

Inaugural lecture

On the Varieties of Sustainable Innovation and Entrepreneurship

INAUGURAL LECTURE BY PROF. DR. ANDREA M. HERRMANN

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Andrea M. Herrmann is Professor of Sustainable Innovation and Entrepreneurship at Radboud University (Nijmegen). Before, she worked as Assistant and Associate Professor in Innovation Studies

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In her research, Andrea M. Herrmann investigates how incumbent firms and entrepreneurs innovate, what human and financial resources are needed to this end, how they are helped (or hindered) in innovation by their institutional environment, and what lessons can be learned from it by policy-makers aiming to stimulate sustainable innovation. More concretely, her research interests comprise the areas of political economy, institutional theory, organisational theory, innovation management, entrepreneurship, online labour markets (gig economy), human resources, corporate strategy, economic European integration, as well as quantitative and qualitative research methodology.

ON THE VARIETIES OF SUSTAINABLE INNOVATION AND ENTREPRENEURSHIP

On the Varieties of Sustainable Innovation and Entrepreneurship

Inaugural lecture delivered upon acceptance of the appointment of Professor of Sustainable Innovation and Entrepreneurship at the Nijmegen School of Management at Radboud University on Friday, May 31, 2024.

by Professor Andrea M. Herrmann

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Geachte Rector Magnificus,

Dear colleagues, family and friends – here in the room and online

It was about today, 22 years ago that I received the letter of acceptance from the European University Institute in Florence to do my PhD at the Department of Social and Political Sciences. That day was not only a particularly happy one for me, because I was absolutely enthusiastic about the idea of doing my PhD at the EUI. But that day also marked the beginning of my research on the varieties of sustainable innovation and entrepreneurship. Today, I would like to give you an overview of these 22 years of research and introduce you to my work, past and present, which has laid the foundation for my Chair of Sustainable Innovation and Entrepreneurship.

The core argument of my lecture is that we must not overlook the variety of, and within, innovation and entrepreneurship. By variety, I simply mean the different types of innovation and entrepreneurship. And we must not overlook this variety, these different types of innovation and entrepreneurship, because they constitute the very basis of the competitive success of firms in general and in our Western economies in particular. It is the specialisation in different types of innovation and entrepreneurship that allows firms – existing ones and entrepreneurial start-ups – to withstand competitive pressures, even in global and digital markets. And yet variety is often overlooked. The core argument of my inaugural lecture will therefore be a plea for taking the varieties of innovation and entrepreneurship into account in order to gain a balanced view of the comparative institutional advantages that our economies offer to firms.

To make this case, I will proceed in three steps. First, I will explain why it is important to study innovation and entrepreneurship in general, and their variety in particular. I will argue that, if we overlook this variety, we risk getting a distorted picture of the innovativeness and competitiveness of firms in different countries. In particular, we risk misperceiving the innovativeness of firms in European economies as second-best compared to the US.

In a second step, I will look back and illustrate how existing research, including my own work, explains how this variety of innovation and entrepreneurship emerges. In particular, I will use the example of the Netherlands, Germany, and the US to explain what it would take to change the regulation of labour and financial markets in the Netherlands or Germany in order to create Silicon Valley conditions for entrepreneurship and breakthrough innovations in Europe. And I will argue that such changes are neither desirable nor useful because they would deprive firms of the comparative institutional advantages that underpin their corporate success.

In a third step, I will look ahead to future research challenges and address the question of whether digitalisation means an end to the variety of innovation and entrepreneurship, because it enables socio-economic activity that is no longer geographically bounded. To address this question, I will present some preliminary findings from my ERC-funded research on the online gig economy. These results suggest that variety persists even in global markets – precisely because of the different comparative institutional advantages that our countries offer firms.

Relevance - Why care about Varieties of Sustainable Innovation and Entrepreneurship?

So why is it important to study the varieties of innovation and entrepreneurship? The answer is straight-forward for innovation and entrepreneurship alike: they stimulate socio-economic growth and development (Audretsch and Thurik 2001, Bottazzi, Dosi et al. 2001, Carree and Thurik 2003, Wong, Ho et al. 2005, Stel, Carree et al. 2005, Freeman 2008).

Let us first consider this argument for innovation. Among the many definitions of innovation that have been proposed, the one by Feldman and Kogler (2010: 384-385) is particularly instructive: "Innovation is the ability to blend and weave different types of knowledge into something new, different and unprecedented that has economic value". The important difference between an invention, which simply refers to a new idea, and an innovation is therefore the economic value it creates. An innovation thus is a new "thing" that can be implemented and marketed. Take the mobile phone as an example, which was invented by Martin Cooper, head of Motorola's communications systems division in the early 1970s. In 1973, Cooper had developed a prototype mobile phone with which he made one of the first calls – namely to engineer Joel Engel, who headed a similar project at Motorola's competitor AT&T.

And the mobile phone is a good example of how innovation can lead to massive socio-economic development: in this case, in the form of entirely new industries that have emerged within the telecommunications sector, creating countless new firms and jobs. In addition, the social impact of the mobile phone has been massive, leading to new and entirely different forms of communication – to the point that, today, parents are being offered training courses on how to introduce their kids to the use, and to prevent the misuse, of mobile phones.

In line with the ambivalent effects that mobile phones can have, especially on very young users, my argument is not that innovations are always and necessarily beneficial. Depending on how innovations are used, they can have very negative consequences: Consider the innovation of nuclear power and its disastrous effects when used for weapons, as well as the highly controversial disposal of nuclear fuel rods for civil energy production. The question of the impact of innovation is rightly and extensively investigated by colleagues (Khessina, Goncalo et al. 2018, Coad, Nightingale et al. 2022, Dadwal, Goyal et al. 2024). However, with regard to the variety of innovations, my argument here centres on the growth-enhancing effects that innovations tend to have for established and start-up companies, particularly through the creation of new jobs.

Similarly, entrepreneurship is an important driver of socio-economic development. Going back to Richard Cantillon's "Essay on the Nature of Commerce" (1730) and, most famously, Joseph Alois Schumpeter, entrepreneurship is generally understood as the exploration of a new business idea, typically in the context of setting up a new firm (Schumpeter 1942). Thereby, the business idea (the product or service developed) can, but does not necessarily have, to be new; it can also be based on the imitation of an existing good. The important

point, according to Schumpeter, is that the entrepreneur does something new in starting his business.

