Socio-Economic Review, 2023, Vol. 21, No. 3, 1795–1821
https://doi.org/10.1093/ser/mwac038
Advance Access Publication Date: 28 September 2022
Article

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Is the online gig economy beyond national reach? A European analysis

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Abstract

With the emergence of the online gig economy, computer-based jobs can be completed by gig workers around the world. This raises the question whether the labour market for online gigs is truly boundless as distance no longer matters. Based on gravity models, we investigate the effect of geographical, institutional and cultural distance on almost 30 000 platform hirings between 26 European countries. While we find that online gig platforms are used to off-shore work from high- to low-wage countries, the online gig economy is not boundless as gig workers are still preferably hired from geographically close economies. A common language furthermore facilitates hirings between countries. Interestingly, though, differences in formal and informal institutions hardly affect hiring patterns across countries, suggesting that online platforms create their own institutional framework. We conclude that the online gig economy constitutes neither a boundless nor a frictionless labour market, implying that its promise of creating equal access to job opportunities is exaggerated.

Key words: Gig economy, global economy, gravity model, labour market institutions, online platforms

JEL classification: F66 economic impacts of globalization; labor; J46 informal labour markets; O33 technological change; choices and consequences; diffusion processes

1. Introduction

Historically, the functioning of labour markets has been shaped by geographical distance and national institutions. Given that workers traditionally completed their tasks at the employers' premises, or at home yet close to their clients, labour markets were essentially local markets. The continued specificity of national institutions within Europe further

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reinforced the local nature of labour markets. Unlike trade in most goods, the hiring of labour across national borders raises transaction costs substantially, reinforcing the strong localization of labour markets. Iversen and Soskice (2019) even argue that comparative advantages created by national institutions are a major reason why a massive 'race to the bottom' of labour standards has not yet occurred within Europe. Thus, the idea of a 'death of distance' in labour markets, be it in terms of geographical distance or institutional distance, has been considered highly unlikely.

The emergence of the online branch of the gig economy, where digitally transferable services such as writing, editing, translating and programming tasks are transacted via internet-based platforms, holds the promise of a boundless labour market (Graham and Anwar, 2019). In contrast to traditional labour markets, the *gig economy* generally refers to paid, one-time service jobs mediated by platforms and carried out by *gig workers*, i.e. individuals with the labour status of freelancers (Koutsimpogiorgos *et al.*, 2020). Importantly, two different types of gig jobs can be distinguished, namely onsite and online gigs. In the *onsite gig economy* (De Stefano, 2015), locally bounded services such as food delivery or handicraft services are transacted by platforms like Uber, Helpling or TaskRabbit. The *online gig economy*, on the other hand, consists of labour services that can be transferred digitally (by platforms such as Fiverr, Upwork or PeoplePerHour), like programming or design tasks. Online gig work can thus be completed by workers around the world, thereby eliminating transportation costs. In addition, and in contrast to traditional labour markets, the online gig economy can be accessed without the need to hold a specific kind of 'entry certificate' (such as an educational degree or work permit), suggesting that prior investments are limited, while entry barriers are very low. And given that workers are typically paid per task without any employment arrangement, the impact of national institutional arrangements on the gig economy also seems to be minimalized. In sum, agreement is broad that transaction costs caused by market frictions and institutional dissimilarities are substantially reduced by online platforms (Sundararajan, 2016; Evans and Schmalensee, 2016). Therefore, one might think that the *online* gig economy constitutes a truly boundless labour market without the common constraints posed by geography and institutions.

Importantly, though, empirical evidence is mixed about whether, or not, the online gig economy indeed constitutes such a boundless labour market where geographical and institutional distance no longer matters. On the one hand, even though freelancers on online gig platforms work from many different countries, wage differences are still noticeable across countries (Beerepoot and Lambregts, 2015; Galperin and Greppi, 2017). In addition, foreign providers are paid less than domestic providers with the same resumé (Lehdonvirta *et al.*, 2014), suggesting that (national) institutional differences might still be important. On the other hand, Braesemann *et al.* (2022) found that rural workers disproportionately use online labour platforms, indicating that these platforms provide job opportunities to workers that are low in demand on traditional labour markets.

A systematic study of the geographical hiring patterns in the online gig economy is thus equally timely and highly needed in order to better understand the implications of online labour markets for deteriorating wages and labour conditions on the one hand, and for gaining access to additional work opportunities on the other hand. Globalization is perceived as a threat to the protection of national labour forces in European economies with high social security standards. Given that work is subject to the labour law of that country in which work is completed, national governments are 'trapped' between not protecting gig workers,

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which entails a race-to-the-bottom of labour standards, and protecting gig workers, which hurts their competitive position in the global labour market of the online gig economy (Mosley and Uno, 2007; Berg *et al.*, 2018). In contrast, workers in European countries with limited labour protection may benefit from getting access to online gig work, which is particularly true whenever workers have limited access to work in traditional labour markets due to their disadvantageous geographical location.

To shed light on the extent to which the online gig economy constitutes a labour market where distance no longer matters, we investigate whether wage differences and transaction costs caused by geographical and institutional distance affect the hiring of online gig workers in Europe. More specifically, we examine the claim that the online gig economy enables offshoring labour to lower-wage countries (Lehdonvirta *et al.*, 2019). Furthermore, we consider whether geographical distributions of skills shape hiring patterns on online gig platforms. And we also assess the arguments of the trade literature (De Groot *et al.*, 2004; Serlenga and Shin, 2007; Álvarez *et al.*, 2018) by examining whether increasing transaction costs hamper the existence of an international labour market due to geographical distance and institutional differences.

To shed light on the different drivers of hiring patterns in the online gig economy, we analyse one of the biggest online gig platforms for high-skilled jobs. By employing gravity regression models, we examine the hiring behaviour of 28 539 reviewed transactions conducted by 5535 gig providers between 26 different European countries. In line with the existing literature (Graham *et al.*, 2017; Lehdonvirta *et al.*, 2019), we show that online gig platforms facilitate offshoring labour to lower-wage countries, even on the European scale. Furthermore, and contrary to common expectations, we also find that geographical distance influences hiring patterns in the gig economy. Similarly, language differences continue to impact transaction costs in the online gig economy (Kuznetsov and Kuznetsova, 2014; Lehdonvirta *et al.*, 2014), despite its international character. In contrast, we find formal institutional distances between countries not to affect hiring patterns in the European online gig economy (Berg and de Stefano, 2018).

The remainder of the paper is organized as follows. Section 2 develops the theoretical framework upon which we draw in order to derive hypotheses about how distance and institutions relate to (transaction) costs, which may influence the hiring behaviour in a global labour market. Section 3 lays out the empirical and methodological approach that allows for testing these hypotheses. The results of these analyses are presented in Section 4. Section 5 concludes by summarizing and discussing the respective findings.

2. Theory

The literature on online gig platforms highlights three main reasons for requesters to hire online gig workers (Beerepoot and Lambregts, 2015; Gomez-Herrera *et al.*, 2017; Graham *et al.*, 2017; Cedefop, 2020; Berg *et al.*, 2021), namely (a) lower wages, (b) access to skills and (c) lower administration costs. Importantly, the first is an argument of regime competition, translating into direct cost savings, because workers are typically hired from low-wage countries by requesters in high-wage economies (Graham *et al.*, 2017). Access to skills and lower administration costs, by contrast, are institutional arguments related to limiting uncertainty in the hiring process, translating into indirect, transaction cost savings. Ultimately, both logics can be expressed in terms of 'distance', whereby the latter expresses 'cost

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differences' from a regime-competition logic, whereas distance means 'uncertainty reduction' from an institutional logic. While some of these factors have already been explored in previous studies (Lehdonvirta *et al.*, 2014; Beerepoot and Lambregts, 2015; Stanton and Thomas, 2019; Cedefop, 2020; ILO, 2021), a comprehensive study of the determinants of hiring patterns in the online gig economy is still lacking. We therefore systematically elaborate on distance arguments related to both direct wage costs (in Section 2.1) and different types of transaction costs (in Section 2.2).

2.1 Direct costs

There is broad scholarly agreement that requesters hire gig providers to lower costs (e.g. Sundararajan, 2016; Graham *et al.*, 2017; Bryson, 2018; Lehdonvirta *et al.*, 2019; Lustig *et al.*, 2020; Vallas and Schor, 2020). Most obviously, the online gig economy enables a substantial reduction of labour costs by offering work requesters the possibility to hire gig workers from lower-wage countries. In other words, the online gig economy enables cost reduction through offshoring, because the digitalization of services allows requesters from high-wage countries to move their work to countries with substantially lower wages (Beerepoot and Lambregts, 2015). Although global offshoring to low-wage countries is not new, online gig platforms allow to scale-up offshoring to an unprecedented extent (Lehdonvirta *et al.*, 2019).

Offshoring has been enabled by increased access to telecommunication technology and the increased education levels of gig workers in low-wage countries (Freeman, 2008). Faced with a risk of offshoring to low-wage countries, even highly skilled workers around the globe have therefore become vulnerable to international competition, resulting in a potential downward pressure on incomes—particularly in the Global North (Brown *et al.*, 2008).

By showing that the majority of gig requesters are located in high-wage countries, while the majority of gig workers are located in low-wage countries, previous studies have provided empirical support for the argument that gig hiring patterns take shape as a function of wage differentials between economies (Lehdonvirta *et al.*, 2014; Graham *et al.*, 2017). Therefore, we expect to find that:

> *H1 A lower average wage in the gig worker country, compared to the average wage in the requester country, positively influences gig worker hirings.*

2.2 Transaction costs

2.2.1 Geographical distance

Enabling offshoring practices is not the only way in which online gig platforms reduce costs. Possibly more importantly, online platforms reduce the transaction costs that are associated with hiring gig workers. Contrary to direct costs (including a gig worker's wage costs and the platform's fees), transaction costs are those costs related to market participation (Coase, 1937; Williamson, 1981, 1985). At a theoretical level, scholars distinguish between three different types of transactions costs (Furubotn and Richter, 2010): First, *search and information costs* emerge from those efforts that need to be made in order to find an appropriate good or service, which offers the most opportune quality-price ratio. Second, *bargaining and decision costs* are those costs related to setting up the preferred agreement, including the costs for negotiating and setting up a contract. Third, after contract formation, transaction

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costs finally include *policing and enforcement costs*. These costs emerge from ensuring that all parties involved follow the rules established in the contract.

