society and were further institutionalized through the creation of the Regio Basiliensis network in 1963 (Reitel 2006). In this region, cross-border collaboration emerged long before respective strategies of the European Commission (Muller et al. 2017). Given the presence of a well-established CBIC, a central goal of this paper is to explore how actors in the cluster are benefiting from their peripheral location.

Theoretical Expectations

Both the VoC perspective and the LPS perspective assume that industry clusters are embedded within one national frame – which, however, is clearly not the case for CBICs. Thus, what expectations can we derive from each of these two theories for the case of successful CBICs that span two or more national systems? Based on their basic premises, the two perspectives allow us to infer two competing, stylized scenarios of how firms and other actors in the cluster can benefit from their location in a cross-border region. In the case of a successful CBIC, one can assume that the relationships between the subnational

Figure 1: Stylized depiction of the competing (1.) VoC and (2.) LPS perspectives on the FGS region.
 Note: CH = Switzerland, DE = Germany, FR = France



parts of the cluster and between each subnational part and the respective national model are configured in a way that supports the operation of the cluster. VoC and LPS suggest different accounts regarding these configurations. As explained below, we apply the two competing scenarios with a special focus on the Swiss part of the cluster. In empirical terms, we address the question which of the two scenarios (VoC and LPS) applies, on the one hand, in the case of VET, and, on the other hand, in the case of HE in the FGS region. Due to the distinct premises of VoC and LPS, only one (or none) of the two scenarios can be expected to apply to a particular policy field (here: VET or HE).

Assuming the VoC perspective is valid, we would expect coherence between each national subunit of the CBIC and the respective national model of capitalism. This, in turn, would imply incoherence between the three subnational parts of the CBIC, as the three countries represent different models of capitalism (see Figure 1, left half). Taking this type of incoherence as a starting point and looking at the CBIC from the Swiss side, cross-border related benefits for firms located in the Swiss part are likely to derive from them tapping into the institutional resources – or comparative institutional advantages – of the French and German parts. That is, firms located in the Swiss part would mainly contribute to the provision of skill formation in their Swiss part alone. Yet, at the same time, they would find ways to leverage and draw on the distinct ways in which skill formation is institutionalized in the German and French parts of the cluster. Overall, in this scenario, we would expect to observe within-country complementarity between the Swiss subnational part of the cluster and the Swiss national level, based on coherence (Hypothesis 1.1, H1.1) and cross-border leveraging of distinct comparative institutional advantages in the French and German parts (H1.2).

Switching to the LPS perspective and its focus on CCGs as foundational elements of successful industry clusters, we would expect the development of CCGs that bridge the

different parts of the CBIC and that are not equally present in the respective national model. Such goods can be considered especially important in the case of CBICs to compensate for the peripheral location of the respective subunits that would otherwise disadvantage them compared to more centrally located clusters. As private and/or public actors within the CBIC provide these goods jointly, we call them joint *cross-border CCGs*. These goods represent an element of coherence within the CBIC (see Figure 1, right half, large rhombus in dashed circle). In turn, this would allow for a productive incoherence (in the LPS sense) between the Swiss part of the cluster and the overall mode of governance in the Swiss national model. Indeed, in this scenario the strength of the Swiss subnational region is also linked to incoherence between it and the Swiss model of capitalism: it represents regional innovation in the Swiss national context (see Figure 1, right half, Swiss part of figure). Taken together, from this point of view, the cluster's location in a cross-border region provides a source of institutional innovation. Thus, in this scenario we would expect to find jointly provided cross-border CCGs within the cluster (e.g., common study programs and curricula) based on coherence (H2.2) but also productive incoherence between the Swiss part of the cluster and the Swiss model of capitalism (H2.1).

Figure 1 visualizes the two competing scenarios on the trinational industry cluster in a highly stylized way. The left half depicts the VoC, the right half the LPS perspective. The dashed circle illustrates the boundary of the CBIC, the solid lines stand for national borders, and each different shape represents a distinct mode of governance and related institutional characteristics. The shapes (hexagon, triangle, rhombus, square) were assigned randomly to a specific mode of governance. In both the VoC and the LPS scenario, productive forms of coherence and incoherence are expected to be at play in the cross-border context – however, they are located differently. In the VoC perspective, we would expect coherence between the Swiss part of the cluster (“small rhombus”) and the Swiss national level (“large rhombus”), but incoherence relative to the French part (“small triangle”) and German part (“small square”) of the CBIC, which makes possible the leveraging of the respective comparative institutional advantages. In the LPS perspective, coherence is expected at the level of the industry cluster related to jointly provided cross-border CCGs within the CBIC (“large hexagon”), implying some degree of incoherence between the CBIC and the Swiss national model (“large rhombus”).