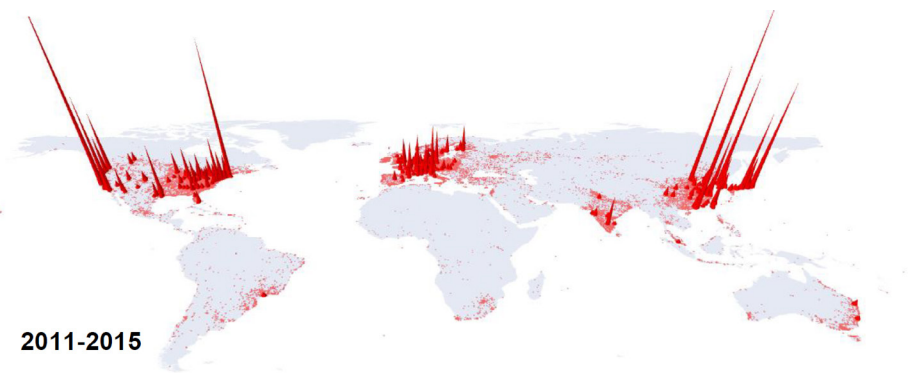
A good example of this is Facebook, which was conceived by Mark Zuckerberg and his roommates while they were students at Harvard University. Initially, "TheFacebook" – as the platform was first called when it was launched from Zuckerberg's dorm room in 2004 – was a digital version of the printed Facebooks distributed to students at Harvard University. The Facebook contained pictures and basic information about each student. Zuckerberg expanded the concept into an online social networking platform. The site quickly gained popularity amongst Harvard students, leading Zuckerberg and his colleagues to expand it to other Ivy League universities and eventually to universities across the United States and abroad. The success and rapid growth of Facebook led Zuckerberg to drop out of Harvard to develop the business idea full-time. In 2005, Facebook was registered as a company and since then has become one of the most used social media platforms world-wide. With nearly 3 billion monthly active users by December 2022 and the world's third most visited website by October 2023, facebook's economic growth is so legendary that its early days were the subject of the blockbuster movie "the social network". And much like the development of the mobile phone, Facebook has not only spawned the development of new industries and countless new jobs but has also profoundly changed the ways of communication in our societies.

While their socio-economic impact clearly makes innovation as well as entrepreneurship relevant topics that deserve scientific, policy, and media attention, why is it important to study their varieties? In short, studying their different types is relevant in order get a balanced picture of the different competitive advantages that firms have across countries (Porter 1990, Hall and Soskice 2001b, Berger 2005, Schneider and Paunescu 2012, Dilli, Elert et al. 2018). Given that breakthrough innovations and entrepreneurship are based on radical innovations, which bring a new technology to the market, they have the potential to be particularly growth-enhancing – if they actually make it to the point of sustainable profitability without prior failure. As a result, radical innovation and, accordingly, entrepreneurship based on radical innovation tend to be at the focus of research (Wong, Ho et al. 2005, Shane 2009, Henrekson and Johansson 2009, Henrekson and Johansson 2010), media and policy attention (Schreyer 2000, Mason and Brown 2013). Examples such as the mobile phone or Facebook are particularly typical in this regard. They are fascinating and at the centre of our attention, precisely, because they have brought about such far-ranging economic and societal change.

But the danger of focusing on radical innovations and entrepreneurship, based on the development of new technologies, is that we lose sight of the different types of innovation and entrepreneurship that exist, and thus of the different types of competitive advantage that firms have between economies. And it also risks conveying the impression that firms in Europe are, in general, not sufficiently innovative. Consider, for example, figures 1.1 and 1.2, which show the number of patent applications by region between 2011 and 2015 (Figure 1.1)

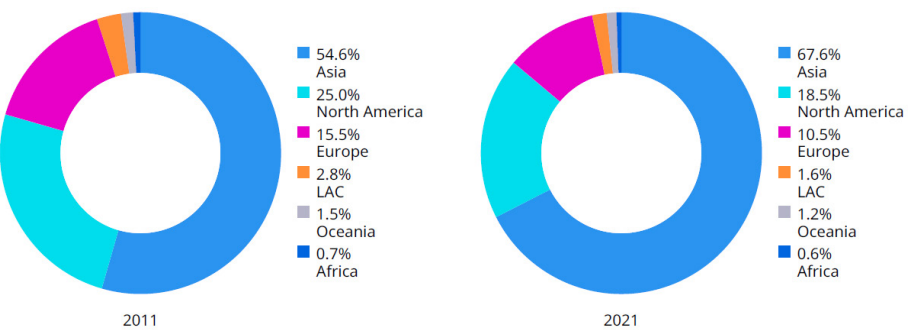
and, respectively, in 2011 and 2021 (Figure 1.2). Both figures clearly show that, between 2011 and 2021, over three quarters of patent filing activities increasingly took place in Asia and the US, while only about 10-15% of patent applications came from Europe.

Figure 1.1: Geographical Dispersion of Patents, 2011-2015



Source: Crescenzi, Iammarino et al. (2019: 15)

Figure 1.2.: Patent Applications by Region, 2011 and 2021



Source: WIPO (2022: 11)

Patents are granted for “inventions, in all fields of technology, provided that they are new, involve an inventive step and are susceptible of industrial application.” (Article 52(1) European Patent Convention). Patents have therefore often been used as an indicator of innovation performance (for example Henderson and Cockburn 1994, see also Katila 2000) because, to be patented, “an invention must be something not already known from prior

publication, or not a part of the experience of those skilled in the art" (Walker, 1995: 83, in Katila 2000). Thereby, the required novelty does not necessarily involve a technological (but at technical) development, implying that patents are not only granted for radical but also for incremental innovations (as defined above). But if we assume that the share of radical innovations covered by patents is roughly the same across countries (or, as I will argue below, even particularly high for the US), figures 1.1 and 1.2. show that firms in the US and China are much stronger in radical innovation than their European counterparts. In other words, figures 1.1 and 1.2. suggests that Europe is far less (radically) innovative than the US and China. The fear that firms in European countries are falling behind because they are not innovating enough and are therefore at risk of being outperformed by their competitors, especially from the US, is reflected in the strategy papers on entrepreneurship published by the European Commission at the turn of the millennium (European Commission 1999, European Commission 2003).