In traditional employment, freelancing and even temp agency work, geographical distance has been a key determinant of all three types of transaction costs. First, *search and information costs* increase with geographical distance (McCann, 2008), because both information (Granovetter, 1973) and reputation (Buskens, 2002) generally percolate within social networks. Social networks have largely remained geographically determined as both offline (Wellman, 1996; Mollenhorst *et al.*, 2011) and online networks (Takhteyev *et al.*, 2012; Lengyel *et al.*, 2015) remain spatially proximate. Second, *bargaining* usually makes it necessary for the work requester and applicant to meet in person. If this is not possible, the bargaining phase will be prolonged due to less efficient communication, which additionally increases bargaining costs (Lunnan *et al.*, 2019). Finally, *policing and enforcement costs* are dependent on distance as well. Typically, these costs are reduced by installing a local body, generally a supervisor who oversees the worker, which necessarily becomes more difficult with increasing geographical distance between work requester and provider.

Online gig platforms accredit their success mainly to reducing, or even elevating, these geographically bounded transaction costs (Lehdonvirta *et al.*, 2014). First, online gig platforms lower *search costs* by publicly showing the profiles of gig providers, including their CVs, work portfolios and skill tests. Platforms also provide performance ratings of both gig requesters and providers (Agrawal *et al.*, 2013; Gomez-Herrera *et al.*, 2017; Kässi and Lehdonvirta, 2019). In this way, gig requesters can immediately assess the workers' skill types, work portfolios and past performance.

Furthermore, online gig platforms provide both gig requesters and providers with tools to express their *bargaining* position effectively. Gig providers can, for example, indicate their requested hourly wage, while gig requesters can signal their budget available for a specific task. Platforms facilitate this communication digitally, therefore eliminating the need to meet in person.

Finally, the platforms' reputation system also lowers the *enforcement and policing costs*, by facilitating trust between requester and provider. Trust in transactions arises from 'learning', i.e. having information about the past behaviours of the contracting partner, and 'control', namely the possibility to impose sanctions in the case of uncooperative behaviour (Buskens and Raub, 2002). Online review systems facilitate both. Review scores, as well as written reviews, provide an easily interpretable way to 'learn' from previous experiences—even for outsiders who have not been involved in this past experience. In this way, reputation systems facilitate trust between strangers (Cook *et al.*, 2005; Przepiorka, 2013). Furthermore, gig requesters can quite easily 'punish' a provider for calamities through a poor review, thereby exerting substantial 'control'. The mere threat of receiving a poor performance rating and review creates a strong monitoring force (Wood *et al.*, 2019a). What is more, platforms also retain the right to block the account of gig work providers and requesters without prior notice as a policing and enforcement tool of last resort.

While online platforms allow participants to escape geographical constraints, this does *not* imply that geographical distance does not matter in online transactions in the gig economy. First, while the job transaction can be easily completed without face-to-face encounters, the completion of the job itself may involve face-to-face interaction. And even if face-to-face interaction is not foreseen from the outset, parties may ask for such encounters in case questions or disagreements arise, e.g. about how the work is to be completed.

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Second, transactions via online platform may occur between parties that also trade, or have traded offline in the past. In such cases, the geographical structure of an offline labour market may still be visible in the online labour market. In particular, Lehdonvirta *et al.* (2014) find that gig workers have a higher chance of obtaining a job, and of getting better paid for jobs, by domestic than by foreign requesters. This leads us to hypothesize that geographical distance or, respectively, proximity still matters as it also shapes hiring patterns in the online gig economy:

H2 Geographical proximity positively influences gig worker hirings between countries.

2.2.2 Skill differences

Another reason for why requesters use online gig platforms is that these platforms reduce search costs whenever particular worker skills are needed. Labour platforms offer requesters access to an international labour force characterized by a large variety of skills, while gig workers can offer their services to numerous requesters. The chance of finding a match between supply and demand in such a thick market is therefore much higher than in thin local markets. In economics, such benefits pertaining to both supply and demand of concentrating a market onto a single platform are known as 'two-sided network externalities' (Rochet and Tirole, 2003).

Given that online gig platforms create thick markets with a highly diverse labour force, offering a wide variety of skills, requesters can more easily find those scarce skills in their home markets (Gomez-Herrera *et al.*, 2017). Herrmann (2008) shows that firms in traditional labour markets already use international labour markets to hire scarce skills from abroad, thereby bypassing national institutional rigidities. Similarly, skill requesters can use online gig markets to overcome national labour-market constraints and acquire those skills that are under-supplied in traditional labour markets (Lehdonvirta, 2017). In line with this reasoning, we hypothesize that gig requesters use labour platforms to hire workers for skills that are scarce in the requester's home country.

H3 Differences in the skill sets of workforces positively influence gig worker hiring between countries.

2.2.3 Formal institutions

National differences in institutions are typically mentioned as a third factor that increases transaction costs in international trade—next to geographical distance and differences in skill supply (e.g. Linders *et al.*, 2005; Walsh, 2006). In international trade, requesters and providers are embedded within different formal (regulatory) and informal (cultural) institutions. In line with historical institutionalism (see Koelble, 1995; Hall and Taylor, 1996; Streeck and Thelen, 2005), we here understand institutions as 'formalised rules that may be enforced by calling upon a third party' (Streeck and Thelen, 2005, p. 10). In other words, they are the agreed upon rules of the game, either written or verbal, which foster a systematic behaviour of the actors involved. Various authors have argued that institutions are among the most important factors that define transaction costs, and can, therefore, impede

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trade (e.g. North, 1990; Nickell and Layard, 1999) and, accordingly, the hiring of gig workers.

To date, the online gig economy is hardly regulated. However, pre-existing institutions, which developed at the national level outside the gig economy, may still influence the online gig economy by shaping the behaviour of national workforces and work requesters on gig platforms. For the offline economy, economic geographers repeatedly showed that similar institutions decrease transaction costs (e.g. Beugelsdijk *et al.*, 2004; De Groot *et al.*, 2004; Linders *et al.*, 2005). The reasons are twofold and both applicable to the online gig economy. First, similar institutions prevent major adjustment costs, stemming from an unfamiliarity with the rules and habits of the trading partner's economy, and from the insecurity related to transaction contingencies (De Groot *et al.*, 2004, p. 111). Second, actors from the same institutional background tend to share similar behavioural norms (Beugelsdijk *et al.*, 2004). This, in turn, makes communication easier, faster, and hence less costly.

In line with these arguments, empirical studies have extensively shown that domestic trade is preferred over foreign trade (Wolf, 2000; Jošić and Jošić, 2016; Olayele, 2019). Crossing borders typically implies increasing costs, especially transaction costs associated with higher administrative costs and higher uncertainty levels about contractual compliance. The socio-economic literature widely refers to this preference of domestic over foreign trade as the 'border effect' (Anderson and Van Wincoop, 2003; Olayele, 2019), 'liability of foreignness' (Hymer, 1976; Zaheer, 1995; Lehdonvirta *et al.*, 2014), or as the term we will use here: 'home country bias' (Wolf, 2000; Jošić and Jošić, 2016). This leads us to propose a fourth hypothesis:

H4 National boundaries negatively influence the hiring of gig workers.

While national boundaries constitute a pars-pro-toto indicator of institutional homogeneity within and, respectively, heterogeneity between countries, a wide variety of institutions also exist within countries. Out of these, what kind of differences in specific institutions are particularly likely to influence hiring patterns in the online gig economy? The socio-economic literature makes a distinction between formal institutions, related to law formation and legal enforcement, and informal institutions, related to social norms and common practices (e.g. Hall and Soskice, 2001; Linders *et al.*, 2005; Bilgin *et al.*, 2017). From this literature, we also know that both types of institutions can affect trade if they differ between countries. Accordingly, they are likely to influence hiring patterns in the online gig economy as well.

The literature on formal institutions shows that their *quality*, i.e. their effectiveness (such as the time it takes to obtain a judgement whatever the legal approach pursued), is of particular importance. A better quality of the institutional framework reduces uncertainty about contract enforcement and general economic governance (De Groot *et al.*, 2004). Various economic geographers found that institutions of poor quality entail negative externalities and, thus, reduce international trade (e.g. Wei, 2000; Anderson and Marcouiller, 2002; Linders *et al.*, 2005). In addition, both De Groot *et al.* (2004) and Linders *et al.* (2005) found that differences in institutional quality reduce bilateral trade in the traditional economy. The reason, simply, is that institutional quality affects expectations of both parties, e.g. regarding how strictly contracts will be enforced. Different kinds of institutional quality thus entail a difference in expectations between labour requester and worker. Different expectations increase uncertainty, hence increase costs, which discourages hirings. Applying

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this argument to the online gig economy, our second hypothesis on formal institutional differences is that:

H5 Similar degrees of the quality of regulatory institutions positively influence gig worker hiring between countries.