Case Selection, Methods, and Data

To test the hypotheses, our starting point are education and training programs that provide firms in the Swiss part of the FGS region in the pharmacy, chemistry, and life sciences industries, as well as adjunct suppliers producing necessary tools and instruments, with the skilled workforce they require to be competitive in global markets. These high-end industries best flourish in regions with high innovative capacity (Ketels 2007). Despite their global outreach and partially global recruitment practices, they still rely substantially on the regional skills pool (Streckeisen 2010; Interview 7). To limit complexity in the trinational context, we pay special attention to the Swiss part of the cluster, which represents the economic center (Zeller 2001) and key driver (Wassenberg 2008) of the CBIC. Switzerland's Basel region constitutes “the nucleus of the Upper Rhine integration and ‘mother’ of European regionalization processes” (Schneider-Sliwa 2018: 207, authors' translation). We analyze the whole CBIC but mainly through the lens of the actors in its Swiss part. This approach is congruent with other studies of cross-border regions highlighting the role of the economically preeminent subnational region (e.g., Greater

Copenhagen in the Øresund Euroregion or Luxembourg in the Saar-Lorraine-Luxembourg-Rhin Euroregion) (see Belkacem and Pigeron-Piroth 2020).

While each cross-border region has a specific history, the study of the FGS region can provide more general insights into the socio-economic fabrics of other cross-border regions and the institutional resources into which local actors in such regions can tap by combining 'native' and 'foreign' institutional conditions. Another example of a trinational European region known for its strength in chemicals, health, and life sciences (OECD 2013) is the Eindhoven-Leuven-Aachen Triangle (INTERREG Meuse-Rhine). Indeed, there are numerous INTERREG regions – e.g., 'Italy-Austria' or 'France (Channel England)' – in which different models of capitalism meet, and for which the analysis of the FGS region (INTERREG Rhin supérieur) can provide relevant insights.

We mainly focus on the most relevant programs of initial professional education and training – and related actor constellations – in this Swiss part and explore how these are linked to the cross-border context. More specifically, we consider the following two educational fields that offer the main educational pathways into the (regional) labor market within the cluster's Swiss part: (a) apprenticeship training at the upper secondary level, which represents the main model of VET in Switzerland (Emmenegger et al. 2020), and (b) HE programs offered by universities and universities of applied sciences. Regarding (a) apprenticeship training, the main educational provider in the Swiss part of the CBIC is the regional host-company training network called 'Aprentas', in which around 70 firms in Northwestern Switzerland cooperate to build their workforce in the chemistry, pharmacy, and life sciences sector. Regarding (b) HE, the main providers are the University of Basel and the University of Applied Science Northeastern Switzerland. While both VET and HE are crucial providers of skills for the industry, the traditional division of labor between apprenticeship training and HE usually implies that the skilled workers trained in the apprenticeship model are responsible for the day-to-day lab operations, while the academically HE trained workers lead the research projects and handle general managerial tasks.

Our goal is to explore to what extent the institutionalization of VET and HE in the CBIC corresponds to either the expectations derived from the VoC or the LPS perspective regarding the successful operation of policy fields in such a cluster. For instance, if we find that the way in which a policy field (VET or HE) is institutionalized in the Swiss subnational part of the cluster corresponds to the Swiss national model, and that firms can leverage the institutional differences relative to the French and German parts of the cluster (e.g., through recruiting students or skilled workers from those parts), this would support the VoC perspective regarding this policy field. In contrast, if we observe that in a policy field the provision of cross-border CCGs (e.g., joint study programs) is prominent, and if this leads to innovations in the Swiss part of the cluster relative to the respective national model, this would speak in favor of the LPS perspective.

The comparative institutional analysis is based on a review of relevant secondary literature, document analysis as well as expert interviews with key actors. Ten interviews were carried out with expert practitioners from the public and private sectors in the CBIC, including representatives of educational institutions, businesses, unions, cross-border intermediary organizations, and local politicians, between November 2016 and July 2018. Interviewees were mainly senior practitioners with first-hand experiences of cross-border activities in the FGS region. Most of the interviewees were Swiss actors, in line with the abovementioned focus on the Swiss part of the industry cluster, but all of them had substantial knowledge of the whole CBIC. The interviews were based on a semi-structured

interview guideline building on key concepts derived from the theoretical framework. This involved, for instance, arguments regarding barriers and opportunities related to cross-border activities in education and training. The interview data was analyzed with reference to the steps proposed by Meuser and Nagel (2005) that include, for instance, paraphrasing, coding (ordering of thematic passages), thematic comparison and conceptualization. Interviews took place either in the form of personal meetings or via phone and lasted on average around 50 minutes.