Importantly, though, this image of the inadequate innovative capacity by European firms is based on a one-sided perspective that overlooks the variety of radical and incremental innovations and even imitation strategies that companies can use to compete successfully. It is important to note that radical innovation, which is based on a new technology, is not the only type of innovation. Incremental innovation, based on small improvements in existing technologies, is another widespread type of innovation (Herrmann 2008a, Herrmann 2019). And even imitating existing business ideas, without any technological novelty or modification, is also a viable strategy through which companies can compete successfully (Brenzitz and Murphree 2011).¹

Using this distinction to discern the novelty of start-ups' business ideas, the entrepreneurship literature broadly agrees that start-ups developing radically innovative business ideas are the exception, not the rule (Global Entrepreneurship Monitor 2023: 79 f., Global Entrepreneurship Monitor 2024: 55 ff.). Accordingly, studies show that, depending on how radical innovation is measured, only about 5-15% of all start-ups registered in a country over a given period develop a radically innovative business idea. The second largest group are incrementally innovative start-ups with 25-40%, followed by 45-70% of start-ups that bring imitative business ideas to the market. Hence, a closer look at the diversity of innovation and entrepreneurship reveals that radial innovation is generally the least common type of innovation (Herrmann 2019, see also BMWi 2012).

Moreover, the variety of innovation and entrepreneurship is not only pronounced within countries, but also between them (see Table 1). As *inter alia* my own research shows (Herrmann 2019: 338), start-ups in the United States are indeed more likely to develop

¹ While the diversity of innovation and entrepreneurship is certainly greater than just these three types, radical and incremental innovation and imitation can be particularly well distinguished and thus appear, sometimes under different names, in the literature strands on the comparative institutional advantages of firms (see, in particular, Porter 1990, Lundvall 1992, Nelson 1993).

business ideas that are radically innovative (17%) than in Germany (9.5%), and thus more likely to be radically innovative than the average (12.7%) of start-ups. At the same time, German start-ups outperform their US counterparts when it comes to incrementally innovative business ideas: almost 42% of newly registered enterprises in Germany develop incremental innovations, compared to 37% in the US. With 46% of imitative business ideas in the US and about 48.5% in Germany, start-ups pursue imitation strategies to about the same extent. Table 1 thus suggests that there is variety in innovation and entrepreneurship not only within but also across countries.

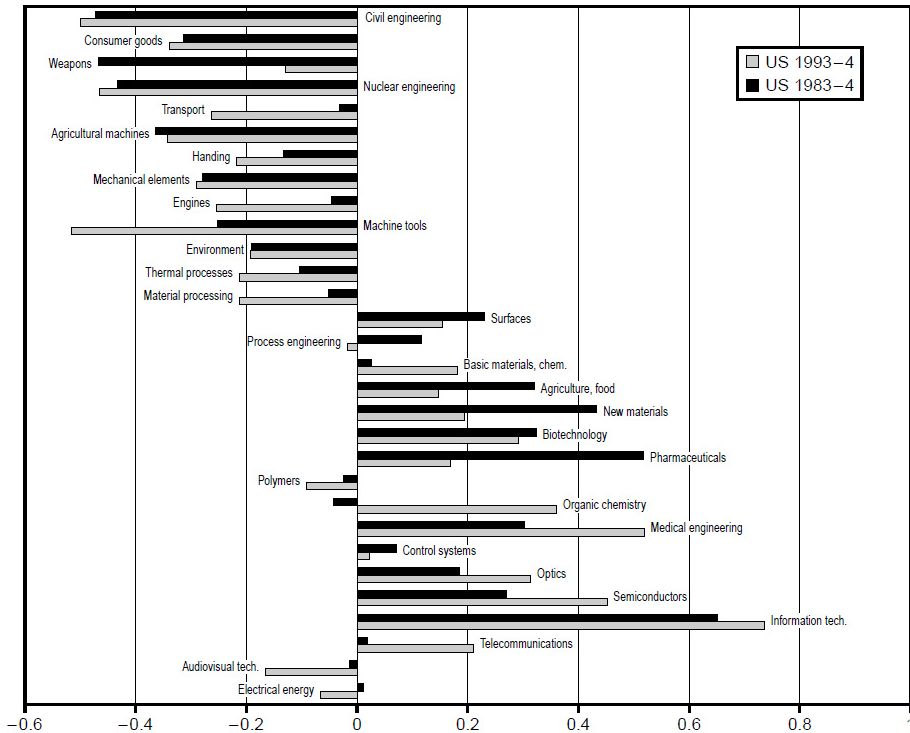
Table 1 Results of crosstab analysis “country” by “innovativeness of venture product/service”

			Novelty			Total
			Radical innovation	Incremental innovation	Imitation	
Country	Germany	Count	29	128	149	306
		Expected count	38.8	121.6	145.6	306.0
		% within country	9.5%	41.8%	48.7%	100.0%
	USA	Count	39	85	106	230
		Expected count	29.2	91.4	109.4	230.0
		% within country	17.0%	37.0%	46.1%	100.0%
	Total	Count	68	213	255	536
		Expected count	68.0	213.0	255.0	536.0
		% within country	12.7%	39.7%	47.6%	100.0%

N = 536; chi-square = 6.762 (0 cells = 0% with expected count less than 5); $p < 0.05$; Cramer's $V = 0.112$; $p < 0.05$

Source: Herrmann (2019: 338)

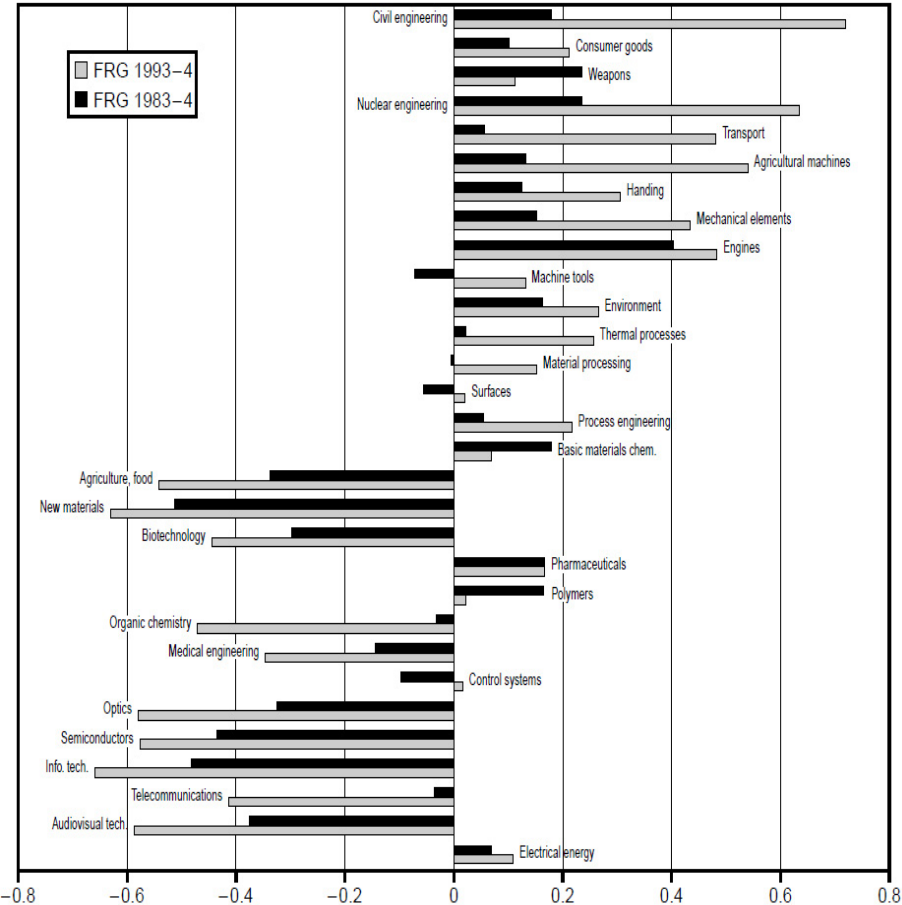
It is also worth noting that there is not only variety within innovation and entrepreneurship, and variety of innovation and entrepreneurship across countries, but also variety of innovation and entrepreneurship within radical innovation across countries (Hall and Soskice 2001a: 42-43):

