Papers in Evolutionary Economic Geography

19.32

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Abstract

Recent studies suggest that greater immigrant diversity in regions and workplaces increases productivity, and inclusive regional conditions are found to be important for this mechanism. Seeking to better understand this relationship, this paper broadens the dimensions and refines the measures of regional context pertaining to immigrant diversity outcomes. Regional measures of trust in foreigners and trust in government are tested under the hypothesis that regions with higher trust will have larger associations between rising immigrant diversity and increasing local wages. Additionally, we hypothesize that the benefits from immigrant diversity will be higher in regions with a strong social bridging culture, while the opposite will be the case in regions with a high level of social bonding. Looking across these novel and more nuanced dimensions of regional context, we find that they each matter in shaping the effects of diversity. Specifically, we find that spillovers from regional diversity are higher in regions with low levels of social bonding and in regions with high levels of trust, confirming the hypotheses. Evidence on regional variation in bridging social capital does not confirm the hypothesis. Using high quality longitudinal matched employer-employee data from Norway from 2001-2011, this paper provides a new case in the empirical diversity-productivity literature and novel evidence on the regional dimensions that shape this relationship.

Keywords: Diversity, immigration, productivity, regions, institutions, social capital, trust, bridging, bonding

JEL codes: O4; F22; J61; F2

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1 Introduction

Researchers in a wide range of disciplines contend that people with different demographic characteristics carry with them different perspectives and that the combination of these perspectives can impact economic outcomes. Economic advantages can arise because interaction within a diverse population allows a wider range of approaches, finding innovative solutions to problems that can increase economic performance. Drawbacks could be caused by the difficulties and costs that individuals from different backgrounds experience when interacting, hampering the establishment of trust and common ground. Given these contradictory forces, the net effect of diversity on productivity likely hinges on transaction costs.

Many empirical studies find a positive correlation between immigrant diversity and productivity (e.g., Ottaviano and Peri, 2006; Trax et al., 2015; Kemeny and Cooke, 2018), suggesting that the advantages of immigrant diversity generally outweigh the costs. However, the regional conditions shaping this outcome are less well understood. If transaction costs are fundamental to the nature of this relationship, attending to regional variation in institutions, which regulate transaction costs, should be a key component in the relevant regional conditions. North (1990) argues that incentives and constraints set by a common trust, culture, religion, and social norms – that is, informal institutions – impact individual actions in an economy. Acemoglu and Robinson (2012) argues that regions with *inclusive* institutions have lower interaction costs between different groups of individuals. Specific to topic at hand, Kemeny (2012) has argued that informal regional institutions that encourage interactions across difference should enhance any beneficial economic effects of immigrant diversity. Empirical evidence from metropolitan areas across the United States supports this proposition (Kemeny, 2012; Kemeny and Cooke, 2017).

While the US is an important empirical case, in many ways it is also an extreme one. In this paper, we first ask whether there is evidence of regional institutional differences in shaping the diversity-productivity relationship in a very different national context than the extant literature has explored: that of Norway. Norway is known for its strong institutional setting (Westlund, 2006; Mehlum and Torvik, 2006) and has a strong national identity. However, its geography and history have also shaped local identities and distinct regional characters (Fitjar and Rodríguez-Pose, 2011). Regions across the country are relatively isolated from one another by large distances and rugged terrain, which has contributed to building strong local communities or regions. Thus the first contribution of this paper is to expand the body of empirical evidence on whether regional context shapes diversity spillovers.

Additionally, there are challenges inherent in operationalizing the hard-to-measure concept of informal institutions. Though Kemeny and Cooke (2017) address some of

this difficulty by triangulating across two distinct markers of how welcoming regions are to immigrants, there is important conceptual nuance in regional informal institutions that may impact the productivity spillovers related to immigrant diversity. In this paper, we distinguish between bridging and bonding social capital (Knack and Keefer, 1997), hypothesizing that strong bridging social capital should enhance positive spillovers (as in Kemeny, 2012; Kemeny and Cooke, 2017), but strong bonding social capital, with its support of intra-group ties (Granovetter, 1973; Woolcock et al., 2001) may dampen the ability of a region to adopt new perspectives from diversity. We also explore the role of trust, which is argued to reduce interaction costs (Fukuyama, 1995) and may encourage involvement in the social community that enables the achievement of collective actions through cooperation, solidarity, and public-spiritedness (Putnam, 2000a). Specifically, we explore two distinct measures which should particularly shape interactions with immigrants: trust in public government and trust in foreign-born individuals, both of which we expect to facilitate interaction and enhance the benefits of diversity for economic performance. Thus, the second contribution of this paper is to expand our understanding and refine the measures of regional context pertaining to immigrant diversity outcomes in a novel way.

In this paper, in keeping with recent contributions (Kemeny and Cooke, 2017; Trax et al., 2015), we use an empirical approach that accounts for a wide range of potential confounding factors to identify the context-specific relationship between diversity and productivity. Using longitudinal microdata, we estimate how workers' annual salaries change as the diversity of immigrants in their region and their workplace change. We limit our analysis to salary changes within job spells, capturing continued employment in a single workplace and region for a minimum of two years. This allows for the use of fixed effects to absorb bias from multiple sources of stationary heterogeneity, helping address concerns about sorting and other selectivity issues (Combes et al., 2008; Kemeny, 2012; Lewis and Peri, 2014). Variation in social capital and trust allows us to consider how the relationship between diversity and wages varies across different regional contexts.

The primary data source used in this study is the Norwegian Linked Employer-Employee Data (LEED). These data provide comprehensive information describing workers matched to their work establishments, available between 2001 and 2011. LEED includes information on workers' place of birth and captures our measure of their productivity: total annual earnings. Aggregating these data, we construct measures of regional and workplace immigrant diversity and observe wage changes over time within job spells. Closely following the existing literature on crafting indicators of social capital, we draw on multiple questions in the Norwegian Monitor Survey data (over the period 1990 to 2011) to construct the region-specific institu-

tional measures: bonding and bridging social capital, as well as the two types of trust.

Our empirical results show that informal institutions, proxied by regional social bonding, bridging and trust, matter for the beneficial effects of diversity in the context of Norway. Our results are mostly consistent with theory and largely in line with our hypotheses. In particular, we find that the benefits of regional diversity are higher in regions with lower levels of social bonding. High levels of trust in foreign individuals are associated with enhanced benefits of diversity, as expected. Similarly, regions with higher levels of trust in local government appear to have a significant positive association with diversity spillovers. Only our estimates examining bridging social capital do not confirm the hypotheses. Together these measures expand and refine our understanding of the dimensions of regional context that matter in shaping the diversity-productivity relationship.

The paper is structured into five further sections. This introduction is followed by an engagement of the relevant literature on the local economics of immigrant diversity and regional informal institutions. In section 3, we present contextual information on Norwegian immigration and regional variation in social capital and trust. Section 4 describes the empirical approach and data used in this paper. Section 5 presents the results. The conclusions and some indications for future research are presented in section 6.

2 Diversity, Productivity, and Regional Context

Across economic geography, regional studies, and urban economics, there is a growing literature interested in the localized spillovers from immigrant diversity (e.g., Kemeny, 2014), a distinctive conversation within a much larger literature on the economic impacts of immigrants. This area of research largely focuses on the idea that interactions among people with diverse perspectives and heuristics can help identify more possible solutions to any complex problem (Hong and Page, 2001) and generate more new and innovative ideas (Aiken and Hage, 1971). Superior problem solving and novel approaches should contribute positively to productivity. With heuristics and perspectives shaped partly by demographic characteristics (Nisbett et al., 1980; Clearwater et al., 1991; Thomas and Ely, 1996; Page, 2008), birthplace diversity, generated by increasing and multiplying immigration flows, should theoretically have at least latent positive spillovers for local economies. Empirical studies with a range of approaches and in varied contexts, while not universally in agreement (Bakens et al., 2013; Longhi, 2013; Elias and Paradies, 2016), provide ample observations of a positive and statistically significant relationship between immigrant diversity and productivity (Ottaviano and Peri, 2006; Nathan, 2011,0;

Suedekum et al., 2014; Kemeny, 2012; Bellini et al., 2013; Lee, 2014; Trax et al., 2015; Nijkamp et al., 2015; Alesina et al., 2016; Kemeny and Cooke, 2018; Cooke and Kemeny, 2017; Delgado Gómez-Flors and Alguacil, 2018; Roupakias and Dimou, 2018).