Analyzing Skill Formation and Employment in the FGS Region

In this section, first, the FGS region and relevant actors are analyzed in general terms. Subsequently, the key skill formation programs in VET and HE identified in the previous section and their connection to the cross-border context are explored.

Between National Periphery and European Center

The FGS region is located very centrally in Western Europe at the crossroads of major trade routes (Brunet 1989) and home to around 6 million people and approximately 90.000 cross-border commuters (Oberrheinkonferenz 2014). It is characterized by a long-standing tradition of cross-border cooperation in various policy domains (Walther and Reitel 2013). Alsace has switched between German and French control several times. While the first language in Alsace is French, the traditional dialect is Germanic – lowering the language barrier in cross-border activities (several interviews; Wassenberg 2008). Although economic activity in the region is diversified, especially in its Southern part, the CBIC is dominated by the chemical, pharmaceutical, and life sciences industries and their suppliers (Zeller 2001). The genesis and rise of the chemical industry are intrinsically linked to its location in the border region. For example, chemists and entrepreneurs, especially from Alsace (France), initially came to Basel to benefit from the non-existence of patent laws for chemical products in Switzerland until 1907 (Stucki 1986).

The following figures give a rough indication of the relevance of cross-border human capital flows in the Swiss part of the cluster (not considering the foreigners taking residence in Switzerland): in 2014, there were 31.400 people commuting from Alsace into Northwestern Switzerland and 33.700 from Baden – while the number of commuters in the opposite directions was very low (Oberrheinkonferenz 2014; Interview 5). Furthermore, in 2008, 14% of the commuters from France and 17% of those from Germany were working in the chemical and pharmaceutical industries (EURES-T 2008). Already in 2004, more than 40% of the employees of Novartis (a global player in the pharmaceutical industry) in Northwestern Switzerland were cross-border commuters (Streckeisen 2008: 122).

In the FGS region, “[n]ational borders play a diminishing role in the formation of policy networks for both information exchange and decision making” (Walther and Reitel 2013: 217). Given that the regional economy is strongly focused on the chemical pharmaceutical sector, Asheim et al. (2011: 895) state that “it is more likely to induce interactive learning and regional innovation in this cross-border region”. This is in line with Trippl’s (2006) observation that cross-border strategic coalitions are more likely to occur when sectors in the subnational units are technologically related. It should be noted that while multinational firms to some extent tap into global recruitment channels, there is a significant role for education and training structures that are locally conditioned – and from which such firms can derive comparative advantages (Sorge and Rothe 2011).

Local actors in the FGS region have been successful in creating a range of cross-border intermediary organizations that foster cooperation but also the exchange of best practices across borders (Interview 8). The most influential of these organizations are the Franco-German-Swiss Upper-Rhine-Conference, Regio Basiliensis, the INTERREG Oberrhein, and EURES-Transfrontalier (EURES-T). The activities of key cross-border intermediary organizations, such as the Upper-Rhine-Conference and Regio Basiliensis, are sponsored by regional authorities and were supporting cross-border cooperation already before the main phase of European support for regional cooperation began (Oberrheinkonferenz 2020). We find that the cross-border intermediary organizations have generally been very supportive of fostering both the mobility of students across borders and cross-border institution building in education. Beyond this, they usually aim to mediate tensions that may occur between actors in the CBIC, for instance, when employers in France or Germany fear to lose skilled workers to Switzerland, where wage levels are higher (Hochstetter 2013; Lezzi 2000). Overall, actors in the region are mostly open towards increasing cooperation, not least to compensate their peripheral location in the respective nation state.

In the case of Basel, strengthening the links to the neighboring regions has been a way to avoid exclusion from the wider European integration, in view of “Switzerland’s self-imposed isolationism” (Scott 1989). In the case of Alsace, actors have sometimes been slightly more hesitant towards regional integration than their counterparts in Switzerland and Germany, given the centralized political structure in France, which implies greater dependence on Paris (Scott 1989). In contrast, regions in Germany and Switzerland have significant authority over education (Kleider et al. 2018). When in the 1990s European policy started to provide financial and political support for cross-border regions, this helped regional actors to further “counterbalance pressures of centralization” (Plangger 2018). In line with this, we find that increasing integration in matters of skill formation in the FGS region involves a constant balancing act between regional and national interests, which helps actors in Northwestern Switzerland to turn their peripheral location relative to Zurich and Bern into a comparative advantage.