Figure 2: Specialization within Radical Innovation by Technology Classes in the US

Source: Hall and Soskice (2001a: 42)

Figure 2 provides an overview of the patents registered by US firms in the 1980s and 1990s in a total of 30 industries. More specifically, the figure shows, for each industry, how the share of US patent registrations compares to the global share of registrations in each of these 30 industries. The figure thus reveals in which industries US firms are above or below the world patenting average. Interestingly, the figure shows that US firms are particularly active in patenting in high-tech industries such as biotechnology, semiconductors or information technologies, but that they are below the world average in patenting radical innovations in engineering industries such as agricultural machinery or civil engineering.

Figure 3: Specialization within Radical Innovation by Technology Classes in Germany



Source: Hall and Soskice (2001a: 43)

When we look at the same figure for Germany (see Figure 3), then we see the opposite picture. Here, companies patent above the world average in engineering industries, but are below average in high-tech industries such as biotechnology, semiconductors, and information technology. This, in turn, points to the variety that exists between countries, even within the same type of innovation.

These overviews illustrate why the study of variety is so important: to show the broader patterns of innovation and entrepreneurship across economies, and hence the different

innovation strategies with which incumbent and start-ups can compete across countries. In other words, it is not problematic that firms in Europe are, on average, less radically innovative than firms in the US – in fact, it is rather desirable that firms do not all compete through the same types of innovation (Porter 1990, Lundvall 1992, Nelson 1993, Hall and Soskice 2001b, Berger 2005, Schneider and Paunescu 2012, Stam 2015, Liguori, Bendickson et al. 2018). And part of my work has simply been to contribute to this literature on the variety in innovation and entrepreneurship by showing the different competitive strategies that firms pursue across countries (Herrmann 2008b, Herrmann 2008a, Herrmann 2009, Herrmann 2010, Dilli, Elert et al. 2018, Van Slageren, Herrmann et al. 2022, van Slageren and Herrmann 2024).

The Literature – Why is there Variety in Innovation and Entrepreneurship?

The observation of these patterns of innovation and entrepreneurial variety then lead to the question why such variety exists? Why is it that incumbent and start-up firms in some countries tend to pursue one innovation strategy rather than another? Answering this question and explaining the reasons for the variety of innovation and entrepreneurship has been another part of my work (Herrmann 2008b, Herrmann and Peine 2011, Meelen, Herrmann et al. 2017, Herrmann 2019, van Slageren and Herrmann 2024)

The first time I was confronted with the question of why there is variety in innovation and entrepreneurship was during my undergraduate studies, when our economics professor criticised the “rigid” labour market in Germany. “In Germany,” I remember him saying, “we have these strong trade unions. And they have influenced labour market regulation in such a way that work is now so well protected that, once employees are hired, they can hardly be fired again. They stay in the same company for life, get used to just one way of working and take it for granted, so they are unwilling or unable to accept change, lose their creativity and become an obstacle to innovation. We are simply not innovative enough in Germany – and the strong trade unions and rigid labour markets are one of the main reasons for it”. So, I remember sitting there as an undergraduate, seriously concerned that Germany's policymakers were overlooking the problem of labour market rigidity for innovation. Why had they not disempowered the unions and made the German labour market more flexible – as Margaret Thatcher had done in the UK in the 1980s?

It was a year later, during my Masters studies at the London School of Economics, that I received an answer to this question. It was here that Bob Hancké introduced us to the “varieties-of-capitalism” literature (Hall and Soskice 2001b) and explained the flip side of the coin: namely the positive effects of labour market rigidity, better described as labour market stability, on incremental innovation. The varieties-of-capitalism literature (Hall and Soskice 2001b, Hancké, Rhodes et al. 2007, Schneider and Paunescu 2012) became particularly

influential for my later work, as it broadened my view of how socio-economic activities are institutionally organised in different countries and gave me a more complete picture of what institutions it takes to be radically and, respectively, incrementally innovative.²

The varieties-of-capitalism (VoC) literature is very parsimonious and concise in its explanations of how a particular set of national institutions, i.e. the formal and informal rules that govern the economy (North 1990), facilitate different types of innovation (Hall and Soskice 2001b, Hancké, Rhodes et al. 2007). In contrast to related literatures on the competitive advantages of nations (Porter 1990), on national innovation systems (Lundvall 1992, Nelson 1993), or on entrepreneurial ecosystems (Stam 2015, Liguori, Bendickson et al. 2018), the VoC literature does not contain an eclectic list of all sorts of institutions that may influence how firms innovate. Instead, it focuses on those three sets of institutions that influence the availability of the core input factors for any firm: namely human capital (i.e. labour skills) (Estevez-Abe, Iversen et al. 2001), financial capital (Vitols 2001) and know-how (Tate 2001, Teubner 2001).