2.2.4 Informal institutions

Apart from formal institutions which emanate from rules and regulations that can be directly influenced by the state, we expect informal institutional differences to play a role as well. This is particularly so, as many tasks transacted via online gig platforms have a strong cultural component drawing on symbolic knowledge, such as writing, translation and design tasks. One way of conceptualizing informal institutions is by means of national cultures. Since culture has been understood as 'a population's shared habits and traditions, learned belief and customs, attitudes, norms, and values' (White and Tadesse, 2008, p. 1079), cultural proximity between countries is accordingly based on a broader, societally shared understanding of how things are and ought to be. Cultural distance thus raises transaction costs of international trade whenever significant cultural differences make it difficult to understand, control and predict the behaviour of others. Accordingly, numerous studies have demonstrated that greater cultural distance hampers trade (e.g. De Groot *et al.*, 2004; Cyrus, 2012). Applied to the cross-border hiring of gig workers, for example, different perceptions of the hierarchy in the relationship between worker and requester might hinder, while similar cross-country values may facilitate cross-border hirings (Kristjánsdóttir *et al.*, 2017). We take this literature strand into account by proposing the following hypothesis:

H6 Cultural distance negatively influences gig worker hirings between countries.

Finally, in addition to culture, language also plays a role in international trade. Various authors (e.g. Chiswick and Miller, 2005; Hutchinson, 2005; Felbermayr and Toubal, 2010) show that transaction costs increase whenever both parties involved in a transaction have different mother tongues because the gathering of information is hampered, while bargaining becomes more difficult (Melitz and Toubal, 2014). With a shared mother tongue, expressions, subtleties and culturally dependent interpretations are passed on easily. But these cues are not (equally) understood whenever the transacting parties have different mother tongues. While the language used on most online gig economy platforms, and the Internet in general, is English, providers and requesters with the same mother tongue can use an additional—namely their most familiar—language to communicate. Gig providers and requesters who do not share the same mother tongue are lacking this additional vehicle of communication which, in turn, decreases communication efficiency (Melitz and Toubal, 2014). This leads us to expect that:

H7 The same official language positively influences gig worker hirings between countries.

3. Methodology

3.1 Data: sampling approach

To test the above hypotheses, we used gravity models which compare the amount of (in our case hiring) flows between countries. To run our gravity models, we applied (aggregate)

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information at the country level in order to obtain a dataset where each case constitutes a country-by-country comparison of hiring flows (dependent variable) and their determinants (independent variables). To obtain such a dataset, we collected information on the gig provider profiles available on one of the largest platforms worldwide for high-skilled, online gig tasks, such as programming, design, translations and writing. Importantly, the platform we examined poses hardly any algorithmic control over the matching process that would bias our results. Both requesters and providers can initiate a transaction—providers by advertising their skills and applying for posted jobs; and requesters by posting a job and/or sending a personal message to specific gig providers. Gig requesters are also not restricted with regard to the size of, and wage/price for, the gig jobs they want to offer; nor does the platform use geographical location to constrain the matching process without explicit request by the gig requester.

Our reasons to choose this platform were threefold. First, it is amongst the largest platforms for online, high-skilled gig jobs in the online gig economy, which increases the external validity of our results as it allows generalizations to the high-skill, online gig economy as a whole. Second, the platform provides the necessary information on the work history of gig providers. More concretely, this platform is one of the few that publicly provides the work history (as far as it has been reviewed) as part of the gig providers' profiles. Third, the platform in question imposes little control on the matching process. Actors need to agree to the terms and conditions in order to get access to the platform. These terms and conditions refer, inter alia, to conflict resolution procedures and property right statements. However, once access has been granted by the platform, workers can set their wages independently, while gig requesters can choose freely which worker to hire. Workers are notified as soon as a job application is posted that requires at least one of the skills included in their respective profiles. It is then up to the gig workers to apply, or not. Yet, irrespective of whether, or not, a gig worker applies for a job, gig requesters can contact gig workers and, if they receive a positive response, hire them. With regard to worker selection, requesters see all applicants for a gig job in historical order, i.e. in the order in which the respective gig workers have applied for the job in question. In this way, our results are largely unbiased with regard to the platform's algorithmic control of prices and trade volume.

We focused our analyses on the hiring flows of gig providers between the following 26 European countries: Austria, Belgium, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, The Netherlands, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland and The United Kingdom. We confined our country selection to European countries that are part of the Schengen area, the UK and Ireland. By focusing on European countries, we provide a conservative setting to examine whether distance still matters. Given the freedom of movement, the rather small differences in terms of institutional quality, and the limited differences in time zones, one would expect distance to be least important. Hence, if we still find geographical and institutional distance to matter, we can expect that they matter even more strongly when examining trade outside Europe.

Since gig profiles can rapidly change over time, it was essential to collect the necessary data within a short timeframe. We, therefore, collected the publicly available profiles of gig providers with the use of a scraping algorithm between December 16 and 22, 2019. While the data was collected in the course of 1 week, the original dataset covered a time span of 18 years of reviewed transactions. To account for countries being early adopters of the

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online gig economy, we selected reviewed transactions conducted in the last 5 years, i.e. completed after December 2014.

By collecting a limited amount of the platform's overall data, in line with our research requirements, we ensured that data collection was in line with the platform's intellectual property rights. By pseudonymizing the data collected, we complied with the necessary legal requirements. Our data collection process was approved by the ethics review board (ERB) of our university. In line with our ERB application, we revealed the platform's name to the paper's reviewers but shall not make it public in order to additionally honour data anonymity.

To establish the hiring flows between economies, we needed to focus on those gig providers whose jobs had been reviewed by the gig requester. This is essential in order to be able and trace the country from, and to, which a worker was hired. Importantly, 94.4% of all jobs in our sample completed by gig providers were reviewed so that our focus on reviewed transactions is highly unlikely to generate a sample bias. After removing all gig provider profiles that never completed a gig job for which they obtained a review, the aforementioned sampling approach led to a dataset containing 5535 gig provider profiles in the 26 aforementioned European economies.

3.2 Operationalization

3.2.1 Dependent variable

We used two dependent variables in this study to determine hirings in the online gig economy. Our first dependent variable indicates the *number of gig hires between two countries*—for all pairs of countries included in the dataset. We calculated the respective hiring amount based on each gig provider's work history. For each hire, we collected information on the gig requester's country of residence to determine between which two countries the transaction took place. In line with our country sample, we then selected those hiring transactions that occurred between the 26 European countries examined in this study. We counted the number of transactions that occurred between 2014 and 2019. This led to 28 539 hiring transactions over the 5-year timeframe. Second, we used the payment amounts related to these transactions in order to determine the *total money flow between two countries*. This resulted in a variable ranging from 0 to 691 495 USD.

3.2.2 Independent variables

We measured *wage differences* by examining the profiles of gig workers in our dataset. On this profile, every gig worker indicates the hourly wage (in USD) for which s/he can be hired (although this hourly rate can deviate from the actual wage for which a gig worker is hired). The difference in hourly wages between countries indicates differences in the labour compensation requested and is used as a proxy for wage differences between countries. To compute the difference between countries, we subtracted the average wage in the provider's country from the average wage in the gig requester's country. Accordingly, the variable obtained indicates the average wage 'gain' or 'loss' for the requester when hiring workers from any other country. The difference in average wages varies between 0 (for the intra-country dyads) to 24. Our variable accordingly ranges from −24 to 24.

To operationalize our second independent variable of interest, *geographical distance*, we followed numerous studies (e.g. Montenegro and Soto, 1996; Porojan, 2001; Gopinath and Echeverria, 2004; Montobbio and Sterzi, 2013) by taking the geographical distance between

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the capital cities of the respective countries as an indicator. We extracted this indicator from the GeoDist database.[1] The GeoDist database is among the most used databases within economic geography, especially appropriate for gravity models because it offers fine-grained geographical indicators for country-by-country dyads for overall 250 countries worldwide. The geographical distance indicator measures the latitude (ϕ) and longitude (λ) of capital cities and then calculates their difference based on the great circle formula.[2] Importantly, the indicator also makes it possible to assess intra-country (hiring) flows and, consequently, provides within-country distances.[3]

We measure differences in gig worker skills in two different ways. First, we follow Bol and Van de Werfhorst (2011), who measure differences in national education systems across multiple dimensions. One of these dimensions indicates the *level of vocational orientation* of a country's education system. This dimension is strongly correlated with the types of skills that workers possess, indicating that countries with a strong vocational education system bring out workers with specific skills, whereas education systems with a weak vocational orientation provide workers with general skills. Following this methodology, we employed OECD data collected in 2018 to measure the percentage of upper secondary education with vocational enrolment (OECD, 2018). We then calculated the absolute difference in vocational orientation between countries, which resulted in a variable ranging from 0 to 40. Second, we measure another kind of skill difference by looking at the *percentage of STEM graduates*. To this end, we used UNESCO data on the percentage of STEM graduates in a country. We took the data for 2018, except for Slovenia (where the most recent data was collected in 2017) and the United Kingdom (collected in 2016). We then subtracted the percentage of STEM graduates in the provider's country from the percentage of STEM graduates in the gig requester's country.

The first institutional proximity variable employed is the aforementioned *home country bias*. It is measured by a dummy that distinguishes between inter- and intra-country trade flows. This variable assumes the value '1' when the requester and gig worker resides in the same country, and the value '0' when they do not. To gauge the impact of formal institutions, we examine the role of differences in *institutional quality*. We follow related studies (Beugelsdijk *et al.*, 2004; Linders *et al.*, 2005; Álvarez *et al.*, 2018) by employing the Kaufmann indicators of institutional quality from 2019, presented in the World Bank's '*Worldwide Governance Indicators*' database (Kaufmann *et al.*, 2011). More precisely, Kaufmann and colleagues use six dimensions of institutional quality: voice and accountability, political stability and absence of violence/terrorism, government effectiveness, regulatory quality, rule of law and control of corruption—of which we took the Euclidean distance to calculate the difference in institutional quality of all country pairs.

1 We also used two alternative variables to measure geographical distance, namely the geographical distance between the biggest agglomerations in a country, derived from the GeoDist dataset, and a dummy indicating whether the countries share a border (contiguity). Importantly, the use of these alternative distance measure did not significantly change the results obtained, thereby corroborating their robustness (see Table A2 and A3).

2 $d_{ij} = r * \cos^{-1}(\sin\phi_i * \sin\phi_j + \cos\phi_i * \cos\phi_j * \cos\Delta\lambda_{ij})$.