VET in the Cross-border Context

We next analyze the Aprentas network – the key provider of VET in the Swiss part of the cluster – and its cross-border dimension. We find that the VET case corresponds to the expectations derived from the VoC perspective. While the Aprentas network is firmly embedded in the Swiss national VET governance model, Swiss firms also draw on the distinct characteristics of VET-related institutions in the other parts of the cluster by recruiting students and graduates from there.

The Aprentas network in northwestern Switzerland

Apprenticeship training in Switzerland typically takes place in three integrated places of learning. Next to the vocational school and the workplace, there is the so-called third place of learning, which is organized by the responsible professional organization and offers inter-firm training for apprentices (Wettstein and Gonon 2009). Another prominent feature of Swiss VET are training networks. These are made up of various firms within a region that operate in related sectors and in which a “lead organization” supports the firms in implementing apprenticeship training, for example through providing the third place of learning, vocational schooling, marketing, and recruitment instruments (Imdorf

and Leemann 2012). In the Basel region, the Aprentas network was founded “bottom-up” in 2000 by Novartis, Syngenta, and Ciba (now BASF Schweiz) (Zeller 2001: 270). Aprentas was established with the mission to service all three companies. However, from the beginning, the network has been open to smaller companies. The three founding firms explicitly stated that Aprentas should enable other firms to participate in apprenticeship training that previously abstained from it due to their small size (Ciba and Novartis 2000).

Aprentas offers initial and further training for around 600 students in 14 occupations in the natural sciences, technical occupations, and commerce. The three main occupations that Aprentas trains for are chemical and pharmaceutical technologist, lab technician in chemistry and biology, but also several technical and commercial occupations. It is a non-profit association with several training locations in the greater Basel area (Aprentas 2013), subsidized by the cantons Basel-Country and Basel-City. At the level of apprenticeship training, Aprentas organizes the third place of learning and, for some occupations, also the vocational schooling part. Like training networks in other parts of Switzerland, Aprentas supports its regional member firms in the marketing of their training positions and in the selection process. Next to the three key sponsoring firms, around 70 other firms in the chemical-pharmaceutical, technical, and service sectors are members.

The Aprentas network serves the needs of employers in the Swiss part of the CBIC in line with and representing productive coherence with the overall Swiss liberal collective skill formation system. For instance, Aprentas, on behalf of the Scienceindustries trade association, represents the chemical industry in the official Swiss committees dealing with VET (SBFI 2020). Scienceindustries, in turn, is the official organization of the world of work responsible for apprenticeship training in the respective occupational field. Compared to Germany, where unions and chambers play a pivotal role in apprenticeship governance, in the Swiss case, as illustrated by the linkages between Aprentas and Scienceindustries, this role is in large parts left to such organizations of the world of work, which are usually dominated by employers.

In sum, we find that the Aprentas network is fully embedded in the system of decentralized cooperation in Swiss collective skill formation (H1.1 supported). Yet how does this training network relate to the cross-border context in which it is also embedded?

The cross-border dimension

At the Upper Rhine, the principle tool of internationalization in the field of VET is the EUREGIO-Certificate, specifically created for this region in 1992 by local actors not directly related to European-level policies (EUREGIO 2020). This certificate supports work experiences abroad, targeting apprentices but also students in full-time vocational schools. For four weeks or longer, apprentices go abroad for a work experience in a firm within the FGS region – usually during their holidays, as it tends to be difficult to integrate the work abroad phase into the regular curriculum (Interview 1). The EUREGIO-Certificate was, from the beginning, strongly supported by the Franco-German-Swiss Conference of the Upper Rhine (Lezzi 2000) and continues to be overseen by it. Further actors involved include regional public governance organizations but also German and French chambers of industry and commerce. The Certificate does not build on joint teaching staff or a joint curriculum, but ‘merely’ facilitates student exchange. In 2016, the total number of certificates granted was 382 (EUREGIO 2020). The actual number of apprentices participating in the EUREGIO-Certificate program on behalf of Aprentas is rather limited (Interviews 3, 10). The core problem is that the three-year apprenticeship programs are usually very densely packed, leaving little room for such

international exchanges. Furthermore, the different national VET legislations and corresponding curricular contents make it difficult to create integrated cross-border VET programs (Interview 6). In addition, as firms pay apprentices a salary, they are not always keen on sending them abroad and thus lose productive capacities (Interview 1).