With regard to labour skills, the VoC literature (Estevez-Abe, Iversen et al. 2001, Hall and Soskice 2001a, Hancké and Herrmann 2007), on which I base my work my work (Herrmann and Peine 2011, Meelen, Herrmann et al. 2017, Herrmann 2019, van Slageren and Herrmann 2024, Herrmann 2008c) shows how flexible labour market institutions, like in the United States, indeed facilitate radical innovation. In the US, workers can be fired from one day to the next without specific reasons and without the involvement of works councils. As a result, workers change jobs more frequently, as evidenced by the relatively short average job tenure in the US. Frequent job changes facilitate the development of so-called general skills, which Becker defined as transferable to, and equally useful in, different firms and even different industries (Becker 1975: 19-20) – such as the ability to use a standard computer programme (e.g. Microsoft Office) or to drive a forklift. Employees thus acquire general skills through frequent job changes and through “general training [which] increases the marginal productivity of trainees in the training firms by exactly the same amount as in other firms” (Becker 1975: 26). General skills also mean that workers are used to different working environments, which makes them both more adaptable to change and more creative in generating new ideas – qualities that are inherent in, and necessary for, radical innovation. In sum, flexible labour markets facilitate the development of the general skills that enable radical innovation.

At the other end of the spectrum, long-term, stable labour-market institutions – like in Germany – are indeed an obstacle to radical innovation (Estevez-Abe, Iversen et al. 2001, Hall and Soskice 2001a, Hancké and Herrmann 2007, Herrmann and Peine 2011, Meelen, Herrmann et al. 2017, Herrmann 2019, van Slageren and Herrmann 2024, Herrmann 2008c). Once hired, employees can only be dismissed for specific and very limited reasons, with

² As mentioned in footnote 1, there are more types of innovation than just radical and incremental innovation (Herrmann 2009) and imitation (Breznitz and Murphree 2011). My illustrations are thus two examples of the broader variety of innovation and entrepreneurship that exists – on a continuum between radical and incremental – and of how this variety emerges from the institutional constellations of a country (or region).

several months' notice and in consultation with the company's works councils. Taken together, this makes that employees tend to work for the same company for a long time. As a result, they do not acquire the general skills that would facilitate radical innovation.

What is important, however, is that Germany's employees develop very specific skills instead. Becker defines specific skills as skills that are useful only within the context of one firm (Becker 1975: 26-27). Employees acquire these skills by working for the same firm for a prolonged period of time and by receiving specific training, which "increases the future marginal productivity of workers [only] in the firm providing it" (Becker 1975: 19).

One person with such firm-specific skills, whom I met during an internship as part of my undergraduate studies, was an engineer who worked for the car company Audi, located in Ingolstadt. As this engineer explained to several Audi interns over lunch, he was responsible for the connecting systems for the air conditioning pipes behind the windscreen of the Audi TT model. As the TT model is a very compact vehicle, space is limited, so all the equipment has to be most sophisticatedly engineered. And such highly specific knowledge of the connection systems in the Audi TT model is hardly transferable to the same extent to other car manufacturers. Accordingly, the engineer was only willing to acquire these specific skills because he knew he could work at Audi for the rest of his career – if he wanted to.

A specifically trained workforce, in turn, enables incremental innovation because workers know what their firm's suppliers can deliver, what customers want, and they have the ability to improve and refine the production process autonomously. Such sophisticated firm- or industry-specific skills are therefore at the heart of the incrementally innovative, high-quality production for which the German metal industry enjoys a global reputation. So, while it is true that the generally skilled workforce in the US is particularly good at radical innovation, this does not mean that the specifically skilled workforce in Germany is an obstacle to innovation *pari pro toto*. On the contrary, they are a rich source of incremental innovation (Estevez-Abe, Iversen et al. 2001, Hall and Soskice 2001a, Hancké and Herrmann 2007, Herrmann and Peine 2011, Meelen, Herrmann et al. 2017, Herrmann 2019, van Slageren and Herrmann 2024, Herrmann 2008c).

Taken together, my work on comparative institutional advantages thus shows that not only is there no one-best-way to innovate and be entrepreneurial, but that this institutional variety gives firms the opportunity to compete in different innovation and entrepreneurship segments. Despite repeated attempts by policy makers across Western Europe, a second Silicon Valley has not emerged in continental Europe – which is not problematic *per se*, but rather the result of the comparative institutional advantage that Western continental European countries offer to their firms in incremental innovation. In addition to these comparative institutional advantages, workers in these economies are likely to find it personally advantageous not to be subjected to hire-and-fire rules, but to enjoy job security and social protection.

For national governments, this link between national institutions, the resulting input factors, and the related innovation and entrepreneurship types implies that there is a trade-

off between the national institutions that policymakers can put in place and the types of innovation and entrepreneurship that these institutions facilitate (Herrmann 2008b, Dilli, Elert et al. 2018, Herrmann 2019). National labour market (as well as financial market) institutions (and institutions governing cooperation between suppliers and producers) can facilitate either radical or incremental innovation. In other words, if labour market regulations are not fully flexible, but also protect workers only to a limited extent, national workforces will develop neither truly general nor specific skills, and hence will not excel in either radical or incremental innovation. To support firms in their economy, governments should therefore make a clear choice between the flexibility or stability of national labour skill-, finance-, and know-how-related institutions.

What governments can (and actually do) do, is to allow and create flexibility within stable labour markets (Herrmann 2008b, Herrmann 2008c, Sanders, Stenkula et al. 2020). For example, they can exempt particularly small or young firms from strict dismissal rules or subsidise their employees' social security contributions. In addition, policymakers can allow the hiring of workers on atypical contracts, such as contracts of a limited duration or agency work. And this is, exactly, what we are seeing in Western Continental European economies: an increase in the number of flexible workers employed on atypical (i.e. non-standard) contracts.

But my work shows that any general measures taken to facilitate innovation and entrepreneurship, such as tax breaks for start-ups, will stimulate incremental innovation in a stable labour market and radical innovation in a flexible one. And any specific measures taken, for example to facilitate radical innovation by allowing the use of flexible contracts, must be of a permanent nature, as their effect will cease as soon as the measure is terminated.

Importantly, this does not mean that firms are 'doomed' to pursue the strategy facilitated by their country's institutions. As I have shown in my PhD work (Herrmann 2006, Herrmann 2008b), firms can pursue strategies that are not institutionally supported by creating and acquiring the necessary input types (i.e. labour skills, finance, and know-how) through individual efforts, thereby bypassing national institutions. For example, biotech firms that want to develop radically innovative drugs in Germany tend to hire workers with general skills from abroad or create the necessary flexibility in their employees' knowledge pools by hiring only temporary workers. This explains how firms such as BioNTech can be radically innovative even though they operate in a country with stable labour- and financial-market institutions. These firms often circumvent institutional stability (rigidity) by acquiring the necessary human and financial resources from abroad or through atypical contracts. Similarly, pharmaceutical companies that want to be incrementally innovative in the UK incentivise employees to stay with them for a long time, for example by offering pension schemes that become more attractive the longer employees stay with the same company. Importantly, my work also shows that firms which pursue strategies that are not facilitated by national institutions are, on average and in the long run, as successful as firms that pursue institutionally facilitated strategies (Herrmann 2009).