Human interaction, however, is not costless. All else equal, interacting with people who are different from you is likely more costly than interacting with those with whom you are similar or share a similar social context. This idea – that fractionalization might actually be costly – finds support by development economists at the national scale (Alesina and Drazen, 1991; Easterly and Levine, 1997; Rodrik, 1999; Alesina and La Ferrara, 2005; Montalvo and Reynal-Querol, 2005), as well as subnational scales (Poterba, 1997; Alesina et al., 1999; Goldin and Katz, 1999; Pennant, 2005). Just as there is variation in the costliness of interactions, there is also variation in the contexts in which that interaction occurs. This suggests that the institutional context – formal or informal – should shape the transaction costs among people. Where interactions among different people are less costly, the benefits of diversity should be more apparent.

Institutions are an important factor in determining learning capacity (Morgan, 2007) and play an important role in shaping economic performance (North, 1990, 2012; Acemoglu and Robinson, 2012; Rodríguez-Pose, 2013) and innovation (Crescenzi et al., 2013; Nathan and Lee, 2013). Institutions are widely thought of as a system of formal and informal rules and norms facilitating interaction among actors, within the national or regional scale, and in doing so, they regulate the cost of interactions in an economy (North, 1990). Acemoglu and Robinson (2012) argue for the importance of inclusive institutions in particular, defining these as ones that structure and draw people into creative and entrepreneurial opportunities. If these economic activities are the ones that stand to benefit the most from immigrant diversity (Cooke and Kemeny, 2017), then institutions that provide opportunities for interactions across difference should amplify diversity spillovers.

Though there can be regional variation in formal institutions, often captured by laws or regulation, many of these are set at the national level; thus, informal institutions are of particular importance at the regional scale. Informal institutions, also known as 'soft' or 'community' institutions, can include norms, interpersonal contacts and relationships, and networks, all of which can show substantial local and regional variation (Rodríguez-Pose and Storper, 2006). Both theory and evidence support the importance of informal institutions in shaping regional economies (Rodríguez-Pose, 1999; Rodríguez-Pose and Di Cataldo, 2014; Morgan, 2007; Feldman and Storper, 2018).

While clearly important to regional economies, these informal institutions can be challenging to pin down, with considerable debate over definitions and opera-

tionalization (Rodríguez-Pose and Storper, 2006). We find the literature on social capital and trust to be of particular use for our purposes. Putnam (2000b) defines social capital as those features of social organizations, such as trust, norms, and networks that can improve the efficiency of society by facilitating coordinated action (p.167), and enable people to act collectively (Woolcock et al., 2001, p.226). Trust among actors reduces information and cost of interactions (Fukuyama, 1995) and may encourage involvement in the local community enabling collective action through cooperation, solidarity, and public-spiritedness (Putnam, 2000b). These features are associated with what is often called a high level of social capital and make it easier to mobilize local resources. But social capital itself can have multiple dimensions, not all conducive to the smoothing of interactions as imagined above (Coleman, 1988). Homogeneous and tightly knitted communities or networks may have strong social capital within their communities, but can be less exposed to new information and less prone to create new ideas and perspectives (North, 1990). To distinguish these aspects of social capital, and their different potential economic implications, the literature has proposed a distinction between bonding and bridging dimensions of social capital (Knack and Keefer, 1997). On the one side, bridging social capital creates trust and interaction between individuals from different backgrounds, highlighting what is often referred to as 'cross-cutting ties'. On the other side, bonding social capital, focusing on 'intra-group ties', can be defined as strong links and connections between individuals or groups with the same background (Granovetter, 1973).

Following Malecki (2012), we expect social capital to vary at the regional scale in ways that affect trajectories of economic development. Social bridging or a more open culture may help individuals learn from those nearby, taking advantage of the "buzz" possible in regions around the exchange of ideas with others, facilitating the development of new knowledge and creative innovation (Storper and Venables, 2004; Asheim et al., 2007). Florida et al. (2010) goes as far as to argue that tolerant and open cities can attract creative workers that likely bring new knowledge that can create economic advantages. Specific to the implications for immigrant diversity, high bridging social capital in a region should reduce the costs of interacting across differences, facilitating more interactions, which is key to the main theorized mechanism underlying the productivity spillovers of diversity. Following this, we propose that trust and bridging social capital are crucial for the spillover effects of immigrant diversity in a region because they function as a bridge between individuals with different perspectives. By making the local region more interconnected and coordinated, a higher level of trust and the presence of bridging-type social capital are expected to enable the combination of different values, knowledge, and capabilities that underlie the productivity spillovers from diversity. The opposite

applies in the case of bonding social capital. We argue that bonding social capital should be detrimental to the ability of regions to adopt new perspectives from newcomers. Inward-looking groups strongly embedded in a region should reduce the opportunities for interaction across difference and dampen the reception of different perspectives. This should hamper diversity spillovers. Turning to regional variations in trust, we argue that high levels of trust in foreign-born individuals should facilitate more interaction with immigrants. Additionally, we conjecture that high levels of trust in public goverment should reduce transactions costs across all individuals as well. Motivated by these arguments, this article tests the following four hypotheses:

1. Spillovers from immigrant diversity on worker productivity should be higher in regions with higher levels of trust in foreign individuals.

2. Spillovers from immigrant diversity on worker productivity should be higher in regions with higher level of trust in their government.

3. Spillovers from immigrant diversity on worker productivity should be lower in regions that feature higher levels of social bonding.

4. Spillovers from immigrant diversity on worker productivity should be higher in regions that feature higher levels of social bridging.

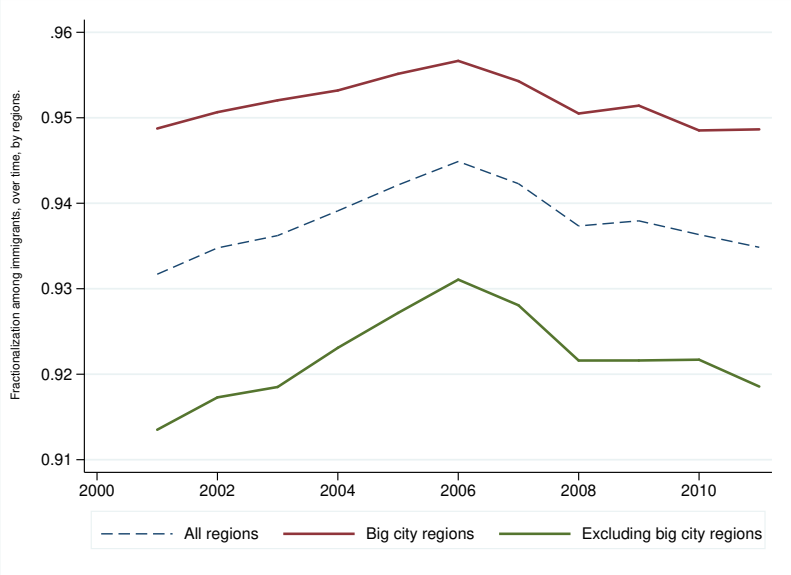
There are only a few studies we are aware of that address related topics at a subnational scale. The closest studies to the current one are two studies in the United State context (Kemeny, 2012; Kemeny and Cooke, 2017). The latter of these studies demonstrates that inclusive institutions matter for the benefits of immigrant diversity and that it matters more for native-born workers than others. We contribute to this research by: offering an empirical example from a context quite different from the United States; and by providing novel information on how different aspects of informal institutions may shape the diversity-productivity relationship. Specifically, we do so by examining regional differences in bonding versus bridging social capital, and two different aspects of trust. The measures of trust, and particularly the explict measure of reported trust in foreigners, provide a clear and direct measure of regional context pertaining to immigrant diversity outcomes that has not been done in earlier research.