The influence of the EUREGIO-Certificate as a tool to facilitate cross-border mobility is modest and it does not have a substantial impact on the Aprentas network. We do not observe the emergence of a substantial cross-border CCG or a significant influence of the French or German VET structures and institutions on those in the Swiss part, which remains firmly embedded in the Swiss liberal collective skill formation system. Similarly, the Swiss training system is not seen to be taken up by its neighbors within the FGS region (several interviews). While the region has seen some attempts to foster more substantial cross-national capacity building in VET, these are hampered, for instance, by the specific national regulations for VET and industrial relations on each side of the national border.

However, two other aspects of cross-border activity are more relevant. These relate to the question of who is recruited (I.) for apprenticeships and (II.) for entry-level jobs. In this context, it is important to note that the educational expansion, occurring in all Western industrialized nations in the post-World War II period (Schofer and Meyer 2005), played out differently in Switzerland than in Germany and France. In Germany, and even more so in France, this expansion mainly took place in general academic schooling at the secondary and the HE level (Powell et al. 2012). In France and Germany, social democratic parties supported the expansion of academic education – with social democrats as key proponents of making selective academic secondary schools more accessible to the lower middle classes (Nikolai and Rothe 2013). In contrast, in Switzerland – with its arguably more conservative and business-oriented political landscape in which employers and their associations have greater direct influence on educational programs and contents – the pressure for expansion was primarily channeled through expanding apprenticeship training at the secondary level and higher VET programs (Gemperle 2007). The differences in the relative prestige of VET and HE in the three countries partly shape the CBIC's mobility dynamics. Crucially, the resulting lack of academic skills in Switzerland facilitates the cross-border recruitment activities of Swiss firms at the Upper Rhine (i.e., both I. and II. below support H1.2).

I. Recruitment for apprenticeships: The member firms of Aprentas increasingly recruit talented graduates from the academic track of upper secondary level education (who hold a HE entrance qualification) from Germany (*Abitur*) and France (*baccalauréat*) for their apprenticeship positions (Interview 6). Not only do these candidates have a higher level of general education that helps them cope with risen work requirements related to, for instance, modern digital process control technology and more complex project structures overall, but also advanced English-language skills, which are of high relevance in the rapidly globalizing chemical, pharmaceutical and life sciences industries (Streckeisen 2008). In the case of Novartis, which contributes almost half of the apprentices to the Aprentas network, already around one third of all apprentices hold a HE entrance qualification (Interview 2). At the same time, in 2011, foreigners from neighboring countries took up 20-30% of the apprentice positions Novartis offers in Switzerland (Furger 2011). This situation is unusual in the Swiss context, where, unlike in Germany, it is uncommon for people holding HE entrance qualifications to enter apprenticeship programs at the secondary level (see Gonon and Maurer 2012). Thus, Swiss firms in the industry cluster strategically draw on the skills portfolio developed in the neighboring regions.

II. Recruitment for entry-level jobs: Employers in the Swiss part of the cluster – as an add-on strategy – often also hire graduates from practice-oriented short-track postsecondary training programs in France and Germany for entry-level jobs (Streckeisen 2010). One main reason why they can do so are the Swiss wage levels, which are higher than in both France and Germany (Hochstetter 2013). For example, in Alsace there exists a range of post-baccalaureate short-track vocational programs in the field of chemistry, pharmacy, and life sciences, in which students receive more theoretical training than Swiss apprentices do. Such programs are mainly offered by national higher vocational schools (e.g. *École Nationale Supérieure d'enseignement en Chimie*, Mulhouse) or through university-based two-year technological courses (e.g., *Instituts universitaires de technologie* in Mulhouse or Strasbourg). In this way, firms based in the Swiss part of the cluster can add to the practical skills portfolio that Swiss apprentices acquire by hiring graduates from abroad and, thus, by leveraging the comparative institutional advantages of the other regions of the cluster. Another facet of changing recruitment patterns relates to the origin of the management personnel. In the past 10-15 years, more and more international managers have been hired in the chemical industry. These managers are not as familiar with the Swiss concept of dual apprenticeship, and more open to recruiting academically trained personnel from outside the Swiss frame (Interview 1).