3 In line with the standard economic-geography approach, within-country distances are calculated by using the following formula: $d_{ij} = .67\sqrt{area/\pi}$. (see Head and Mayer, 2010 for details).

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To operationalize *cultural differences*, we follow Tabellini (2010) and Tadesse and White (2010) in that culture can be measured as the sum of trust, respect, control and obedience. Using the European Value Study (2020), we employed the same questions as Cyrus (2012), where further methodological elaboration can be found. We used the data collected in 2017—with the exception of Belgium, Greece, Ireland, Latvia, Luxembourg and Poland, where we used the 2008 data wave. However, combining the four indicators could create similar composite values for countries that arrive at that score very differently. Therefore, we took a more fine-grained approach to cultural differences by examining the four indicators separately in our models. We computed the average value per country for all four attributes and took the counties' absolute differences.

As an additional operationalization of informal institutional differences, we examined whether two countries share a *common official language*.[4] We build a dummy variable that indicates whether (1), or not (0), a common official language is spoken. This variable was extracted from the GeoDist Dataset.

3.2.3 Control variables

In gravity models, it is necessary to control for the *'mass'* of a country in order to test whether different distances are additional explanations for the differences in the size of trade, on top of the sheer size (or mass) differences between two economies. Most gravity models estimate the mass of a country by either using a country's GDP (Wei, 1996; Gopinath and Echeverria, 2004; Baier and Bergstrand, 2009) or its population size (Porojan, 2001; Gopinath and Echeverria, 2004; Carrere, 2006) as a proxy. While this approach is plausible when the entire country's economy is examined, these mass indicators are less useful for our study, because they do not reflect the respective size of a country's online gig economy. To use a meaningful proxy, we determined, and control for, the size of a country's gig economy based on our own dataset by calculating the total number of gig hires from, and to, a country.[5] This results in two mass variables as controls: For example, to explain the number of Dutch workers hired by requesters from the UK, we control for (a) the total number of jobs for which Dutch workers were hired, as well as (b) the total number of jobs requested by UK residents.

Furthermore, we include employment protection and social dialogue as two control variables, because it could be possible that formal institutions related to dependent employment influence freelancing gig work. For example, gig requesters might be afraid of potential lawsuits when hiring gig workers from countries with more stringent employment protection or high social dialogue effectiveness. To control for the impact of dependent-employment institutions, we measure differences in *employment protection* between countries, by following the institutional literature (e.g. Schneider and Paunescu, 2012; Witt and Jackson, 2016; Dilli *et al.*, 2018; Hope and Martelli, 2019) in using the OECD's '*indicator of regular*

4 As robustness check, we employed an alternative measurement indicating whether there is a common language spoken by at least 9% of the population of both countries. The regression results are presented in Appendix Table A4.

5 In addition, we analysed our models using an alternative mass variable, namely the number of gig providers and requesters from our dataset. The results are presented in Appendix Table A5.

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employment protection legislation'.[6] This indicator includes the conditions for terminating employment, the involvement of third parties (such as works councils), the length of notice periods to be respected, severance pay, conditions required for laying off employees, repercussions of unfair dismissals and provisions for collective dismissals. The indicator combines this information into one single numeric value ranging from 0 (no employment protection) to 6 (highly stringent employment protection), thereby measuring the strictness of employment regulation. Based on this indicator, we subtracted—for each country pair—the employment protection of the Freelancer's country from the employment protection of the requester's country. For all countries covered in our dataset, we used the most recent data available, namely from 2013—except for Slovenia and the United Kingdom (where the most recent data is from 2014), as well as for Lithuania and Croatia (with the most recent data from 2015). Given that institutional change is a slow, gradual process (Mahoney and Thelen, 2009; Thelen, 2009), the results obtained are hardly biased by possible differences between years. For *social dialogue effectiveness*, we used the IPD database (Gracia and Nedjam, 2018), which includes perception data on 127 indicators of institutional characteristics for countries and has been widely used in institutional economics (Bénassy-Quéré *et al.*, 2007; Punt *et al.*, 2021). This variable ranges from 0, indicating very little social dialogue at the national level, to 1, indicating a highly effective national social dialogue. We again subtracted the Freelancer's country value from the requester's country value. For further elaboration on data collection of the IPD database, we refer to Gracia and Nedjam (2018).

Table 1 provides an overview of the descriptive statistics of the respective dependent and independent variables for all country-by-country dyads used in the main results of our study.

3.3 Analyses: gravity models

To identify the importance of distance in online labour markets, we use gravity models. Gravity models were first applied to social science research by Tinbergen (1962), who used an analogue model to Newton's Law of Universal Gravitation in order to explain trade flows between countries. In short, the model relates the force of attraction—the amount of reviewed gig hirings—between two objects or, respectively, countries to the size of both the countries and the distance between them. Therefore, the basic gravity equation is:

$$I_{ij} = a_1 \frac{\mathrm{MASS}_i^{a_2} \mathrm{MASS}_j^{a_3}}{Distance_{ij}^{-a_4}}$$

Where Tinbergen's model I_{IJ} describes the amount of trade between two countries, various scholars have adopted the model to study other country-by-country flows, including migration flows (Karemera *et al.*, 2000) and scientific collaborations (Hoekman *et al.*, 2010). Accordingly, scholars have used gravity models to assess the impact of these country-by-country attributes by considering their distances or similarities. This means that gravity models do not assess whether, for example, employment protection in a country has an effect on that country's trade flows; instead, gravity models examine whether differences in

6 https://www.oecd.org/employment/emp/oecdindicatorsofemploymentprotection.htm

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Table 1. Descriptive statistics ($N = 676$)

	Range	Mean	SD
Dependent variable			
Reviewed transactions	0 to 3390	42.22	183.97
Total money flow	0 to 691 495	8794.20	41 774.54
Independent variables			
Wage difference	−24 to 24	0.00	7.45
Vocational education difference	0 to 3.8	2.49	1.03
Difference STEM graduates	−18 to 18	0.00	6.00
Geographical distance	19 to 4167	1319.70	786.23
Home country bias (same country = 1)	0/1	0.04	–
Difference institutional quality	0 to 2	0.58	0.37
Cultural distance: Trust	0 to 61	20.48	16.25
Cultural distance: Respect	0 to 41	12.32	9.33
Cultural distance: Control	0 to 17	4.63	3.65
Cultural distance: Obedience	0 to 51	12.13	10.32
Common official language (yes = 1)	0/1	0.09	–
Control variables			
Reviewed transactions inflow	5 to 6364	1097.70	1491.58
Reviewed transactions outflow	83 to 7721	1098.00	1608.09
Money flow inflow	240 to 1 207 069	228 622.30	304 450.10
Money flow outflow	19 935 to 1 579 003	228 622.00	340 413.00
Difference employment protection	−3 to 3	0.00	0.68
Difference effective social dialogue	−3 to 3	0.00	1.36

employment protection between countries (i.e. between all country pairs) have an effect on the trade flows between all countries (i.e. between all country pairs).

By log-transforming the variables at both sides of the equation, we arrived at the following linear formula underlying the models we test:

$$\ln I_{ij} = \ln a_1 + \ln a_2 Mass_i + \ln a_3 Mass_j + \ln a_4 Distance_{ij} + \varepsilon$$

Since our first dependent variable in this study represents the number of hirings between two countries, we analyse this variable by using General Linear Models that are most appropriate for count data. The conditional variance of the number of hirings is larger than the conditional mean (over-dispersion), whereby Theta is significantly different from 1, which implies that negative binomial regression models are most appropriate. For the total money flow between countries, we log-transformed the dependent variable and used OLS regression models. Also, all continuous independent variables were log-transformed, which is both most appropriate and the standard approach for gravity models. If the range of a variable included negative values, the minimum value plus one was added to the variable before the logarithm was calculated, because a logarithmic transformation can only be performed on positive values. We reported odds ratios for the models for each of the two dependent variables. Standard errors were clustered at the level of country-by-country dyads. We also probed into possible multicollinearity problems by calculating the VIF scores of all independent variables. As shown in Appendix Table A1, no multicollinearity problems were detected. All hypotheses were tested two-sided.

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4. Results

Table 2 shows the regression results obtained for the number of transactions on the one hand and total money flows on the other. The first noticeable result is that a positive difference in average wage has a significant positive effect on trade between countries, both for the number of transactions and the total money flow (Transactions: OR = 1.384, SE = 0.085, $P < 0.001$; Money flow: OR = 1.639, SE = 0.240, $P < 0.050$). This indicates that, even within Europe, online gig platforms are typically used to hire workers from lower-wage countries—which, in turn, confirms Hypothesis 1.

Interestingly, geographical distance has a strongly significant negative effect, both on the number of gig transactions between two countries (OR = 0.766, SE = 0.043, $P < 0.001$) and on the total money flow (OR = 0.713, SE = 0.122, $P < 0.010$). Both coefficients (of about 0.7 points) are surprisingly similar to those of other studies using gravity models in order to examine service trade in various parts of the world (Kimura and Lee, 2006; Walsh, 2006; Anderson *et al.*, 2014). Therefore, and contrary to the general opinion that the online gig economy constitutes a truly boundless labour market, we find support for Hypothesis 2.

Furthermore, Table 2 shows, contrary to our expectations, that the difference in vocational education systems between countries does not have a significant effect on bilateral trade (Transactions: OR = 0.998, SE = 0.028, $P = 0.957$; Money flow: OR = 1.071, SE = 0.074, $P = 0.814$). Roughly the same can be said for the relation between difference in STEM graduates and gig worker hirings. While the between-country differences in the percentage of STEM graduates have a significant positive effect on the number of transactions (OR = 1.111, SE = 0.051, $P < 0.050$), the effect is not significant for total money flows, where the direction is even the opposite to the one predicted (OR = 0.965, SE = 0.144, $P = 0.804$). Taken together, these results are inconsistent and do not support Hypothesis 3 that countries with national education systems that endow their workforces with different skill profiles trade more on online gig platforms.