Taken together, this means that the variety of innovation and entrepreneurship emerges from the national institutions and related types of inputs (labour skills, finance and know-how) needed to pursue different types of innovation and entrepreneurship strategies. Ultimately, it is thus national regulation that underpins variety.

As digitalisation and the associated socio-economic exchange takes place in a virtual world without geographical borders, there are growing fears that the international dimension of digitalisation could make an end to national variety.

Research Challenges – Does Digitalisation Make an End to Variety?

While various literature strands – on the competitive advantage of nations (Porter 1990), on national innovation systems (Lundvall 1992, Nelson 1993), and on entrepreneurial ecosystems (Stam 2015, Liguori, Bendickson et al. 2018) – agree with the varieties-of-capitalism literature (Hall and Soskice 2001b, Hancké, Rhodes et al. 2007, Iversen and Soskice 2019) that different types of innovation and entrepreneurship emerge from differences in labour- and financial-market institutions across countries, digitalisation is time and again feared to put an end to this variety because it is not geographically bounded.

Often used as a buzzword for all sorts of online-related activities, digitalisation simply means the ability to store and analyse analogue data in an electronic format. This possibility to read electronic data digitally has led to three major innovations, namely: (1) big data analysis, (2) artificial intelligence applications, and (3) the platform economy.³

(1) Big data analysis makes it possible to bring together huge amounts of data and extract information, provided by individuals or organisations, for a specific purpose. Take the example of social media platforms, where the pictures and information posted there (e.g. about holiday destinations, food consumption and leisure activities) make it possible to create a unique consumer profile that can be used to target advertising and even election campaigns.

(2) Similarly, the use of self-learning algorithms allows new combinations of data to answer questions or solve problems more systematically and, above all, much faster than the human brain could do. The best-known example of this today is ChatGPT.

(3) Finally, digitalisation has enabled socio-economic exchange via online platforms, such as social media platforms (e.g. Facebook and LinkedIn), gaming platforms (such as Twitch), live streaming platforms (e.g. YouTube Live or Younow) and online work platforms (such as Uber, Upwork, TaskRabbit, or AmazonMechanicalTurk) as well as e-commerce platforms (for example Amazon or Etsy).

³ Even though research on this topic is still in its infancy, the explosion of job opportunities related to big data analytics, artificial intelligence and the platform economy, in particular, seems to be one reason for the labour shortage we are currently experiencing in traditional professions.

Importantly, digitalisation enables socio-economic exchange in a virtual format that is not geographically bounded, because users can access big data, AI algorithms and online platforms from anywhere in the world, while platforms can easily expand their business models across national borders (Nambisan, Lyytinen et al. 2017, Nambisan, Zahra et al. 2019). As a result, there is a recurring fear that digitalisation is beyond national reach, which will put an end to its regulability by national governments and, thus, to the diversity of innovation and entrepreneurship. As platforms become major economic actors, and as users are expected to choose the digital goods offered at the lowest price, it is claimed that governments will become subservient to the business interests and dictates of platforms, allowing only one type of (and possibly the cheapest) business solutions, i.e. the least costly forms of innovation and entrepreneurship, to survive.

The risk of a platformisation of our societies has not only prompted scholars to study the phenomenon (for a meta-study, see Boulianne, Oser et al. (2023)), but has also led the OECD in 2018 to imagine four different scenarios of how digitalisation may affect our societies. In two of these four scenarios, platform governance replaces the nation-state as the central regulatory authority in several respects, implying that “global tech platforms are the new world order” (scenario 3), including the “control (of the economy) by large technology firms” (scenario 3), with “nation states (being) just one node in global AI-enabled (governance) coordination (scenario 4) and the “world being integrated by cross-border platforms” (scenario 3). In the third OECD scenario, work is expected to be organised so that there are “1% platform owners, 9% elite global knowledge workers, (and) 90% flexible workers or unemployed”. (OECD 2018: 5).

In my current ERC-funded research project on online labour platforms, I address the question of whether digitalisation is leading to a convergence of economies by investigating the extent to which the skills offered by freelancers in the gig economy are starting to look the same, driven primarily by a global pressure for low prices. Interestingly, and contrary to the expectation that digital labour platforms are leading to a convergence of the skills offered, our initial findings show that there is variety in the skills offered by gig workers across countries, and thus a variety in their related innovation potential. Importantly, this variety is not primarily driven by the cheap price of skills, but by their scarcity in national labour markets.

To better understand these initial results, let us look at how the gig economy is organised and takes shape across countries. In a nutshell, the gig economy means that a service requester uses an internet-based platform to hire a service provider to perform a one-time service job (a gig). We can therefore think of labour platforms as hotel booking platforms – except that, instead of hotels advertising their qualities, it is the workers who advertise their skills, previous projects and reviews on their profiles. In this way, service requesters can directly identify the skills they need, compare alternatives and hire the preferred gig worker through the platform.

What is new about the gig economy, and what makes it more than an online blackboard and a labour market in its own right, is the intermediation by the platforms. By algorithmically matching supply and demand for service gigs, by controlling the quality of work through their rating and review systems, and by managing the payment process, gig platforms are taking on functions typically performed by either the work requester or the work provider in traditional labour relationships. This also means that an originally bilateral labour relationship becomes a trilateral one in the gig economy. Given that existing labour laws have been developed on the assumption of a bilateral work relationship, this makes the trilateral work relationships in the gig economy difficult to regulate under existing labour laws (Koutsimpogiorgos, Van Slageren et al. 2020).

The gig economy undoubtedly offers benefits – and not only to those who request work as they can hire gig workers at very short notice, without bureaucratic hurdles, and for low pay. The gig economy also has advantages for gig workers who have the flexibility to decide when and for how long they work, whether or not they accept a gig, and who can test their entrepreneurial potential without having to make large upfront investments. In Western economies, gig work is therefore often carried out as a part-time job by those who cannot work '9-to-5' (such as students and adults caring for young children or their parents), and by people who have difficulties finding traditional employment, especially migrants (ILO 2021: chapter 4). In countries in the Global South, such as Brazil, gig work appears to be increasingly preferred over formal employment, particularly when workers are paid in hard currency (usually in US Dollars).

Importantly, however, platforms set the terms and conditions under which work is to be done, and the gig economy is highly transparent and therefore extremely competitive, with the number of gig workers far outstripping the number of gig requesters. As a result, there is a systematic risk that gig workers offer their services at prices that are too low to cover the risk of illness, work disability or poverty in old age. Like other forms of solo self-employment, the gig economy is therefore also criticised for having an increased risk of labour exploitation and precarious working conditions (ILO 2021).