The leveraging regional comparative institutional advantages in VET

In a nutshell, the *Aprentas* network represents a case of within-country complementarity based on similar (coherent) institutions, which corresponds to H1.1. The network is firmly embedded in the specific Swiss mode of decentralized cooperation of skill formation, meaning it is in line with the institutional setting and governance mode at the Swiss national level. At the same time, the VET case illustrates that the involved Swiss employers can rely on the regionally available institutional resources in the other parts of the cluster. For example, they recruit from the large regional pool of young Germans with HE entrance qualification for their apprenticeship programs. Beyond this, for entry-level jobs, firms based in the Swiss part of the cluster also hire graduates from practice-oriented short track HE programs, for instance, in Alsace, who have received more theoretical and language training than Swiss apprentices. In France, such programs are offered by national higher vocational schools or through university-based two-year technological courses. In this sense, in line with H1.2, Swiss firms in the cluster can add to the high level of practical skills that apprentices acquire within the Swiss model by leveraging the distinct institutional features of skill formation in the French and German parts of the cluster. Thus, in the case of VET, we find cross-border leveraging of comparative advantages of distinct educational institutions on the part of Swiss employers, directly linked to a system of cross-border mobility of (prospective) skilled workers. The jointly provided EUREGIO-certificate, overseen by the Upper-Rhine-Conference, plays a minor role but still facilitates cross-border mobility of apprentices.

HE in the Cross-border Context

In this section, we analyze the characteristics and cross-border dimension of the key HE providers in the Swiss part of the cluster. We see the emergence of significant joint cross-border CCGs (e.g., in the form of a joint cross-border campus) representing coherence across the FGS region and institutional innovation relative to the respective national

models for HE. While the VoC scenario could account for the case of VET, we find that the LPS scenario is the better fit in the case of HE in the cross-border context.

University of Basel and EUCOR

The University of Basel is an intercantonal institution (Basel-City and Basel-Country) with a long tradition in training academics in the subject areas of chemistry, pharmaceuticals, and medicine. Life sciences, nanotechnology, and sustainability research are three of its five focus areas (Universität Basel 2014/2014). The organizational set-up and governance structures of said university are similar to those in the FGS region more generally. Considering the international activities of the University of Basel, one specific institutional feature immediately stands out: the university constitutes the Swiss part of ‘The European Campus - EUCOR’. This European Campus includes the five major universities in the FGS region: the Universities of Basel, Freiburg im Breisgau, Haute-Alsace, Strasbourg and the Karlsruhe Institute of Technology, all of which have strategic priorities in the field of life sciences (EUCOR 2019). Today, EUCOR comprises 15,000 researchers, 13,500 PhD candidates and 117,000 students, and a total budget of 2.3 billion euros (EUCOR 2020).

The EUCOR network was established in 1989 and can be considered as a forerunner of European policies now in place to foster similar forms of cooperation (e.g. the European Universities Initiative). Building on a long-standing formalized cooperation, and preceding European policies to support territorial cooperation of universities, EUCOR has in the meantime received financial support through the EU’s INTERREG Upper Rhine Program. Since 2015, the campus has a common legal entity in the form of a European Grouping of Territorial Cooperation (EGTC). It is the first EGTC exclusively run by universities. EGTC is a separate legal personality offering a uniform structural framework as well as uniformity of the applicable law. As such, it has a “much broader character than partnerships hitherto existing between higher education institutions in different countries” (Blaurock and Hennighausen 2017: 529). This implies, for instance, that EUCOR may possess property, and submit funding proposals as an autonomous entity in France, Germany, Switzerland, and at the European level – which can be seen as a clear indication for a cross-border CCG.

EUCOR’s territorialized cross-border cooperation represents an “institutional formalization of regional cooperation” (Giband and Mary 2018: 592). Students at EUCOR institutions can enroll in courses across the whole European Campus and benefit from traveling allowances and the respective student services abroad without additional charges. EUCOR advances joint research institutes, infrastructure, and projects, joint professorships, joint administrative personnel and service departments, as well as joint doctoral supervision, postdoc clusters, and degree programs (EUCOR 2019). Thus, EUCOR aims to draw talented young academics and international students to the FGS region, and to facilitate their transition into the regional labor market. It systematizes joint research transfer activities within the CBIC (EUCOR 2019). Compared to other international cooperation projects between universities, our analysis shows that EUCOR is characterized by its deep legal integration and advanced cross-border governance structures – e.g., with regard to joint decision making, research, and educational provision.

The most relevant cross-border CCG provided through EUCOR are innovative bi- or trinational study programs, which bring international experiences to the curriculum that are exceptional compared to most comparable standard study programs in the respective national contexts. This includes a BSc Regio Chimica, MSc Sustainable Materials Polymer Sciences, and MSc Biochemistry and Biophysics – all of which are double degree programs

(EUCOR 2020). In the FGS region, there exist multiple degree programs between HE institutions from the three subnational parts. These programs involve close cooperation between the involved partner institutions in the administration and implementation of study programs. In total, there are around 50 study programs, initiatives, and support infrastructure projects in the domain of bi- and trilateral study programs in this region (Oberrheinkonferenz 2013). One of these program's key features is that students spend parts of their studies or internship phases abroad, in one or both other subnational parts of the FGS region. In many cases, students receive degrees from all involved HE institutions (i.e. from two or three countries).