With regard to institutional distance, the first noticeable result is a strong home country bias in both models reported in Table 2. Online gig workers from the same country are hired about two and a half times as frequently in terms of the number of gig hirings (Transactions: OR = 2.744, SE = 0.217, $P < 0.001$) and three times in terms of the volume of gig work transacted compared to workers abroad (Money flow: OR = 3.317, SE = 0.525, $P < 0.050$). This supports Hypothesis 4 that gig hirings are less likely across national boundaries than within countries.

When examining differences in institutional quality, we do not find any effect on hiring patterns in the online gig economy. Bigger differences in institutional quality did not hamper the number of gig hirings (OR = 1.003, SE = 0.161, $P = 0.987$) nor the total money flow (OR = 0.792, SE = 0.415, $P = 0.574$). We therefore reject Hypothesis 5.

When examining informal institutional differences, the results on cultural differences do not support our hypotheses: None of the indicators of cultural difference (including differences in trust, respect, control and obedience) has a statistically significant effect on gig hirings, when measured both as the number of hirings and as total money flows. Hypothesis 6 is therefore rejected.

Interestingly, we did find an effect of language. Countries with a common official language are characterized by 1.6 times as many cross-country hirings as would be expected if gig trade was random (Transactions: OR = 1.583, SE = 0.130, $P < 0.001$). When examining

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Table 2. Regression models predicting the number of hiring transactions (negative binomial) and total money flow (linear regression) between two countries (directed)

	Transactions		Money flow	
	OR	*SE*	*OR*	*SE*
Wage difference (Ln)	1.384***	(0.085)	1.639*	(0.240)
Geographical distance (Ln)	0.766***	(0.043)	0.713**	(0.122)
Vocational education difference (Ln)	0.998	(0.028)	1.017	(0.074)
Difference STEM graduates (Ln)	1.111*	(0.051)	0.965	(0.144)
Home country bias	2.744***	(0.217)	3.317*	(0.525)
Difference institutional quality (Ln)	1.003	(0.161)	0.792	(0.415)
Difference trust (Ln)	1.049	(0.030)	1.069	(0.085)
Difference respect (Ln)	1.018	(0.031)	1.032	(0.081)
Difference control (Ln)	0.940	(0.043)	0.940	(0.113)
Difference obedience (Ln)	0.970	(0.032)	0.958	(0.079)
Common language	1.583***	(0.130)	1.672	(0.315)
Mass freelancer country (Ln)	2.345***	(0.019)	2.904***	(0.037)
Mass requester country (Ln)	2.337***	(0.021)	3.231***	(0.052)
Employment protection difference (Ln)	0.941	(0.095)	0.794	(0.260)
Difference national social dialogue (Ln)	1.183*	(0.075)	1.684*	(0.216)
Intercept	0.000***	(0.519)	0.000***	(1.470)
Adjusted R^2	0.279		0.706	
Theta	5.270***			
2 × Log-likelihood	−4177.197			
AIC	4211.2			

*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.

the total money flow, the size of the effect remains the same but loses its statistical significance (Money flow: OR = 1.672, SE = 0.315, $P = 0.104$). This indicates that a common official language is especially important for smaller gig projects. These results thus show mixed support for Hypothesis 7.[7]

5. Discussion and conclusions

While most traditional labour markets are highly localized, the unrestricted international access to gig platforms implies the expectation that the online gig economy elevates geographical and institutional restrictions. To understand whether, or not, this is the case, our study asks whether the online gig economy is indeed a boundless labour market, fostering a level playing field, because limitations due to geographical distance no longer exist while transnational institutions are created beyond the reach of national governance. We answer this question by conducting gravity-model analyses of 26 European countries, examining

7 Due to the importance of language for some of the gig jobs transacted on this platform (mainly translation tasks), we re-did the analyses while removing any gig jobs that required a translating skill. Importantly, this did not significantly change the results. The results are available on request.

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whether geographical and institutional distance between gig requesters and providers affects the probability of getting hired for a gig job.

Most notably, our results show that the online gig economy does *not* constitute a labour market without boundaries, where geographical and institutional distance no longer matters. Accordingly, we find that geographical distance is a vital factor in shaping hiring patterns in online labour markets. Surprisingly, the importance of geographical proximity in the online gig economy is of a similar size to the effect known for the service sector on offline labour markets. In addition, in line with Lehdonvirta *et al.* (2014), we find that the hiring of domestic gig workers is preferred over foreign gig-worker hirings, indicating a strong 'home country bias'. This means that geographical proximity continues to shape hiring patterns even in the international labour market created by online gig platforms. Our findings also point to important follow-up research, in particular to the question what underlies the continued importance of geographical proximity and domestic hirings: This asks for an empirical analysis of the motivations, considerations and expectations of gig workers and work requesters to enter into transactions.

These findings point to, at least, four mechanisms that ought to be examined in future research. First, it could be possible that—hitherto underexplored—information asymmetries entail additional transaction costs, such as a limited understanding of the education trajectories pursued by gig workers of other countries. Second, in line with Lehdonvirta *et al.* (2019), discriminatory tendencies (of a statistical or taste-based nature) could impede geographically independent gig trade. Third, to obtain gig jobs, gig workers may need to be embedded within localized social networks that facilitate trust (Shevchuk and Strebkov, 2018; Wood *et al.*, 2019b) even in the globally accessible online gig economy. Finally, it could be that the mere possibility of meeting in person affects the matching process between gig requesters and gig providers in a digital labour market.

Our results furthermore show that, even when limiting our analyses to European countries, the online gig economy facilitates offshoring labour to lower-wage countries. In line with Beerepoot and Lambregts (2015), our results confirm that requesters use online gig platforms to acquire cheaper labour. Interestingly, though, we find that differences in worker skills between countries do not influence cross-country hirings. This result may reflect that gig work is accessible without formal educational credentials, such as high-school or university diploma, on which our skill indicator is based to determine skill difference between economies. In line with a previous study (Herrmann *et al.*, 2019), this suggests that educational credentials of gig workers may not influence their labour market success. Furthermore, because of the 'unbundling' of gig skills away from traditional occupational profiles (Gomez-Herrera *et al.*, 2017), those skills (and, hence, skill differences between economies) that are essential for being hired by a gig requester, are not easy to measure with traditional skill indicators. Accordingly, our research also contributes to the rapidly growing research strand investigating the role of skills and degrees in the online gig economy (Herrmann *et al.*, 2019; Anwar and Graham, 2021; Braesemann *et al.*, 2021).

Furthermore, we find evidence for the claim that online gig platforms reduce transaction costs by streamlining differences in regulatory structures between countries, which therefore have little influence on hiring patterns in the online gig economy. Online gig platforms thereby successfully bypass existing national institutions: They remove the transaction costs caused by incompatibilities between those national institutions that hampered cross-border

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labour markets in the past. Where previous studies show national regulation to have little influence on the online gig economy (Berg and de Stefano, 2018), our study adds that *discrepancies between* institutions also do not influence hiring patterns in the digital labour markets. The results suggest that online gig platforms create their own institutional infrastructure via the platforms' terms and conditions to which users of online gig platforms need to conform. These terms and conditions impose their own rules, for example, on conflict resolution and payment conditions (Frenken and Fuenfschilling, 2020). In this way, platforms act as 'private regulators' that create their own institutional environment (Grabher and van Tuijl, 2020) – particularly for those activities that are otherwise not strongly bound by national institutions.

Yet, we also find that online gig platforms are not able to bypass all national institutions. When examining informal institutions, we find that gig providers are more frequently hired by gig requesters from countries with a similar official language, even though English is the lingua franca of the online gig economy. This indicates that transaction costs are increased by tacit differences related to different mother tongues, which platforms cannot easily equalize. This, in turn, additionally prevents the online gig economy from being a truly global labour market.

Importantly, country-by-country attributes can influence cross-country trade according to two different logics, or perspectives, which we could not explore all at once. In our study, we give prominence to an uncertainty-avoidance (transaction-cost) perspective on 'distance' over a regime-competition (direct-cost) perspective: While the first approach assesses whether distance (or, rather, proximity) reduces uncertainty by limiting transaction costs, the second highlights direct cost savings resulting from accessing more favourable (wage, skill or institutional) gig countries. In our study, we adopted a regime-competition approach only for wage differentials (expressed in the variable's directional measurement), because work requesters clearly hire gig workers for their cheaper—rather than for their more predictable—wages. This is less straightforward for the skill- and institution-related reasons that lead gig requesters to hire online workers—both at a theoretical and a statistical level. Statistically, low-wage, low-skill and low-institutionalized countries are so highly correlated that a regime competition logic (expressed in directional variables) leads to multicollinearity problems in our dataset. And at a theoretical level, it is very likely that requesters hire gig workers not necessarily to get access to a superior skill- or institutional environment in terms of direct cost savings, but to get access to a more predictable and reliable environment in terms of indirect transaction-cost savings. We therefore adopted an uncertainty-avoidance approach towards distance (expressed in non-directional variables) for the skill- and institutional variables included in our study. While this approach has brought the continued and unexpected importance of geographical proximity to light, also highlighting the limited importance of skill and institutional differences for gig hiring patterns, future research may want to explore these arguments purely from a regime-competition perspective.

Furthermore, our study provides a conservative estimation of the effects of geographical and institutional differences on hiring patterns, because its scope is limited to European countries. Given that this focus reduces the variation in both geographical and institutional dissimilarities, it is particularly noteworthy that geographical and lingual distance turn out to matter for gig hirings even within Europe. Future research, which may want to re-assess our arguments based on a broader dataset including countries beyond Europe, is therefore

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likely to find that these drivers increase in importance at the global level. Importantly, though, a robust typology of institutional and cultural indicators of national (labour) institutions does not yet exist at the global level. Therefore, an encompassing coverage of institutional indicators needs to be developed before future research can investigate the roles of institutional distance for the entire online gig economy.