Figure 4: Advertisement by the Platform Fiverr (2017)



This risk of labour exploitation is illustrated particularly impressively by Fiverr's advertising campaign, which was posted in subway stations all over New York in 2017: "You eat a coffee for lunch. You follow through on your follow through. Sleep deprivation is your drug of choice. You might be a doer." (see Figure 4). The advertising of gig workers as workaholics has led to an outcry not only by labour activists, as it highlights the risk of exploitation and precarious working conditions in the gig economy. And the carelessness with which Fiverr advertised its 'talents' – as some platform so euphemistically refer to their gig workers on their websites – has raised questions about whether national policymakers have become powerless to regulate labour platforms.

To understand the leverage that national policymakers have to regulate platforms, three points need to be recognised.

First, gig work is subject to national labour law. If a Japanese tourist in Paris hires an Uber via the US-based platform of the same name, French labour law applies because the chauffeur service is provided in Paris (France). The same applies if a German translation requester hires a translator in the Netherlands through the Australian-based platform *freelancer.com*, because the translation service is provided in the Netherlands. The protection of gig workers is therefore primarily the responsibility of national governments.⁴

Second, protecting gig workers through national regulations, such as mandatory social security contributions, leads to higher gig wages. To prevent gig workers from relying on national social protection (e.g. in case of illness, disability or old age) without having contributed to it themselves, several countries have introduced an automatic deduction of social security contributions from each gig payment. For example, in several Latin American countries (most notably Uruguay), as well as Indonesia and Malaysia, drivers using taxi apps must register with the national social security and tax authorities to obtain their licence. The apps they use allow drivers to register, and they automatically add a certain percentage of social security contribution to the fare of each ride and remit it to the national social security authorities (ILO 2021: 221-222). While this gives gig drivers access to social security benefits (such as sick pay, maternity and disability benefits, and old-age pensions), it also inevitably raises the price of gigs.

Third, it is important to understand that such price increases, resulting from national protection of gig workers, affect different segments of the gig economy to different degrees. In this respect, it is worth noting that the gig economy is divided into different segments depending on the level of skills required to perform a gig and the location where the gig is performed (see Figure 5). On-site gigs are all those jobs that are carried out at the location of the requester, such as offering chauffeur services through the platform Uber or doing handicraft work through the platform Task Rabbit. Online gigs, in turn, include those jobs that are performed on a computer, such as programming, translation, or design gigs. This also makes the online gig economy the first truly global, or at least globally accessible (see Van Slageren, Herrmann et al. 2022), labour market. It is also worth noting that platforms generally do not offer high-skill jobs together with low-skill jobs, or online jobs together with onsite jobs, but focus on one of these four gig segments.

⁴ While the European Parliament adopted the Platform Work Directive on 8 February 2024, such EU-wide rules to protect gig workers also need to be transposed into national law. With regard to the Platform Work Directive, it is particularly noteworthy that the Directive leaves it to national law and collective agreements to determine the concrete criteria for whether platform workers are to be considered employees or not. In this way, the directive sets minimum labour standards that national governments can, but do not have to, go beyond – depending on their national labour laws. Hence, national governments remain primarily responsible for the protection of gig workers and the way in which this is implemented.

Figure 5: The Gig Economy and Its Sub-Segments



Source: Own Illustration

If gig wages rise as a result of national protection, this will have little impact on the on-site gig economy. That is, it may well be the case that the overall national demand for on-site gig work decreases as a result. But because the on-site gig economy is geographically bounded, there is no international competition between, say, delivery drivers in the Netherlands and Germany. A pizza that needs to be delivered in Nijmegen simply cannot be delivered by a gig driver in Düsseldorf. National regulation of the on-site gig economy will therefore not lead to an international shift in demand to countries with less regulated, less expensive on-site gig workers.

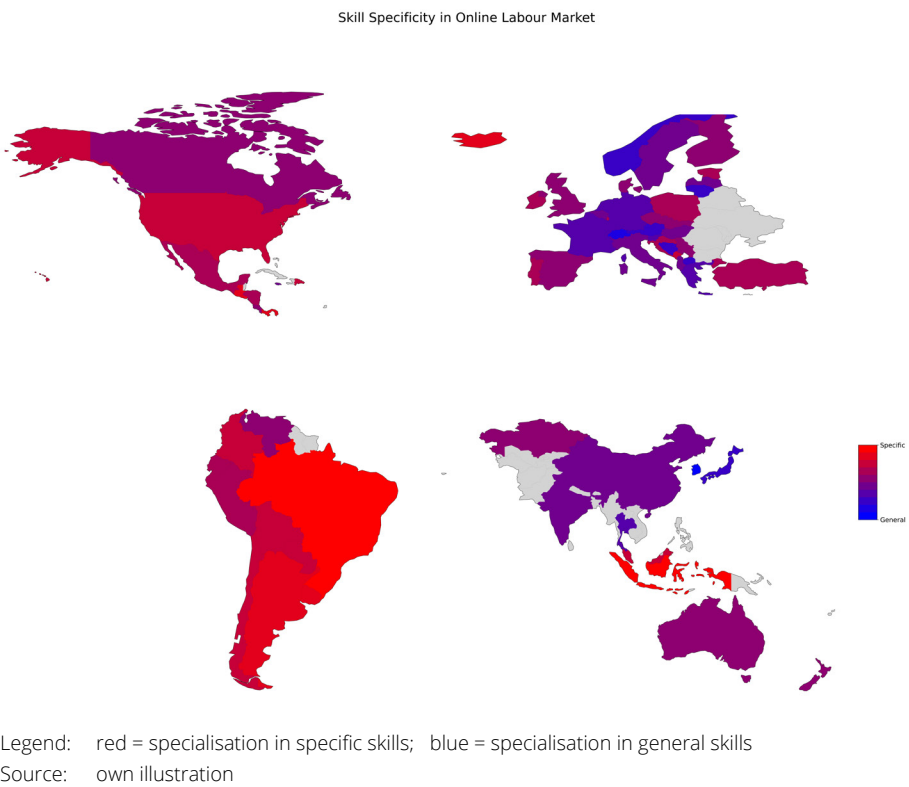
Given that platforms cannot evade national labour regulation (unless they stop operating in that country), and given that worker protection in the on-site gig economy has no international relocation effects, this implies that the conditions under which local gig work is to be performed are likely to differ across countries – in line with national labour regulation. And this is, exactly, what we find in a recent paper (Koutsimpogiorgos, Frenken et al. 2023): Even without being separately regulated, the platform Helping, offering cleaning gig jobs in several European countries, has adapted its terms and conditions to the respective national regulation of the cleaning sector – presumably to avoid lawsuits that could mean the end of its business model. Rather than a uniform way of doing business across economies, we thus see an increasing diversification of the *modus operandi* and, even, of the business models of on-site platforms across economies – in line with national regulation. Digitalisation does thus not mean an end to the variety nor regulability in the on-site gig economy.