3 Norway - a likely case?

3.1 Diversity and productivity

Norway, like other western countries, has had a growing immigrant population over the past decades. In 2018, 14 percent of the total population are immigrants or the Norwegian-born children of immigrants. While in other countries, big city regions are often the major sites of increased diversity, this is not the case in Norway. In the observed time period, diversity increased in all regions, as shown in Figure 1. The peripheral regions[1] contribute substantially to this increase at the beginning of the time period, while at the end of the time period, the changes in fractionalization among immigrants are more similar between the cities and other regions.

Figure 1: Birthplace fractionalization among immigrants in Norway over time, by All Regions, Big City Regions and Peripheral Regions, 2001-2011.

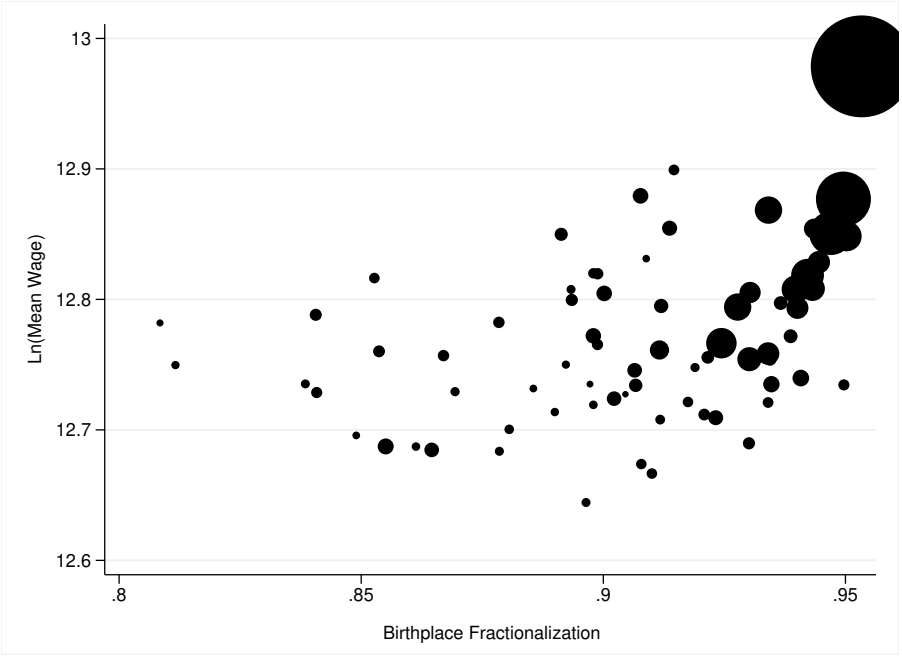


Regions that feature greater immigrant heterogeneity also have workers with higher average annual wages, visible in the simple bivariate correlation in Figure 2. This is a pattern consistent with other countries like the US (Kemeny and Cooke, 2018). However unlike the US, the Norwegian labor market is characterized by strong trade unions power, operating with a rather strict annual wage setting for their members. Under this system of collective bargaining, wages are set annually through a combination of central and local negotiations, with the result that annual wages might not fully represent productivity at the individual level. This labor

[1]We define peripheral regions as regions that are not regarded as 'Big City Regions'. Norway has four 'Big City Regions'; Oslo, Bergen, Trondheim, and Stavanger and therefore 74 regions are regarded as 'Peripheral Regions'.

market feature raises some concerns for our use of individual wages as a proxy for productivity. Two factors should help mitigate major concerns about this. First, there is a general trend in Nordic countries for that the employeer-employee relationship to be more decentralized and individualized (Westlund, 2006). Second, productivity increases from diversity realized by firms should be recognized by the bargaining units, and thus should be generally reflected in rising wages, even if the relationship to individual productivity is somewhat loose. Thus, we argue that individual wages changes within job spells are an operational proxy for productivity in this context. At the same time, these processes might slow the responsiveness of wages to diversity-generated productivity changes, hence we run our models with lagged measures of diversity as a robustness check.

Figure 2: Economic regional average wages and birthplace fractionalization weighted by regional size, 2001- 2011.



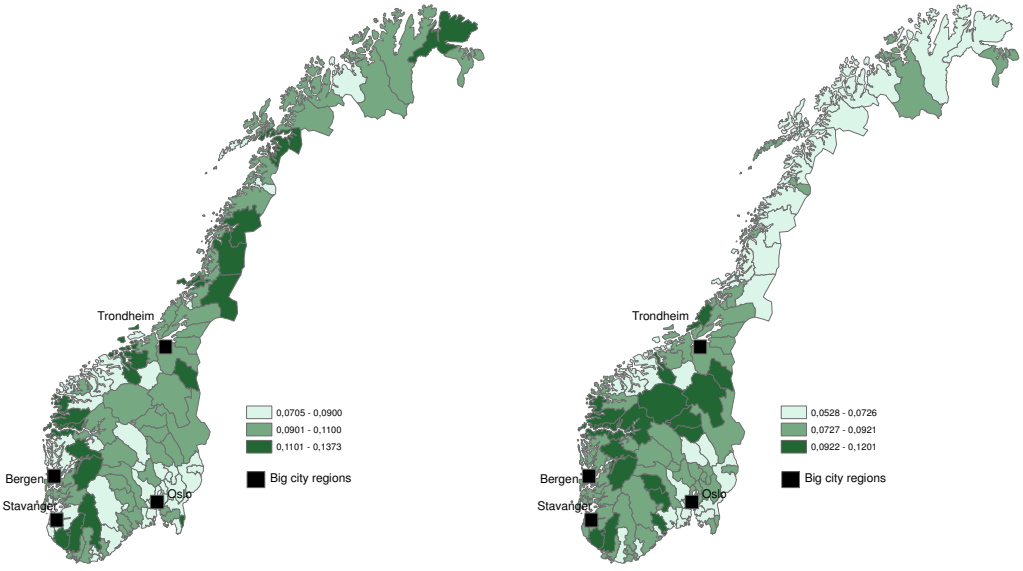
Note: Points on the scatter plot reflect average economic region values for wages and diversity, 2001 to 2011.

3.2 Social Capital and Trust: Norway

Norway, similar to other Nordic countries, is known for its strong institutional setting and its comprehensive welfare system (Westlund, 2006; Mehlum and Torvik, 2006). Furthermore, Norway has a robust national identity and Norwegians typically express high levels of trust in general. But its geography and history have also

shaped differentiated regional identities. Regions across the country are relatively isolated from one another by distance and rugged terrain, contributing to the construction of strong local identities within regions (Fitjar and Rodríguez-Pose, 2011). As in other countries (Rodríguez-Pose and Di Cataldo, 2014), some of this regional variation is visible in measures of social capital and trust across the country. Built on data from the Norwegian Monitor Survey, Figures 3 and 4 underline one of the key motivations for this paper by showing cross-regional differences in social bonding, social bridging, and trust. While the differences in bonding social capital (a) do not suggest a clear spatial pattern, particularly not between big cities and peripheral regions, there do appear to be higher levels of bridging social capital (b) located in areas in the peripheral regions concentrated in the middle of Norway.

Figure 3: Cross-Regional Differences in Social Bonding and Bridging, 1990-2011, average index, in Norway.