Acknowledgements

The authors gratefully acknowledge the comments on earlier drafts of this paper made by Damion Bunders, Jarno Hoekman, Nikolaos Koutsimpogiorgos and Jip Leendertse.

Funding

The development of this paper was funded by a Vidi grant from the 'Netherlands Organisation for Scientific Research' (Nederlandse Organisatie voor Wetenschappelijk Onderzoek—NWO). Grant number: 452-17-017.

References

Agrawal, A. K., Lacetera, N. and Lyons, E. (2013) *Does Information Help or Hinder Job Applicants from Less Developed Countries in Online Markets? (No. w18720)*, Cambridge, MA, National Bureau of Economic Research.

Álvarez, I. C., Barbero, J., Rodríguez-Pose, A. and Zofío, J. L. (2018) 'Does Institutional Quality Matter for Trade? Institutional Conditions in a Sectoral Trade Framework', *World Development*, **103**, 72–87.

Anderson, J. E. and Marcouiller, D. (2002) 'Insecurity and the Pattern of Trade: An Empirical Investigation', *Review of Economics and Statistics*, **84**, 342–352.

Anderson, J. E. and Van Wincoop, E. (2003) 'Gravity with Gravitas: A Solution to the Border Puzzle', *American Economic Review*, **93**, 170–192.

Anderson, J. E., Milot, C. A. and Yotov, Y. V. (2014) 'How Much Does Geography Deflect Services Trade? Canadian Answers', *International Economic Review*, **55**, 791–818.

Anwar, M. A. and Graham, M. (2021) 'Between a Rock and a Hard Place: Freedom, Flexibility, Precarity and Vulnerability in the Gig Economy in Africa', *Competition & Change*, **25**, 237–258.

Baier, S. L. and Bergstrand, J. H. (2009) 'Bonus Vetus OLS: A Simple Method for Approximating International Trade-Cost Effects Using the Gravity Equation', *Journal of International Economics*, **77**, 77–85.

Beerepoot, N. and Lambregts, B. (2015) 'Competition in Online Job Marketplaces: Towards a Global Labour Market for Outsourcing Services?', *Global Networks*, **15**, 236–255.

Bénassy-Quéré, A., Coupet, M. and Mayer, T. (2007) 'Institutional Determinants of Foreign Direct Investment', *The World Economy*, **30**, 764–782.

Berg, J. and de Stefano, V. (2018) 'Employment and Regulation for Clickworkers'. In Neufeind, M., O'Reilly, J. and Ranft, F. (eds) *Work in the Digital Age: Challenges of the Fourth Industrial Revolution*, London, Rowman Littlefield, pp. 175–184.

Berg, J., Furrer, M., Harmon, E., Rani, U. and Silberman, M. S. (2018) *Digital Labour Platforms and the Future of Work: Towards Decent Work in the Online World*, Geneva, International Labour Office.

Downloaded from https://academic.oup.com/ser/article/21/3/1795/6726420 by guest on 19 January 2024

Berg, J., Hilal, A., El, S. and Horne, R. (2021) *World Employment and Social Outlook: Trends 2021*, Geneva, International Labour Office.

Beugelsdijk, S., Groot, H. D., Linders, G. J. and Slangen, A. (2004) Cultural Distance, Institutional Distance and International Trade, 44th Congress of the European Regional Science Association, 25–29 August, Louvain-la-Neuve.

Bilgin, M. H., Gozgor, G. and Lau, C. K. M. (2017) 'Institutions and Gravity Model: The Role of Political Economy and Corporate Governance', *Eurasian Business Review*, **7**, 421–436.

Bol, T. and Van de Werfhorst, H. G. (2011) Measuring Educational Institutional Diversity: External Differentiation, Vocational Orientation and Standardization, *Amsterdam Centre for Inequality Studies Working Paper Series*, **1**.

Braesemann, F., Lehdonvirta, V. and Kässi, O. (2022) 'ICTs and the Urban-Rural Divide: Can Online Labour Platforms Bridge the Gap?', *Information, Communication & Society*, *25*(1), 34–54.

Braesemann, F., Stephany, F., Teutloff, O., Kässi, O., Graham, M. and Lehdonvirta, V. (2021) The Polarisation of Remote Work. https://doi.org/10.48550/arXiv.2108.13356

Brown, P., Ashton, D., Lauder, H. and Tholen, G. (2008) Towards a High-Skilled, Low-Waged Workforce? A Review of Global Trends in Education, Employment and the Labour Market. ESRC Centre on Skills, Knowledge and Organisational Performance (SKOPE).

Bryson, J. R. (2018) 'Divisions of Labour, Technology and the Transformation of Work: Worker to Robot or Self-Employment and the Gig Economy?'. In Paasi, A., Harrison, J. and Jones, M. (Eds.), *Handbook on the Geographies of Regions and Territories*, Cheltenham, Edward Elgar Publishing, pp. 141–152.

Buskens, V. (2002) *Social Networks and Trust*, Vol. **30.**, Boston, Kluwer Academic Publishers.

Buskens, V. and Raub, W. (2002) 'Embedded Trust: Control and Learning'. In *Lawler, E. and Thye, S. (eds.), Group Cohesion, Trust, and Solidarity*, Bingley, Emerald Group Publishing Limited, pp. 167–202.

Carrere, C. (2006) 'Revisiting the Effects of Regional Trade Agreements on Trade Flows with Proper Specification of the Gravity Model', *European Economic Review*, **50**, 223–247.

Cedefop. (2020) Developing and Matching Skills in the Online Platform Economy. Findings on New Forms of Digital Work and Learning from Cedefop's CrowdLearn Study.

Chiswick, B. R. and Miller, P. W. (2005) 'Linguistic Distance: A Quantitative Measure of the Distance between English and Other Languages', *Journal of Multilingual and Multicultural Development*, **26**, 1–11.

Coase, R. H. (1937) 'The Nature of the Firm', *Economica*, **4**, 386–405.

Cook, K. S., Hardin, R. and Levi, M. (2005) *Cooperation Without Trust?,* New York, Russell Sage Foundation.

Cyrus, T. L. (2012) 'Cultural Distance and Bilateral Trade', *Global Economy Journal*, **12**, 1850275.

De Groot, H. L., Linders, G. J., Rietveld, P. and Subramanian, U. (2004) 'The Institutional Determinants of Bilateral Trade Patterns', *Kyklos*, **57**, 103–123.

De Stefano, V. (2015) 'The Rise of the Just-In-Time Workforce: On-Demand Work, Crowdwork, and Labor Protection in the Gig-Economy', *Comparative Labor Law & Policy Journal*, **37**, 471–505.

Dilli, S., Elert, N. and Herrmann, A. M. (2018) 'Varieties of Entrepreneurship: Exploring the Institutional Foundations of Different Entrepreneurship Types through 'Varieties-of-Capitalism' Arguments', *Small Business Economics*, **51**, 293–320.

Evans, D. S. and Schmalensee, R. (2016) *Matchmakers: The New Economics of multisided platforms*, Boston, MA, Harvard Business Review Press.

Downloaded from https://academic.oup.com/ser/article/21/3/1795/6726420 by guest on 19 January 2024

Felbermayr, G. J. and Toubal, F. (2010) 'Cultural Proximity and Trade', *European Economic Review*, **54**, 279–293.

Freeman, R. B. (2008) 'The New Global Labor Market', *Focus*, **26**, 1–6.

Frenken, K. and Fuenfschilling, L. (2020) 'The Rise of Online Platforms and the Triumph of the Corporation', *Sociologica*, **14**, 101–113.

Furubotn, E. G. and Richter, R. (2010) *Institutions and Economic Theory: The Contribution of the New Institutional Economics*. Ann Arbor, University of Michigan Press.

Galperin, H. and Greppi, C. (2017) Geographical Discrimination in the Gig Economy. *Available at SSRN 2922874*.

Gomez-Herrera, E., Martens, B. and Mueller-Langer, F. (2017) Trade, Competition and Welfare in Global Online Labour Markets: A 'Gig Economy' Case Study. *Available at SSRN 3090929*.

Gopinath, M. and Echeverria, R. (2004) 'Does Economic Development Impact the Foreign Direct Investment-Trade Relationship? A Gravity-Model Approach', *American Journal of Agricultural Economics*, **86**, 782–787.

Grabher, G. and van Tuijl, E. (2020) 'Uber-Production: From Global Networks to Digital Platforms', *Environment and Planning A: Economy and Space*, **52**, 1005–1016.

Graham, M. and Anwar, M. (2019) 'The Global Gig Economy: Towards a Planetary Labour Market?', *First Monday*, *24*(4). Available Online at: https://firstmonday.org/ojs/index.php/fm/article/view/9913/ 7748

Graham, M., Hjorth, I. and Lehdonvirta, V. (2017) 'Digital Labour and Development: Impacts of Global Digital Labour Platforms and the Gig Economy on Worker Livelihoods', *Transfer*, **23**, 135–162.

Gracia, M., & Nedjam, M. (2018) *Institutions et développement: que dit l'enquête Profils institutionnels? (IPD, 2016)*. Trésor-Eco. Available at: http://www.cepii.fr/institutions/EN/ipd.asp.

Granovetter, M. S. (1973) 'The Strength of Weak Ties', *American Journal of Sociology*, **78**, 1360–1380.

Hall, P. A. and Soskice, D. W. (2001) 'An Introduction to Varieties of Capitalism'. In Hall, P. A. and Soskice, D. W. (eds) *Varieties of Capitalism – The Institutional Foundations of Comparative Advantage*, Oxford, Oxford University Press, pp. 1–68.

Hall, P. A. and Taylor, R. C. (1996) 'Political Science and the Three New Institutionalisms', *Political Studies*, **44**, 936–957.