Beyond EUCOR, there are a range of formalized networks that facilitate cooperation between researchers, including those of EUCOR institutions, but also businesses in the FGS region. Key examples are 'Neurex – Neuroscience Upper-Rhine Network', 'nanoValley.eu', and 'BioValley – The Life Sciences Network' (Rosca-Sadurschi and Buhociu 2015). Furthermore, there exists a BioValley College Network supported by a broad group of private and public actors that aim to connect academic secondary schools in the FGS region regarding the topic of life sciences. Concerning academic secondary education – as the key pathway to universities in all three countries – a prime example of cross-border cooperation is the *phaenovum Schülerforschungszentrum Lörrach-Dreiländereck*, a border triangle student research center offering courses in science and technical subjects in an extracurricular setting (Phaenovum 2018). Phaenovum is supported by multiple public and private actors based in the CBIC, including BASF, Roche, and Novartis. Overall, analyzing HE-related institutions, we find a range of cross-border CCGs within the trilateral region, which are based on a relatively high level of cross-border coherence (H2.2) and offer innovative institutional resources not available to the same extent in the national skill formation models alone (H2.1 supported).

University of applied sciences of northwestern Switzerland (FHNW) and its trilateral study programs

The FHNW is sponsored by the cantons of Aargau, Basel-Country, Basel-City and Solothurn and represents the key provider of practically-oriented academic programs in the Swiss part of the CBIC. While the FHNW, as a university of applied sciences, is not part of EUCOR, it is involved in four trilateral study programs offered in combination with five HE partner institutions in the Upper-Rhine region (e.g., Baden-Wuerttemberg Cooperative State University, Lörrach, and University of Haute-Alsace, Mulhouse). Two of these trilateral programs are trilateral *work-based* HE programs, based on the German model of dual study programs (Graf 2018). More specifically, students receive the theoretical training in HE institutions in all three countries (rotating between campuses) as well as practical in-company training in at least two countries (Mechatronik trilateral 2018). These HE programs were developed in close cooperation with businesses from the CBIC. For instance, the program in Mechatronics was created on the initiative of Endress+Hauser, a large multinational Swiss-based instrumentation and process automation company that supplies the pharmaceutical and life sciences industry, among others. The company has its headquarters near Basel and production facilities in all three subnational parts of the FGS region. To facilitate cross-border operations and enhance recruitment options (Interview 9), in the early 1990s Endress+Hauser was seeking to establish a cross-border educational program in the field of mechatronics. The company then successfully initiated the trilateral Mechatronics program in cooperation with regional HE institutions as well as support from the

French-German-Swiss Upper-Rhine-Conference and state agencies from all three countries (Interview 4). Like EUCOR, these applied trinational study programs represent a bottom-up emergence of a cross-border CCG (H2.2 supported). It is also worthy of note that the FHNW has been interested in creating a work-based study program in the field of life sciences, too. However, it was unable to do so as their core partner in the region, the Baden-Wuerttemberg Cooperative State University in Lörrach, does not offer study programs in this subject area, illustrating that a certain level of coherence is required to develop joint cross-border CCGs.

While work-based HE programs are common in Germany and France, this is not so in Switzerland. However, in the case of the trinational work-based study programs of the FHNW, innovative ideas from the cross-border context have diffused into these programs' organizational structures, from which Swiss employers in the region can benefit. Through this cross-border educational model diffusion, the FHNW is now in a position to attract students with an academic baccalaureate to practice-oriented skill formation at the HE level (Interview 4) which represents a novel configuration in the Swiss context (H2.1 supported).

The role of cross-border CCGs in HE

The case of HE fits H2.1, i.e. the scenario where the CBIC displays innovative institutions that at least in part distinguish themselves from the mode of governance in the typical Swiss model. These 'divergent' institutions have emerged at the cross-border level and are linked to the attempt to create joint cross-border CCGs. These goods help provide local employers with a highly qualified workforce ready for jobs in increasingly demanding, often transcultural, workspaces. This is especially relevant to compensate for the region's peripheral location seen from a national perspective. That is, in the case of HE we observe that dynamically evolving cross-border CCGs are created in the form of jointly regulated trinational study programs or even a joint trinational university campus (EUCOR). These institutions transcend national borders and merge institutional elements from all three parts of the CBIC, thus creating novel institutional resources (supporting H2.2). Hence, in the case of HE, we find the emergence of a cross-border skill formation regime.