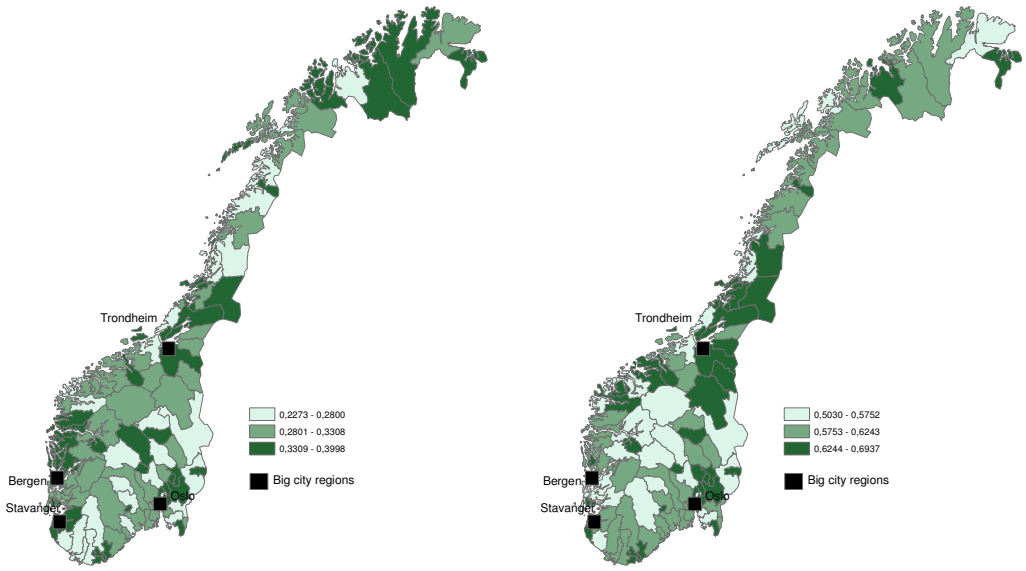
(a) Bonding Social Capital (b) Bridging Social Capital

Note: Bonding and bridging social capital are defined as decribe in section 4.4. Data source: Authors' elaboration on Norwegian Monitor Survey data, 1990-2011.

Building on the same data, we find cross-regional differences in trust in public government and trust in foreign individuals. Regions with high levels of trust might

be considered as sharing same features with regions with high level of social bridging. Indeed, we find a positive correlation between these two measures of trust and the bridging social capital measure. Also visible in Table 1 is the correlation between the two measures of trust: regions with high trust in goverment also are more likely to exhibit high levels of trust in foreign-born individuals. In line with expectations, the correlations between both measures of trust and bonding social capital are negative. Note that there is no significant correlation between bonding and bridging social capital. These features – increasing immigrant populations, diversity in all regions as shown in Figure 1, and the regional variation in social capital and trust as shown in Figures 3 and 4 – make Norway an interesting case for studing how regional context matters for the economic benefits of diversity.

Figure 4: Cross-regional differences in trust, 1990-2011, average index, in Norway



(a) Trust in Foreign-Born Individuals (b) Trust in Public Government

Note: Both trust variables are defined as describe in section 4.4. Data source: Authors' elaboration on Norwwgian Monitor survey data, 1990-2011.

Table 1: Correlation between Social Capital and Trust measures.

		(1)	(2)	(3)	(4)
Bonding Social Capital	(1)	1.000			
Bridging Social Capital	(2)	-0.012	1.000		
Trust in Foreign-Born Individuals	(3)	-0.338*	0.375*	1.000	
Trust in Public Government	(4)	-0.460*	0.407*	0.637*	1.000

Note: * significant at 1 percent level.

4 Empirical Approach and Data

To identify the relationship between immigrant diversity and productivity, we examine how individual workers' wages respond to changes in the diversity that surrounds them. We follow Kemeny and Cooke (2018) (also, Moretti, 2004; Gibbons et al., 2013) to focus our attention on wage changes that occur within job spells, during which individuals that remain in a single workplace and thus region for at least two years. With these workers fixed in place, variation comes from the panel structure of our data, and more specifically from changes in immigrant diversity around these workers – in both their regions and workplaces. We estimate the following equation:

$$ln(w)_{ipjt} = D'_{pjt-1} + d'_{pjt-1} + X'_{ipjt} + E'_{pjt} + C'_{jt} + \mu_{it} + eta_t + \nu_{ipjt} \qquad (1)$$

where, $ln(w)$ represents the log annual wages of an individual worker i in establishment p located in region j at time t; $D'_{pjt-1} = (d_{jt-1}, s_{jt-1})$ is a vector consisting of d_{jt-1}, regional-specific immigrant diversity at time $t-1$ and s_{jt-1} regional immigrant share; d'_{pjt_1} is a vector consisting of d_{pjt-1}, diversity at the level of the firm and s_{pjt-1}, immigrant share at the level of the firm; X' represents time-varying measures of worker-specific characteristics; E' describes a vector of dynamic employer characteristics, such as firm size and share of college educated workers; and C' indicates typical time-varying characteristics of a worker's region, such as population size and share of college educated employees. The fixed effect, μ_{ipj}, is important in our approach. Because we analyze workers only within job spells, this term absorbs the influence of unobserved permanent characteristics of each individual worker, as well as the establishment where they work, and the regional economy in which they live. η_t represents unobserved time-specific shocks that exert uniform impacts across all individuals, such as business cycles; and ν_{ipjt} is the standard error term.

Applying the fixed effects estimator, equation (1) explores how an individual's wages relate to changes her region's and workplace's level of immigrant diversity, while accounting for several other likely influences on wage changes but which are

relatively static but hard to observe at scale[2].

As a point of departure, we estimate equation (1) for all regions of the country together, which helps illuminate the general relationship between immigrant diversity and productivity. However, to gain purchase on our hypotheses, that the regional context should shape this relationship, we estimate equation (1) separately for workers in regions with different levels of bonding social capital, bridging social capital, and the two different types of trust. The next section describes our data, analytical sample, and the construction of our measures of diversity, trust, and social bonding and bridging capital.

4.1 Data

Our primary data source is Norwegian register data for individuals and firms, linked together into an employer-employee (LEED) data set. Our data cover all inhabitants in Norway over the age of 16 who are employed in private establishments located in Norway. The annual data span the period 2001 to 2011. LEED data provide a range of information about individual workers, such as their place of birth, parents' place of birth, sex, birth year, where they live, how much they work, annual wage, and detailed information about any education acquired in Norway. We also know where individuals work and where their establishment is located[3].

4.2 Analytical Sample

The analytical sample includes a subset of all workers within continuous job spells. From the total LEED-covered set of workers available to us, we identify and keep each person's longest continuous job spell that exceeds two consecutive calendar years. Each worker only appears in one establishment and one region in the panel, even if they have multiple job spells over their observed career. Workers who do not hold a job lasting at least two years will not be included in our analytical sample. We further limit our sample by excluding workers with low wages[4], and those who work part-time. To ensure that our measure of diversity in establishments is informative, we restrict our sample to establishments with at least 10 employees. The resulting sample is 1.26 million individuals and altogether 6.77 million observations. While these restrictions in the analytical sample aid in identifying the relationship

[2]For workers, such unobserved heterogeneity could include ability, intelligence, or motivation. Firm characteristics could include differences in capital intensiveness or persistent product quality. Among regions, relatively persistent differences in specialization or agglomeration could be relevant. The individual fixed effect also absorbs important observable but persistent characteristics, such as gender or relative age differences which, in cross section, would be captured by X'. Note that all such observable individual charactistics available in our data are absorbed by the fixed effect.

[3]We know the address of each establishments location, by postcode. We use this to identify their economic region. Workers are identified to their workplace at the establishment level.

[4]We exclude workers that earn below 100,000 NOK.

of interest, they do require a tradeoff in generalizability; our analysis can say little about the relationship between diversity and wages for people who work part-time, have very low wages, change jobs with high frequency, or who work in very small establishments. Our results need to be looked at with that in mind.