But what about the online gig economy? Given that online gig jobs are performed on a computer (such as programming, translation, or design tasks), a price increase in, say, German gig wages due to mandatory social security contributions in Germany is likely to lead to a shift in demand for workers in less regulated, lower-pay countries. The only characteristic of gig workers that might prevent such a shift in demand is their specialisation in unique skills. I first realised the importance of skill specialisation as a way of resisting global price pressures when I listened to a colleague's interview with a gig translator. When she started working on the platform in its early days, this translator was one of the few native speakers in both English and the African language Swahili. When asked about price pressure in the global gig market, the interviewee replied that she could charge almost any price because there were hardly any other translators with the same specialised skills.

To understand whether specialisation in distinct skill sets enables online gig workers to withstand global price pressures in general, and rising prices resulting from protective gig regulation in particular, my ERC team and I are currently investigating skill specialisation in the online gig economy. And, interestingly, such specialisation patterns do indeed exist:

Accordingly, Figure 6 shows the extent to which online gig workers have general or specific skills across countries. More concretely, Figure 6 shows that there are significant differences across countries in the extent to which gig workers either specialise in industry-specific skills, offering all of their core skills within one industry (in red), for example PHP together with SaaS, Python and Software Architecture; or specialise in general skills, offering their core skills across three or more industries (in blue), for example PHP programming in combination with French Language and Webpage Design. According to Becker (add date) and Estevez-Abe (add date), such specialisation in (industry-)specific or, respectively, general skills tend to be more resistant to price pressure because there are fewer competitors with similar skill combinations than in undifferentiated, non-specialised skill segments. It is accordingly noteworthy that online gig workers in many countries specialise in either general or specific skills, as indicated by the red or blue colouring. Countries where workers have undifferentiated, non-specialised skill profiles are rare and often (albeit not always) characterised by very low wages, such as China and India. On the other hand, specialisation in specific or, respectively, general skills is particularly pronounced in some high-wage countries such as the Netherlands, Germany or the US, suggesting that specialisation does indeed enable gig workers to resist price pressure and to charge higher prices.

Figure 6: Skill Specificity (in General or Specific Skills) in the Online Gig Economy

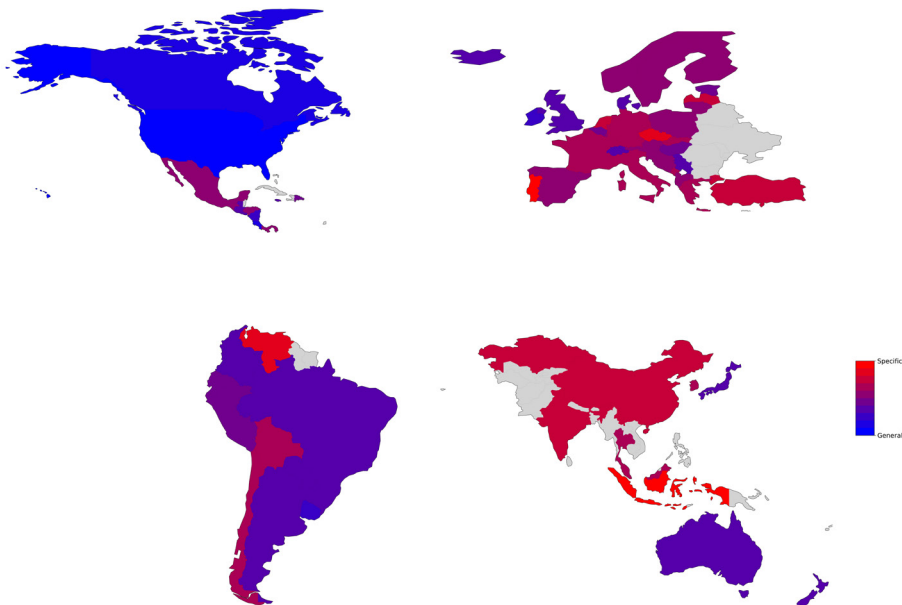


But under what circumstances do online gig workers specialise in industry-specific skills, and when do they specialise in general, cross-industry skills? Our initial findings on this question show that online gig workers specialise in the opposite type of skills to those for which workforces are traditionally hired in their home labour markets. As Figure 7 shows, gig workers in countries where the national workforce has specific skills (such as Germany or the Netherlands) tend to offer general skills in the online gig economy, whereas gig workers in countries where the national workforce has general skills (such as the US) tend to offer industry-specific skills in the gig economy. We call this phenomenon the "mirror-image effect" because the skills of national workforces and online gig workers in the same country take opposite forms. And we explain this phenomenon in terms of job availability: In countries with specifically skilled workforces, workers with general skills find it harder to find work in traditional employment and therefore offer their general skills in the online gig economy. Vice-versa, workers in countries with generally skilled workforces have more

difficulties in finding jobs requiring specific skills, thus offering their specific skill sets in the online gig economy.

Figure 7: Skill Specificity (in General or Specific Skills) in Traditional Labour Markets

Skill Specificity in Traditional Labour Market (Employment Protection)



Legend: red = specialisation in specific skills; blue = specialisation in general skills

Source: own illustration

While this research is still in its infancy, one point is becoming increasingly clear: even the online gig economy is not homogeneous in terms of the skills offered by gig workers. Price pressures in global labour markets are driving gig workers to specialise in either specific or general skills that they can offer at good prices, rather than undercutting each other with similar skills at the lowest possible price. So far, we are not seeing platform-imposed convergence in the online gig economy, but rather specialisation-driven divergence.

Ultimately, this leads me to conclude that digitalisation does not mean the end to the variety of skills offered and hence to the types of innovation and entrepreneurship that rely on these skills, but that different types of skills and, thus, innovation persist even in the face of digitalisation.

To summarise, I have argued that there is no 'one-best-way' of innovation and entrepreneurship, I have explained how this variety of innovation and entrepreneurship is induced by national institutions, and I have argued that national regulations even influence the shape of international digital markets. It is precisely this variety of institutionally induced innovation and entrepreneurship that enables workers and firms to gain competitive advantage in digital, global markets, which in turn is why they deserve our research attention.

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