Head, K. and Mayer, T. (2010) Illusory border effects : Distance mismeasurement inflates estimates of home bias in trade. In van Bergeijk, P. A. G., and Brakman, S. (eds.), *The gravity model in international trade*, Cambridge, Cambridge University Press. https://doi.org/10.1017/CBO9780511762109.

Herrmann, A. M. (2008) 'Rethinking the Link between Labour Market Flexibility and Corporate Competitiveness: A Critique of the Institutionalist Literature', *Socio-Economic Review*, **6**, 637–669.

Herrmann, A. M., Zaal, P., Chappin, M. M. H. and Schemmann, B. (2019) 'Does Education Still Matter in Online Labor Markets?'. In Wruk, D., Oberg, A. and Maurer, I. (eds) *Perspectives on the Sharing Economy*, Newcastle upon Tyn, Cambridge Scholars Publishing, pp. 64–71.

Hoekman, J., Frenken, K. and Tijssen, R. J. (2010) 'Research Collaboration at a Distance: Changing Spatial Patterns of Scientific Collaboration within Europe', *Research Policy*, **39**, 662–673.

Hope, D. and Martelli, A. (2019) 'The Transition to the Knowledge Economy, Labor Market Institutions, and Income Inequality in Advanced Democracies', *World Politics*, **71**, 236–288.

Hutchinson, W. K. (2005) '"Linguistic Distance" as a Determinant of Bilateral Trade', *Southern Economic Journal*, *72*(1), 1–15.

Downloaded from https://academic.oup.com/ser/article/21/3/1795/6726420 by guest on 19 January 2024

Hymer, S. H. (1976) *The International Operations of National Firms: A Study of Foreign Direct Investment*, Cambridge, MA, MIT Press.

Iversen, T. and Soskice, D. (2019) *Democracy and prosperity: Reinventing capitalism through a Turbulent Century*, Princeton, NJ, Princeton University Press.

Jošić, H. and Jošić, M. (2016) 'Alternative Measures of Internal Distance in Estimating Home Bias in Trade: The Case of Croatia', *Economic research-Ekonomska Istraživanja*, **29**, 380–394.

Karemera, D., Oguledo, V. I. and Davis, B. (2000) 'A Gravity Model Analysis of International Migration to North America', *Applied Economics*, **32**, 1745–1755.

Kässi, O. and Lehdonvirta, V. (2019) Do Digital Skill Certificates Help New Workers Enter the Market? Evidence from an Online Labour Platform (No. 7810), CESifo Working Paper.

Kimura, F. and Lee, H. H. (2006) 'The Gravity Equation in International Trade in Services', *Review of World Economics*, **142**, 92–121.

Koelble, T. A. (1995) 'The New Institutionalism in Political Science and Sociology', *Comparative Politics*, **27**, 231–243.

Koutsimpogiorgos, N., Van Slageren, J., Herrmann, A. M. and Frenken, K. (2020) 'Conceptualizing the Gig Economy and Its Regulatory Problems', *Policy & Internet*, **12**, 525–545.

Kaufmann, D., Kraay, A., and Mastruzzi, M. (2011) *The Worldwide Governance Indicators: Methodology and Analytical Issues*, *Hague Journal on the Rule of Law*, *3*(2), 220–246.

Kristjánsdóttir, H., Guðlaugsson, Þ. Ö., Guðmundsdóttir, S. and Aðalsteinsson, G. D. (2017) 'Hofstede National Culture and International Trade', *Applied Economics*, **49**, 5792–5801.

Kuznetsov, A. and Kuznetsova, O. (2014) 'Building Professional Discourse in Emerging Markets: Language, Context and the Challenge of Sensemaking', *Journal of International Business Studies*, **45**, 583–599.

Lehdonvirta, V. (2017, July 11) 'Where Are Online Workers Located? The International Division of Digital Work', *The iLabour Project*, accessed 17 June 2021 at https://ilabour.oii.ox.ac.uk/where-are-online-workers-located-the-international-division-of-digital-gig-work/

Lehdonvirta, V., Barnard, H., Graham, M. and Hjorth, I. (2014) *Online Labour Markets-Levelling the Playing Field for International Service Markets?*, Paper presented at Internet, Politics & Policy 2016, Oxford, UK, September 25–26.

Lehdonvirta, V., Kässi, O., Hjorth, I., Barnard, H. and Graham, M. (2019) 'The Global Platform Economy: A New Offshoring Institution Enabling Emerging-Economy Microproviders', *Journal of Management*, **45**, 567–599.

Lengyel, B., Varga, A., Ságvári, B., Jakobi, Á. and Kertész, J. (2015) 'Geographies of an Online Social Network', *PLoS One*, **10**, e0137248.

Linders, G. J., Slangen, A. H. L., de Groot, H. L. F., Beugelsdijk, S. (2005) *Cultural and Institutional Determinants of Bilateral Trade Flows* (Tinbergen Institute Discussion Paper No. 05-074/3). http://dx.doi.org/10.2139/ssrn.775504

Lunnan, R., Tomassen, S., Andersson, U. and Benito, G. R. (2019) 'Dealing with Headquarters in the Multinational Corporation: A Subsidiary Perspective on Organizing Costs', *Journal of Organization Design*, **8**, 12.

Lustig, C., Rintel, S., Scult, L. and Suri, S. (2020) 'Stuck in the Middle with You: The Transaction Costs of Corporate Employees Hiring Freelancers', *Proceedings of the ACM on Human-Computer Interaction*, **4**, 1–28.

Mahoney, J. and Thelen, K. (eds) (2009) *Explaining Institutional Change: Ambiguity, Agency, and Power*, Newcastle upon Tyne, Cambridge University Press.

McCann, P. (2008) 'Globalization and Economic Geography: The World Is Curved, Not Flat', *Cambridge Journal of Regions, Economy and Society*, **1**, 351–370.

Downloaded from https://academic.oup.com/ser/article/21/3/1795/6726420 by guest on 19 January 2024

Melitz, J. and Toubal, F. (2014) 'Native Language, Spoken Language, Translation and trade', *Journal of International Economics*, **93**, 351–363.

Mollenhorst, G., Völker, B. and Flap, H. (2011) 'Shared Contexts and Triadic Closure in Core Discussion Networks', *Social Networks*, **33**, 292–302.

Montenegro, C. E. and Soto, R. (1996) 'How Distorted Is Cuba's Trade? Evidence and Predictions from a Gravity Model', *The Journal of International Trade & Economic Development*, **5**, 45–68.

Montobbio, F. and Sterzi, V. (2013) 'The Globalization of Technology in Emerging Markets: A Gravity Model on the Determinants of International Patent Collaborations', *World Development*, **44**, 281–299.

Mosley, L. and Uno, S. (2007) 'Racing to the Bottom or Climbing to the Top? Economic Globalization and Collective Labor Rights', *Comparative Political Studies*, **40**, 923–948.

Nickell, S. and Layard, R. (1999) 'Labor Market Institutions and Economic Performance', *Handbook of Labor Economics*, **3**, 3029–3084.

North, D. C. (1990) *Institutions, Institutional Change and Economic Performance*, Cambridge, Cambridge University Press.

OECD (2018) *Education at a Glance 2018*, Paris, Organization for Economic Cooperation and Development.

Olayele, B. F. (2019) 'Gravity, Borders, and Regionalism: A Canada–US Sub-National Analysis', *The International Trade Journal*, **33**, 416–443.

Porojan, A. (2001) 'Trade Flows and Spatial Effects: The Gravity Model Revisited', *Open Economies Review*, **12**, 265–280.

Przepiorka, W. (2013) 'Buyers Pay for and Sellers Invest in a Good Reputation: More Evidence from eBay', *The Journal of Socio-Economics*, **42**, 31–42.

Punt, M. B., van Kollem, J., Hoekman, J. and Frenken, K. (2021) 'Your Uber Is Arriving Now: An Analysis of Platform Location Decisions through an Institutional Lens', *Strategic Organization*, 1–36.

Rochet, J. C. and Tirole, J. (2003) 'Platform Competition in two-sided markets', *Journal of the European Economic Association*, **1**, 990–1029.

Schneider, M. R. and Paunescu, M. (2012) 'Changing Varieties of Capitalism and Revealed Comparative Advantages from 1990 to 2005: A Test of the Hall and Soskice Claims', *Socio-Economic Review*, **10**, 731–753.

Serlenga, L. and Shin, Y. (2007) 'Gravity Models of Intra-EU Trade: Application of the CCEP-HT Estimation in Heterogeneous Panels with Unobserved Common Time-Specific Factors', *Journal of Applied Econometrics*, **22**, 361–381.

Shevchuk, A. and Strebkov, D. (2018) 'Safeguards against Opportunism in Freelance Contracting on the Internet', *British Journal of Industrial Relations*, **56**, 342–369.

Stanton, C. and Thomas, C. (2019) *Missing Trade in Tasks: Employer Outsourcing in the Gig Economy, CEP Discussion Papers (1606)*, London, Centre for Economic Performance, LSE.

Streeck, W. and Thelen, K. A. (eds) (2005) *Beyond Continuity: Institutional Change in Advanced Political Economies*, Oxford, Oxford University Press.

Sundararajan, A. (2016) *The Sharing Economy: The End of Employment and the Rise of Crowd-Based Capitalism*, Cambridge, MA, MIT Press.

Tabellini, G. (2010) 'Culture and Institutions: Economic Development in the Regions of Europe', *Journal of the European Economic Association*, **8**, 677–716.

Tadesse, B. and White, R. (2010) 'Cultural Distance as a Determinant of Bilateral Trade Flows: Do Immigrants Counter the Effect of Cultural Differences?', *Applied Economics Letters*, **17**, 147–152.

Takhteyev, Y., Gruzd, A. and Wellman, B. (2012) 'Geography of Twitter Networks', *Social Networks*, **34**, 73–81.