4.3 Building diversity measures

To create regional measures of diversity, we use all workers observed in the LEED data, not just workers in the analytical sample. While the overall share of immigrants in a region or workplace arguably shows one aspect of labor force diversity[5], more complex measures can better capture the non-binary (Norwegian or not) nature of diversity arising from the combination of people from many backgrounds. Drawing on Alesina et al. (2016) and Ozgen et al. (2013), we calculate a fractionalization index among only the foreign-born population. Excluding Norwegians from this calculation avoids constructing a measure closely correlated with the overall share of immigrants. The index is calculated as follows:

$$Fractionalization_{jt} = 1 - \sum_{r=1}^{R} s_{rjt}^2 \tag{2}$$

where s is the of proportion of residents in the region j who were born in country r in time t; and R is the maximum number of countries captured in the region. The index value can range between 0 (where all immigrants originate from the same country) and 1-1/R (there are an equal number of immigrant from each of the R countries). Recent research Docquier et al. (see e.g., 2018) argues for similarly decomposing the diversity index and distinguishing a *Between* and *Within* component of the diversity index. The fractionalization index is constructed analogously at the establishment-level, based on the set of individuals working in each firm during the first quarter of the year[6]. These measures, at the region and establishment-level, provide the key independent variables of interest in our estimates.

4.4 Building Regional Social Capital and Trust Measures

We approach the challenge of proxying informal institutions by constructing multiple measures, each capturing a nuanced aspect of this hard-to-measure construct. We seek to operationalize a widely accepted notion of social capital as "the norms and networks that enable people to act collectively" (Woolcock and Narayan, 2000, p.226). Putnam (2000a) famously unpacks this idea into two categories: bonding,

[5]This is included primarily as a control variable in our models.

[6]In our data we have information where each individual works in the first quarter. Workers who change workplace after the first quarter will be counted in our diversity measures where they worked during the first quarter and be counted in their new workplace the following year.

which captures such norms and networks within groups of similar individuals in a community; and bridging, which indicates these capacities among members of disparate groups. Capturing the bridging and bonding dimension of social capital is far from easy and straightforward. We use data from the Norwegian Monitor Survey from 1990 to 2011, following the approach proposed by Knack and Keefer (1997) and used in recent studies looking at other research questions (see e.g., Cortinovis et al., 2017).

The Norwegian Monitor is survey data collected every second year, based on a sample of inhabitants representative at the regional level. From this data set, we get information about how individuals within a region are involved[7] in different types of associations. We catagorize this involvement based on sets of associations identified in the literature as plausibly indicative of different measures of social capital. We cannot directly observe the associational activities of the individuals in our analytical sample, just as we cannot observe the interactions they may have with people born in different countries from them. Instead, we must assume that at the region level, the share of people involved in associations tied to bridging or bonding social capital will be indicative of the broader informal institutional climate in that location. This institutional climate, or regional context, should shape opportunities for interactions across people from different backgrounds. On the one hand, more people involved in associations which are inclusive of different groups (bridging) should facilitate more interactions among people from different countries. On the other hand, more people involved in associations that are more exclusive and homogeneous (bonding) should encourage interactions among people with similar backgrounds and limit interactions across difference.

Following (Knack and Keefer, 1997) we link the bridging dimension of social capital to associations like culture activities (e.g., art, music, education), youth work, and religion. Professional associations, political parties, and trade unions represent associations related to the bonding-type of social capital. For each set of associations, we calculate the share of people that have interacted in at least one organization belonging to each set, over the total respondents in a region, over the time period 1990 to 2010. We aggregate the mean value over time for each region and this provides our measures for regional social bonding and bridging[8].

Our second set of measures of informal institutions makes use of data describing regional trust in public government and trust in foreign individuals. For each

[7]While other studies often use membership data, we consider whether individuals are directly involved in associations. In the survey, the participants are asked if, during the last year, they have been actively interacting in different types of associations.

[8]The time-varying nature of these regional measures would be novel to the literature as far as we are aware. However, unsurprisingly, we find little variation over time at national and regional levels in these measures, which makes it hard to exploit this variation over time in our models. Instead we draw comparisons between groups of regions with high and low levels of these measures.

region, we calculated the share of people who agreed with the statement 'foreigners come to Norway to benefit our country', over the total number of respondents in a region the year in the survey. This measure is of particular interest since it should most directly capture local attitudes towards immigrants, providing a thermostat for how warmly immigrants are received. Trust in public government should provide a slightly different aspect of local informal institutions: public trust in the fair functioning of local governments could dampen impluses towards hording of opportunities. In a similar manner, we calculated for each region the share of people who answered that they generally trust public government. We generate the mean value of these measures over time to form our measure for trust in foreign individuals and local trust in government.

4.5 Control Variables

In this paper, we use a fixed effect estimation, where we include an individual-establishment-regional fixed effect. That means that unobserved factors at each level should not to bias our estimates of the relationships of interest, as long as those factors are relatively stationary. While the Norwegian LEED data provides much information on individuals and establishment-level, many of these are absorbed by this important fixed effect term. Controls that are time-variant remain in our model, including the workforce size of establishments and regions, as well as the share of college educated employees in both of these levels.

Eq. (2) captures well the diversity among immigrants and prevents this measure from being too highly driven by the overall share of immigrants in each region or establishment (Nijkamp and Poot, 2015). In addition, we also include a measure of the total share of immigrants among total employment in a establishment p and region j. While this does not directly measure diversity as it pertains mostly closely to the underlying theorized mechanisms of particular interest in this paper, it does capture other potentially important impacts of immigrants in the labor force (Ottaviano and Peri, 2012; Lewis and Peri, 2014). The share of immigrants at region$j$ is calculated as follows:

$$Share_{jt} = \sum_{r=1}^{R} s_{rjt}/(1 - s_{rjt}) \tag{3}$$

where s is the of proportion of residents in the region j at time t who were born in country r. The share of immigrants is constructed analogously at the establishment-level.

One important additional regional control is added to account for the potential role of regional demand shocks, which could shift the supply of different types of workers. Local demand shifts might be correlated with changes in diversity, due to

the generally higher geographical mobility of immigrants compared to natives [9]. To measure local demand shocks, we draw on a method developed by Bartik (1991), and widely used in labor and regional economics. The 'Bartik' measure is constructed as follows:

$$Bartik_{jt} = \sum_{l=1}^{L} e_{jlt-1}(lnE_{lt-1} - E_{lt-1}) \tag{4}$$

where Bartikjt captures the growth in log national employment in industry l at time t, and weights this national growth based on the initial local employment e_{jlt-1}. We use data on regional industry structure based on NACE codes at the two-digit level[10].

4.6 Summary Statistics

Table 2 provides summary statistics for the analytical sample used in our basic model. It includes nearly 1.3 million individuals working in nearly 34 thousand establishments. Average earnings are almost 440,000 NOK. The average spell duration is 7.2 years and the average age is just over 42 years. At the establishment level, diversity, measured by the fractionalization index among immigrants is 0.67 on average; and 0.92 at the regional level. The share of immigrants is 9 percent at the establishment and regional level. The average establishment in the sample has 204 employees and the average share of college educated employees is just over 22 percent. The regional share of college educated employees is 20 percent and the average regional size 106 thousand people.

5 Results

This section presents results from models estimating equation (1), describing the relationship between the wages of individual workers and the immigrant diversity that surrounds them. As described in Section 4, results are produced using fixed effects models on an annual panel of workers over their longest job spell during the study period (2001-2011). Each model includes a fixed effect that eliminates bias from stationary unobserved heterogeneity among individuals, their establishment, and their region. Year dummy variables are included to capture shocks that are

[9] Regions may experience an increase in the average wage as a result of a positive economic shock. This could attract migrants, leading to an increase in diversity. In the Norwegian case, this is particularly pertinent for regions specialising in oil extraction, which may become 'boom regions' in periods of rising oil prices. Such reverse causality could result in upwardly biased estimates. One way to tackle this problem is to control for local demand shocks.

[10] Because of the change to NACE rev. 2 in 2007, we convert all NACE codes back to NACE rev. 1, allowing us to apply this index for the whole time period.