Discussion and Outlook: CBICs – A Model for Europe?

Cross-border regions represent a key feature of Europe and other world regions but have been largely neglected by the growing literature on the political economy of skill formation. Here we adopted an approach in line with the recent trend in studies of cross-border labor markets to include institutional factors at the macro level into the analysis (Belkacem and Pigeron-Piroth 2020). For this we referred to two of the most prominent approaches in comparative political economy (VoC and LPS) to conceptualize how the relevant regions are related to each other and embedded in the respective national institutional context. These approaches have already been applied to industry clusters, but not yet in the context of cross-border regions, despite the empirical significance of CBICs in Europe. We find that the VoC and LPS perspectives each can explain different parts of the whole set of available institutional characteristics and comparative advantages related to skill formation and labor markets in cross-border regions. In other words, while the two theoretical perspectives represent antipodes, this paper shows that in the case of borderland regions they can – once slightly extended (see next paragraph) – both shed

light on different core elements regarding skill formation and employment in cross-border regions. In the case at hand, a distinction must be made between the fields of VET and HE. In the case of dual apprenticeship training, the theoretical predictions derived from the national VoC literature fit well. In contrast, in the case of HE, those made by the LPS perspective fit better.

These differences are in part grounded in general institutional and organizational features of VET and HE governance respectively. While it was beyond the scope of this paper to explore these in detail, our analysis points to the relevance of factors such as the capacity for organizational innovation (higher for universities than in VET), the available regional autonomy in the creation of educational programs (higher in HE than in VET), the proportion of public vs. private funding for educational programs and the returns of international experiences in the workplace (higher in HE than in apprenticeship training), and the degree to which the involved educational organizations themselves benefit from international network reputation (more in HE than in VET). As a result, VET remains rather strongly embedded in the national framework, while HE is more open towards the development of innovative cross-border institutions. Cross-border intermediary organizations, through which local actors cooperate and receive support, play a vital role in facilitating either of these two ways in which actors in the industry cluster can benefit from their cross-border location.

Considering other European regions in which two or more models of capitalism meet, what can we learn from the case of the governance of skill formation in the FGS region more generally? The paper has mapped out two main patterns through which education and training are embedded in the cross-border context: on the one hand, the cross-border leveraging of dissimilar (incoherent) skill formation institutions (in the case of VET), and, on the other, the creation of relatively similar (coherent) institutions in each part of the cluster in the form of joint cross-border CCGs (in the case of HE) – the latter constituting the emergence of a cross-border skill formation regime. The innovative capacities thus embedded in the CBIC serve well the demands of the pharmacy, chemistry, and life sciences industries that offer high-end products and face strong global competition. This contributes to our understanding of governance structures in dynamic cross-border regions and is in line with more general research on trans-boundary cooperation in macro-regions (Plangger 2018) that points to the capacity of such areas to recombine institutional structures in relatively fluid ways.

More generally, in the case of cross-border regions, increased attention should be paid to education and training developments taking place in the neighboring countries as integral parts of the production models and stratification systems of these regions, and how they shape and are shaped by different socio-economic and political processes that increasingly transcend the national paradigm. This implies considering the different education systems of the neighboring countries, and how their institutional features – often shaped by distinct models of capitalism – translate into the respective country's system of training and labor. In a relatively small country like Switzerland, where a significant proportion of economic activity takes place in or close to cross-border regions, this perspective presents a challenge to the strong national focus of much of the comparative capitalism literature, but also the perception of Switzerland as a laggard regarding European integration.

Cross-border regions are constantly challenged by the need to internalize influences both from the 'inside' and 'outside'. This challenge is relevant to all those actors that need to coordinate activities in skill formation and labor markets but are faced with a situation in

which extensive socio-economic activities prevail that crosscut the respective political-administrative units in such regions. Regarding the European level, the findings suggest that the success of the European educational system is not so much dependent on the harmonization of national or regional specificities, but more on a sophisticated combination of regionally available institutional resources.

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Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Lukas Graf is Assistant Professor of Educational Governance at the Hertie School in Berlin. He combines comparative, institutional, and organizational approaches to analyze educational governance, labor markets, social inequality, and institutional change. He is affiliated with the Swiss Leading House "Governance in Vocational and Professional Education and Training". Email: graf@hertie-school.org Correspondence Hertie School - The University of Governance in Berlin, Friedrichstraße 180, 10117 Berlin, Germany graf@hertie-school.org