Downloaded from https://academic.oup.com/ser/article/21/3/1795/6726420 by guest on 19 January 2024

Thelen, K. (2009) 'Institutional Change in Advanced Political Economies', *British Journal of Industrial Relations*, **47**, 471–498.
Tinbergen, J. (1962) *Shaping the World Economy*, New York, The Twentieth Century Fund.
Vallas, S. and Schor, J. B. (2020) 'What Do Platforms Do? Understanding the Gig Economy', *Annual Review of Sociology*, **46**, 273–294.
Walsh, K. (2006) 'Trade in Services: Does Gravity Hold? A Gravity Model Approach to Estimating Barriers to Services Trade', *IIIS Discussion Paper Series No. 183*.
Wei, S. J. (1996) *Intra-National versus International Trade: How Stubborn Are Nations in Global Integration? (No. w5531)*, Cambridge, MA, National Bureau of Economic Research.
Wei, S. J. (2000) 'How Taxing is corruption on international investors?', *Review of Economics and Statistics*, **82**, 1–11.
Wellman, B. (1996) 'Are Personal Communities Local? A Dumptarian Reconsideration', *Social Networks*, **18**, 347–354.
White, R. and Tadesse, B. (2008) 'Cultural Distance and the US Immigrant–Trade Link', *World Economy*, **31**, 1078–1096.
Williamson, O. E. (1981) 'The Economics of Organization: The Transaction Cost Approach', *American Journal of Sociology*, **87**, 548–577.
Williamson, O. E. (1985) *The Economic Institutions of Capitalism*, New York, Macmillan.
Witt, M. A. and Jackson, G. (2016) 'Varieties of Capitalism and Institutional Comparative Advantage: A Test and Reinterpretation', *Journal of International Business Studies*, **47**, 778–806.
Wolf, H. (2000) 'Intranational Home Bias in Trade', *Review of Economics and Statistics*, **82**, 555–563.
Wood, A. J., Graham, M., Lehdonvirta, V. and Hjorth, I. (2019a) 'Good Gig, Bad Gig: Autonomy and Algorithmic Control in the Global Gig Economy', *Work, Employment & Society: A Journal of the British Sociological Association*, **33**, 56–75.
Wood, A. J., Graham, M., Lehdonvirta, V. and Hjorth, I. (2019b) 'Networked but Commodified: The (Dis) Embeddedness of Digital Labour in the Gig Economy', *Sociology*, **53**, 931–950.
Zaheer, S. (1995) 'Overcoming the Liability of Foreignness', *Academy of Management Journal*, **38**, 341–363.

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Appendix

Table A1. VIF scores

	VIF
Wage difference (Ln)	1.423
Geographical distance (Ln)	1.750
Vocational education difference (Ln)	1.335
Difference STEM graduates (Ln)	1.178
Home country bias	2.885
Difference institutional quality (Ln)	1.705
Difference trust (Ln)	1.730
Difference respect (Ln)	1.752
Difference control (Ln)	1.350
Difference obedience (Ln)	1.367
Common language	1.969
Total money inflow (Ln)	1.221
Total money outflow (Ln)	1.122
Employment protection difference (Ln)	1.515
Difference national social dialogue (Ln)	1.598

Table A2. Regression models predicting the number of hiring transactions (negative binomial) and total money flow (linear regression) between two countries (directed) with geographical distance of biggest agglomerations

	Transactions		Money flow	
	OR	*SE*	*OR*	*SE*
Wage difference (Ln)	1.386***	(0.085)	1.640*	(0.230)
Geographical distance agglomerations (Ln)	0.763***	(0.043)	0.724**	(0.123)
Vocational education difference (Ln)	1.000	(0.028)	1.017	(0.074)
Difference STEM graduates (Ln)	1.136**	(0.048)	0.983	(0.142)
Home country bias	2.827***	(0.219)	3.510*	(0.542)
Difference institutional quality (Ln)	1.018	(0.162)	0.797	(0.444)
Difference trust (Ln)	1.047	(0.029)	1.069	(0.086)
Difference respect (Ln)	1.025	(0.031)	1.035	(0.082)
Difference control (Ln)	0.940	(0.043)	0.941	(0.115)
Difference obedience (Ln)	0.968	(0.031)	0.954	(0.077)
Common language	1.550**	(0.139)	1.635	(0.323)
Mass freelancer country (Ln)	2.339***	(0.019)	2.901***	(0.037)
Mass requester country (Ln)	2.334***	(0.021)	3.230***	(0.053)
Employment protection difference (Ln)	0.945	(0.095)	0.799	(0.247)
Difference national social dialogue (Ln)	1.185*	(0.074)	1.684*	(0.155)
Intercept	0.000***	(0.509)	0.000***	(1.383)
Adjusted R^2	0.279		0.707	
Theta	5.269***			
2 × Log-likelihood	−4176.333			
AIC	4210.3			

*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.

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Table A3. Regression models predicting the number of hiring transactions (negative binomial) and total money flow (linear regression) between two countries (directed) with contiguity

	Transactions		Money flow	
	OR	*SE*	*OR*	*SE*
Wage difference (Ln)	1.395***	(0.085)	1.638*	(0.238)
Geographical contiguity	1.415***	(0.088)	2.098***	(0.220)
Vocational education difference (Ln)	0.997	(0.030)	1.010	(0.075)
Difference STEM graduates (Ln)	1.117*	(0.049)	0.992	(0.144)
Home country bias	4.912***	(0.223)	8.899***	(0.579)
Difference institutional quality (Ln)	0.953	(0.162)	0.791	(0.409)
Difference trust (Ln)	1.053	(0.030)	1.080	(0.086)
Difference respect (Ln)	0.987	(0.032)	0.999	(0.082)
Difference control (Ln)	0.947	(0.046)	0.959	(0.112)
Difference obedience (Ln)	0.968	(0.029)	0.955	(0.078)
Common language	1.471**	(0.127)	1.380	(0.350)
Mass freelancer country (Ln)	2.295***	(0.020)	2.891***	(0.036)
Mass requester country (Ln)	2.320***	(0.022)	3.213***	(0.052)
Employment protection difference (Ln)	0.963	(0.098)	0.801	(0.262)
Difference national social dialogue (Ln)	1.184*	(0.077)	1.664*	(0.218)
Intercept	0.000***	(0.433)	0.000***	(1.185)
Adjusted R^2	0.275		0.707	
Theta	5.010***			
2 × Log-likelihood	−4205.266			
AIC	4239.3			

*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.

Table A4. Regression models predicting the number of hiring transactions (negative binomial) and total money flow (linear regression) between two countries (directed) with common minority language

	Transactions		Money flow	
	OR	*SE*	*OR*	*SE*
Wage difference (Ln)	1.394***	(0.085)	1.654*	(0.241)
Geographical distance (Ln)	0.762***	(0.043)	0.703**	(0.120)
Vocational education difference (Ln)	1.000	(0.028)	1.014	(0.073)
Difference STEM graduates (Ln)	1.111*	(0.051)	0.970	(0.144)
Home country bias	2.527***	(0.220)	2.662*	(0.474)
Difference institutional quality (Ln)	0.991	(0.163)	0.785	(0.415)
Difference trust (Ln)	1.047	(0.029)	1.067	(0.085)
Difference respect (Ln)	1.019	(0.031)	1.030	(0.080)
Difference control (Ln)	0.935	(0.043)	0.931	(0.114)
Difference obedience (Ln)	0.973	(0.031)	0.962	(0.079)
Common language minority	1.691***	(0.134)	1.958**	(0.227)
Mass freelancer country (Ln)	2.333***	(0.019)	2.886***	(0.037)
Mass requester country (Ln)	2.325***	(0.021)	3.211***	(0.052)

continued

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Table A4. *Continued*

	Transactions		Money flow	
	OR	*SE*	*OR*	*SE*
Employment protection difference (Ln)	0.939	(0.096)	0.793	(0.260)
Difference national social dialogue (Ln)	1.186*	(0.075)	1.691*	(0.216)
Intercept	0.000***	(0.515)	0.000***	(1.458)
Adjusted R^2	0.280		0.708	
Theta	5.281***			
2 × Log-likelihood	−4174.949			
AIC	4208.9			

$^{*}P < 0.05$; $^{**}P < 0.01$; $^{***}P < 0.001$.

Table A5. Regression models predicting the number of hiring transactions (negative binomial) and total money flow (linear regression) between two countries (directed) with amount of workers and requesters as controls

	Transactions		Money flow	
	OR	*SE*	*OR*	*SE*
Wage difference (Ln)	1.283**	(0.095)	1.579	(0.257)
Geographical distance (Ln)	0.761***	(0.050)	0.655***	(0.128)
Vocational education difference (Ln)	1.024	(0.031)	1.031	(0.077)
Difference STEM graduates (Ln)	1.143*	(0.062)	1.477**	(0.147)
Home country bias	2.360**	(0.268)	2.179	(0.551)
Difference institutional quality (Ln)	1.150	(0.160)	0.595*	(0.411)
Difference trust (Ln)	0.987	(0.032)	1.051	(0.088)
Difference respect (Ln)	1.066	(0.038)	1.104	(0.085)
Difference control (Ln)	0.855***	(0.045)	0.806	(0.114)
Difference obedience (Ln)	0.978	(0.036)	1.054	(0.081)
Common language	1.722**	(0.176)	2.021*	(0.339)
Mass freelancer country (Ln)	2.673***	(0.024)	4.218***	(0.051)
Mass requester country (Ln)	2.318***	(0.026)	3.434***	(0.061)
Employment protection difference (Ln)	1.189	(0.111)	1.077	(0.269)
Difference national social dialogue (Ln)	1.116	(0.083)	1.924**	(0.226)
Intercept	0.000***	(0.583)	0.000***	(1.437)
Adjusted R^2	0.264		0.695	
Theta	4.182***			
2 × Log-likelihood	−4268.744			
AIC	4302.7			

$^{*}P < 0.05$; $^{**}P < 0.01$; $^{***}P < 0.001$.

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