Table 2: Summary statistics

Variable	Mean	Standard deviation
Individual characteristics		
Age	42.08	11.53
Annual wage	439,280	285,249
Spell duration	7.20	3.03
Female	0.31	0.46
Establishments measures		
Diversity	0.67	0.33
Share foreign-born	0.97	0.12
Firm size	204	416.5
Share of educated employees	0.22	0.21
Regional measures		
Diversity	0.92	0.03
Share foreign-born	0.10	0.04
Regional size	106,229	116,818
Share of educated employees	0.20	0.07
Individuals	1,262,272	
Establishments	34,707	
Regions	78	
Observations	6,769,648	

uniform across individuals, establishments, and regions, but which vary over time. Standard errors are clustered at the establishment level. We predict changes in a worker's wage as a function of changes in the diversity in their region and workplace. Grouping observations by regions with different levels of social bonding, social bridging, and trust, provides results that shed light on the role of the regional context in shaping the diversity-productivity relationship.

To provide a starting point for how diversity and productivity generally relate in Norway, we begin by presenting estimates for the country as a whole in Table 3. Column 1 of Table 3 presents estimates of a model where diversity measured at the establishment-level is the primary predictor of interest, and where we exclude all regional-level measures. While the coefficient on establishment-level diversity is basically zero, the control variables are all significant and positively related to wages. Fractionalization among foreigners at the establishment level seems to matter little for individual wages in Norway. However, note that workers in establishments featuring a larger annual increase in the share of foreign-born employees see a statisically significant increase in wages.

In Column 2 we add in our controls for regional-level measures for diversity, regional size, and share of college educated employees. In this model, the con-

Table 3: Fixed Effects Estimated of the Relationship between Immigrant Diversity and Log Annual Wages, 2001 - 2011.

	(1)	(2)	(3)
Establishment-level measures			
Diversity	0.001	0.001	0.000
	(0.001)	(0.007)	(0.001)
Share foreign-born	0.016**	0.0001	0.001
	(0.008)	(0.008)	(0.007)
Establishment size*(log)*	0.062***	0.059***	0.059***
	(0.013)	(0.002)	(0.019)
Share of educated employees*(log)*	0.075***	0.072***	0.072***
	(0.064)	(0.011)	(0.011)
Regional-level measures			
Diversity		0.066**	0.048**
		(0.017)	(0.015)
Share foreign-born		0.317***	0.226***
		(0.064)	(0.059)
Regional size*(log)*		0.316***	0.150***
		(0.064)	(0.011)
Share of educated employees*(log)*		0.054*	0.192***
		(0.028)	(0.049)
Observations	6,769,648	6,769,648	6,769,648
Individuals	1,262,457	1,262,457	1,262,457
R^2	0.42	0.42	0.42
Bartik index	No	No	Yes

Note: Standard errors in parentheses, clustered by establishment. Estimated equation is (1). Year and individual and regional fixed effects included in model 1, while year, individual, establishment and regional fixed effects included in model 2 and 3.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

trol variables are all significant and positive related to wages. At the same time, controlling for regional-level measures somewhat diminishes the magnitude of the establishment-level measures, indicating that some of the estimated associations presented in column 1 are instead captured by regional-level measures. In Column 3, we further control for local shocks in labor demand by including our version of the Bartik-index. All control variables at the establishment level remain more or less the same, while variables at the regional-level change. Our key variable of interest, immigrant fractionalization, still remains significant at the 1% level but the magnitude of the coefficient declines somewhat. This indicates that part of the estimated association found in Column (2) is attributable to dynamic regional demand for labor. This suggests the importance of including the Bartik index in rest of our models, which we do. Overall, these results confirm that the economic benefits for workers' wages in regions that feature more heterogenity among their workers also

are found to be present in the context of Norway.

5.1 Estimates of the Regional Role of Trust, and Bonding and Bridging Social Capital

We now turn to our key interest of this paper, estimating the role of regional context in shaping basic diversity-productivity relationship described in Table 3. In Table 4 we look at regional levels of trust in foreign-born individuals. For comparative purposes, we include in the estimates for all workers in our analytical sample in Column 1, (identical to Column 3 in Table 3). For simplicity sake, we do not show the control variables in these tables, though they are included in all the models, and operate consistently across estimations. Column 2 presents results estimated on a subset of workers residing in regions where trust in foreigners is lowest (lowest tercile of the regional trust in foreginers measure). Column 3 includes workers living in regions that fall in the middle tercile, while estimates in Column 4 show results for workers who live in regions in the top tercile, where trust in foreigners is highest. The results show that in regions with high levels of trust in foreign-born individuals, the average worker experiences a statistically significant raise as immigrant diversity increases in their region. Where trust in foreigners is low, however, it appears that rising diversity is negatively associated with wages, though the estimate is not statistically significant at a 5 percent level. This finding is consistent with our expectations and supports the first hypothesis. Note that the establishment-level measure of diversity still remains insignificant and near zero. This largely holds across the different measures, as is apparent in the following tables. In the rest of this paper, we therefore focus on regional diversity and how its estimates shift according to differences in the regional context.

Table 4: Fixed Effect Estimates of the Relationship between Immigrant Diversity and Log Annual Wages by Terciles of Trust in Foreign-born Individuals

	Full	**Trust in Foreign-born**		
	Sample	Low	Medium	High
Establishment-level measures:				
Diversity	0.000	-0.005	-0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Share foreign-born	0.001	-0.024	0.024	0.004
	(0.007)	(0.016)	(0.013)	(0.010)
Regional-level measures:				
Diversity	0.048**	-0.043	0.005	0.078**
	(0.015)	(0.035)	(0.046)	(0.017)
Share foreign-born	0.226***	-0.094	0.238***	0.369***
	(0.056)	(0.093)	(0.123)	(0.078)
Observations	6,769,648	857,456	1,373,050	4,539,140
Individuals	1,262,457	154,140	249,181	859,136
R^2	0.42	0.44	0.45	0.41

Note: Standard errors in parentheses, clustered by establishments. Estimated equation is (1). Year and individual, workplace, regional fixed effects included in each model. Standard controls and local shift in labor demand measured by the Bartik index are all included in each model. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 5 presents similarly structured estimates across regions varying in trust in public government. Put briefly, we find the same pattern that we found in the models for trust in foreign individuals. Workers in regions with a higher level of public trust seem to benefit from diversity, whereas workers in regions with low levels of trust in the government do not, supporting the second hypothesis. Interestingly, in this case, their wages appear to actually be hurt by rising diversity, significant at a 5 percent level.

Table 5: Fixed Effect Estimates of the Relationship between Immigrant Diversity and Log Annual Wages by Terciles of Regional Trust in Goverment

	Full	**Trust in Public Government**		
	Sample	Low	Medium	High
Establishment-level measures:				
Diversity	0.000	0.001	0.000	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Share foreign-born	0.001	-0.022	-0.014	0.013
	(0.007)	(0.015)	(0.012)	(0.012)
Regional-level measures:				
Diversity	0.048**	-0.070*	0.147**	0.066***
	(0.015)	(0.037)	(0.048)	(0.020)
Share foreign-born	0.226***	-0.025	0.832***	0.031
	0.059)	(0.010)	(0.142)	(0.080)
Observations	6,769,648	940,647	4,143,125	3,418,813
Individuals	1,262,457	193,806	883,768	644,482
R^2	0.42	0.45	0.44	0.40

Note: Standard errors in parentheses, clustered by establishment. Estimated equation is (1). Year and individual, workplace, regional fixed effects included in each model. Standard controls and local shift in labor demand measured by a Bartik index are included in each model.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 6 presents estimates across different levels of regional social capital, in both its bonding and bridging forms. Focusing first on bonding social capital, it is apparent that while wages in all regions are positively associated with diversity, the only staistically the estimate is for regions with the lowest levels of bonding social capital. This is in line with expectations, supporting the third hypothesis. Estimates across different levels of social bridging indicate a more unexpected story. Looking at our key variable of interest, workers in regions with low levels of bridging social capital experience positive and significant wage increases from rising diversity, while regions that feature high levels of bridging show no such relationship. The main result from the bridging social capital models does not support our hypothesis on how this aspect of regional context should shape diversity spillovers.

Table 6: Fixed Effect Estimates of the Relationship between Immigrant Diversity and Log Annual Wages by Terciles of Bridging and Bonding Social Capital

	Regional-level measures		
	Low	Medium	High
Bonding Social Capital:			
Diversity	0.160*	0.051	0.021
	(0.055)	(0.038)	(0.019)
Share foreign-born	0.456***	0.384*	0.201***
	(0.126)	(0.120)	(0.072)
Observations	4,721,574	1,480,971	567,103
Individuals	888,947	270,641	102,869
R^2	0.41	0.45	0.45
Bridging Social Capital:			
Diversity	0.166*	0.026	0.036
	(0.040)	(0.018)	(0.038)
Share foreign-born	-0.106	0.145*	0.495***
	(0.095)	(0.078)	(0.065)
Observations	1,209,733	4,464,140	1,094,735
Individuals	222.692	838,143	201,622
R^2	0.44	0.41	0.43

Note: Standard errors in parentheses, clustered by establishment. Estimated equation is (1). Year and individual, workplace, regional fixed effects included in each model. Standard controls and local shift in labor demand measured by a Bartik index are included in each model.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

5.2 Share of Immigrants in the Region

As noted before, since the main focus of this paper is on the effects of immigrants that specifically run through diversity, the measure of share of immigrants is largely included as a control variable. However, as noted by Lewis and Peri (2014) in a helpful summary of immigrant economic impacts, these impacts do not only operate through diversity mechanisms. The imperfect substitutabilty of immigrants for native-born workers (Ottaviano and Peri, 2012) in the labor market allows for productivity improvements via improved labor market sorting and occupational upgrading of native born workers. Though the effect size is generally small, the impact of the share of immigrants in a regional labor market is generally found to be positive in the literature Lewis and Peri (2014). In this paper, results show that holding changes in immigrant diversity constant, regional share of foreign born is generally positive and significant across the models in this paper. However, it is interesting to note key exceptions to this general finding that suggest that regional context may also matter for these other avenues of immigrant inpact in labor markets. Ex-

ceptions to the generally positive relationship are in regions where bridging social capital, trust in foreigners, and trust in government are each lowest (Tables 4-6). Curiously though, immigrant share is not significantly associated with wage changes where trust in government is highest (Table 5).

5.3 Robustness Checks

One potential concern relates to the question of whether Norwegian salaries respond to productivity-enhancing diversity at the same time scale as in other national labor markets. Rigid wage setting that is set collectively and changed in some sectors every second year might mean that any diversity-generated economic benefits show up in wages after some lag in time. In a working paper by Haus-Reve et al. (2019), using the same data, this concern is taken into account by running models on a sub-set of workers in sectors where individual wage setting is more prevalent. Those findings show that while the estimated coefficients for diversity at the regional level in this sectoral subset do change in magnitude, the broader pattern persists. In other words, in the sectors of the Norwegian economy where individual earnings are likely most closely associated with individual productivity, the economic benefits from regional diversity follow the same pattern as in other sectors.

In this paper, we provide additional information relating to this same concern by running our models with lagged measures of immigrant diversity and immigrant share. Theory does not provide guidance on what the appropriate lag might be. However, typically in Norway wages and salaries can be renegotiated annually. Any productivity gains realized by employers ought to be recognized by the workers and bargaining negotiators and fought for in the following contract reviews. Thus, one plausible delay in any diversity-driven productivity impacts that show up in individuals' wages would be a one year interval.

Table 7 presents results analogous to the results in the top panel of Table 6, but with one-year lags in diversity and immigrant share at both establishment and regional levels. With a special focus on the regional diversity measure, Column 1 shows that for all regions together, the relationship between fractionalization among immigrants still holds when we lag the measure one period. The next three columns show that across each tercil, the pattern corresponds to Table 6, where low social bonding is associated with positive and significant regional diversity spillovers.

Taken together, and despite the contradictory results from the bridging social capital measure, we find support for the idea that regional context matters for the relationship between immigrant diversity and productivity in Norway. At the broadest level, this is in line with evidence from the US (Kemeny, 2012; Kemeny and Cooke, 2018). However, the findings presented here substantially extend and refine our understanding of the particular elements in the regional context that may matter

Table 7: Fixed Effects Estimated of the Relationship between Immigrant Diversity lagged one year and Log Annual Wages

	Full	**Social Bonding Capital**		
	Sample	Low	Medium	High
Establishment-level measures				
Diversity(t-1)	0.001	0.001	0.000	0.001
	(0.007)	(0.000)	(0.001)	(0.001)
Share foreign-born(t-1)	0.047***	0.032***	0.096***	0.091***
	(0.008)	(0.010)	(0.015)	(0.020)
Regional-level measures				
Diversity(t-1)	0.040**	0.188**	0.012	0.043
	(0.016)	(0.050)	(0.036)	(0.019)
Share foreign-born(t-1)	0.282***	0.503***	0.357***	0.136*
	(0.051)	(0.104)	(0.114)	(0.073)
Observations	6,163,195	4,306,804	1,343,865	512,526
Individuals	1,262,385	888,895	270,622	102,868
R^2	0.40	0.39	0.43	0.44

Note: Standard errors in parentheses, clustered by establishment. Estimated equation is (1). Year, individual, establishment and regional fixed effects, control variables and local shift in labor demand measured by a Bartik index are included in each model.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

for this relationship. On the one hand, trust in both foreign-born individuals and local governments captures elements that enhance diversity spillovers. On the other hand, strong bonding social capital – whatever social benefits it may have for those entwined in its inward-facing connections – has the opposite effect of dampening diversity spillovers. The only puzzling result here is that the measure of bridging social capital appears to operate in the opposite manner as hypothesized.

6 Conclusion

This paper set out to answer the following question: do the effects of immigrant diversity on workers productivity depend on the regional context, measured by trust, and bonding and bridging social capital? Institutions are widely viewed to regulate the cost of interactions and because of regional differences in informal institutions, it makes sense to exploit variation at this level. Our study finds that these aspects of regional institutions do indeed matter and our findings highlight the importance of the regional context. Our results provide support for several of our main hypotheses. Wages changes associated with changing immigrant diversity are greater in regions that feature a low level of social bonding compared to regions with high social bonding. We also find that regional variation in trust in foreign individuals, as well as

trust in the government, conditions the relationship between diversity and wages. Here, in regions with high levels of trust (in either foreigners or the government), wages are positively and significantly associated with immigrant diversity. However, in regions with low levels of trust, the coefficient on regional diversity is negative, though only significant for the government measure. Finally, contrary to expectation, high regional levels of bridging social capital were not associated with larger spillovers, but rather the reverse. The association between wages and diversity was largest in regions with the lowest levels of bridging social capital.

The measure of bridging social capital used in this paper is consistent with other uses of the survey data to capture this intangible regional characteristic (e.g., Knack and Keefer, 1997). However, while aiming to capture the same concept, this construction is different than the bridging measure used in Kemeny and Cooke (2017). That measure was built not from survey data but rather a composit of indicators that included elements such as population-scaled counts of associations and 'third spaces', as well as quantifiable traces of civic engagement in the form of voter turnout and Census response rates. It bears repeating: regional levels of social capital are hard to measure. As such, we interpret our results with some caution, just as we might for other work using alternative measures, such as the composit indicator mentioned above, or others such as blood donation rates.

An important feature of this paper is that it expands and refines our understanding of what elements of the regional context may particularly matter in shaping the diversity-wage relationship. The extant literature focuses largely on triangulating across proxies that might indicate 'bridging' social capital. Here we draw attention explicitly to the other important (and regionally variable) part of social capital: bonding. This inward-focused dimension of social capital may be particularly relevant to consider with the apparent rise of nativist sentiment in many Western countries. The bonding dimension has received no sustained attention that we are aware of in this part of the literature. Additionally, the measures of trust, and particularly the explicit measure of reported trust in foreigners, provide rather clear and direct measure of regional context pertaining to immigrant diversity outcomes. These too are, to the best of our knowledge, so far missing from the regional immigrant diversity literature.

References

Acemoglu, D. and Robinson, J. (2012). *Why Nations Fail: Origins of Power, Poverty and Prosperity*. Crown Publishers (Random House).

Aiken, M. and Hage, J. (1971). The organic organization and innovation. *Sociology*, 5(1):63–82.

Alesina, A., Baqir, R., and Easterly, W. (1999). Public Goods and Ethnic Divisions. *Quarterly Journal of Economics*, 114(4):1243–1284.

Alesina, A. and Drazen, A. (1991). Why are stabilizations delayed? *The American Economic Review*, 81(5):1170–1188.

Alesina, A., Harnoss, J., and Rapoport, H. (2016). Birthplace diversity and economic prosperity. *Journal of Economic Growth*, 21(2):101–138.

Alesina, A. and La Ferrara, E. (2005). Ethnic diversity and economic performance. *Journal of Economic Literature*, 43(3):762–800.

Asheim, B., Coenen, L., and Vang, J. (2007). Face-to-face, buzz, and knowledge bases: sociospatial implications for learning, innovation, and innovation policy. *Environment and Planning C: Government and Policy*, 25(5):655–670.

Bakens, J., Mulder, P., and Nijkamp, P. (2013). Economic impacts of cultural diversity in the Netherlands: Productivity, utility and sorting. *Journal of Regional Science*, 53(1):8–36.

Bartik, T. J. (1991). Who benefits from state and local economic development policies?

Bellini, E., Ottaviano, G., Pinelli, D., and Prarolo, G. (2013). Cultural diversity and economic performance: Evidence from European regions. In Crescenzi, R. and Percoco, M., editors, *Geography, institutions and regional economic performance*, pages 121–142. Springer-Verlag.

Clearwater, S., Huberman, B., and Hogg, T. (1991). Cooperative solution of constraint satisfaction problems. *Science*, 254(5035):1181–1183.

Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology*, 94:S95–S120.

Combes, P., Duranton, G., and Gobillon, L. (2008). Spatial wage disparities: Sorting matters! *Journal of Urban Economics*, 63(2):723–742.

Cooke, A. and Kemeny, T. (2017). Cities, immigrant diversity, and complex problem solving. *Research Policy*, 46(6):1175–1185.

Cortinovis, N., Xiao, J., Boschma, R., and van Oort, F. G. (2017). Quality of government and social capital as drivers of regional diversification in europe. *Journal of Economic Geography*, 17(6):1179–1208.

Crescenzi, R., Gagliardi, L., and Percoco, M. (2013). Social capital and the innovative performance of italian provinces. *Environment and planning A*, 45(4):908–929.

Delgado Gómez-Flors, M. and Alguacil, M. (2018). The impact of immigrant diversity on wages. the spanish experience. *Sustainability*, 10(9).

Docquier, F., Turati, R., Valette, J., and Vasilakis, C. (2018). Birthplace diversity and economic growth: Evidence from the us states in the post-world war ii period.

Easterly, W. and Levine, R. (1997). Africa's growth tragedy: Policies and ethnic divisions. *Quarterly Journal of Economics*, 112(4):1203–1250.

Elias, A. and Paradies, Y. (2016). The regional impact of cultural diversity on wages: evidence from australia. *IZA Journal of Migration*, 5(1):1–24.

Feldman, M. P. and Storper, M. (2018). Economic growth and economic development: Geographical dimensions, definition, and disparities. *The New Oxford Handbook of Economic Geography*, page 143.

Fitjar, R. D. and Rodríguez-Pose, A. (2011). Innovating in the periphery: Firms, values and innovation in southwest norway. *European Planning Studies*, 19(4):555–574.

Florida, R., Mellander, C., Stolarick, K., and Ross, A. (2010). Cities, Skills and Wages. *Martin Prosperity Research Working Paper Series*, (004).

Fukuyama, F. (1995). *Trust: The social virtues and the creation of prosperity*. Free Press.

Gibbons, S., Silva, O., and Weinhardt, F. (2013). Everybody needs good neighbours? evidence from students' outcomes in England. *The Economic Journal*, 123(571):831–874.

Goldin, C. and Katz, L. (1999). Human capital and social capital: The rise of secondary schooling in America, 1910-1940. *Journal of Interdisciplinary History*, 29(4):683–723.

Granovetter, M. (1973). The strength of weak ties. *American Journal of Sociology*, 78(6):1360–1380.

Haus-Reve, S., Fitjar, R. D., and Rodríguez-Pose, A. (2019). Does combining different types of collaboration always benefit firms? collaboration, complementarity and product innovation in norway. *Research Policy*, 48(6):1476–1486.

Hong, L. and Page, S. (2001). Problem solving by heterogeneous agents. *Journal of Economic Theory*, 97(1):123–163.

Kemeny, T. (2012). Cultural diversity, institutions, and urban economic performance. *Environment and Planning A*, 44(9):2134–2152.

Kemeny, T. (2014). Immigrant diversity and economic performance in cities. *International Regional Science Review*, doi: 10.1177/0160017614541695.

Kemeny, T. and Cooke, A. (2017). Urban immigrant diversity and inclusive institutions. *Economic Geography*, 93(3):267–291.

Kemeny, T. and Cooke, A. (2018). Spillovers from immigrant diversity in cities. *Journal of Economic Geography*, 18(1):213–245.

Knack, S. and Keefer, P. (1997). Does social capital have an economic payoff? a cross-country investigation. *The Quarterly Journal of Economics*, 112(4):1251–1288.

Lee, N. (2014). Migrant and ethnic diversity, cities and innovation: Firm effects or city effects? *Journal of Economic Geography*, 15(4):769–796.

Lewis, E. and Peri, G. (2014). Immigration and the economy of cities and regions. National Bureau of Economic Research Working Paper 20428.

Longhi, S. (2013). Impact of cultural diversity on wages, evidence from panel data. *Regional Science and Urban Economics*, 43(5):797–807.

Malecki, E. J. (2012). Regional social capital: Why it matters. *Regional Studies*, 46(8):1023–1039.

Mehlum, Halvor Moene, K. and Torvik, R. (2006). Cursed by resources or institutions? *World Economy*, 29(8):1117–1131.

Montalvo, J. G. and Reynal-Querol, M. (2005). Ethnic diversity and economic development. *Journal of Development Economics*, 76(2):293 – 323.

Moretti, E. (2004). Estimating the social return to higher education: evidence from longitudinal and repeated cross-sectional data. *Journal of Econometrics*, 121(1-2):175–212.

Morgan, K. (2007). The learning region: institutions, innovation and regional renewal. *Regional Studies*, 41(S1):S147–S159.

Nathan, M. (2011). The long term impacts of migration in British cities: Diversity, wages, employment and prices. LSE Spatial Economics Research Centre (SERC) Discussion Paper 67.

Nathan, M. (2016). Ethnic diversity and business performance: Which firms? which cities? *Environment and Planning A: Economy and Space*, 48(12):2462–2483.

Nathan, M. and Lee, N. (2013). Cultural diversity, innovation, and entrepreneurship: Firm-level evidence from london. *Economic Geography*, 89(4):367–394.

Nijkamp, P. and Poot, J. (2015). Cultural Diversity: a matter of measurement. In Nijkamp, P., Poot, J., and Bakens, J., editors, *The Economics of Cultural Diversity*. Edward Elgar Publishing, Cheltenham.

Nijkamp, P., Poot, J., and Bakens, J., editors (2015). *The Economics of Cultural Diversity*. Edward Elgar Publishing, Cheltenham.

Nisbett, R., Ross, L., et al. (1980). *Human inference: Strategies and shortcomings of social judgment*. Prentice-Hall Englewood Cliffs, NJ.

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

North, D. C. (2012). Understanding the process of economic change. In *Worlds of Capitalism*, pages 107–120. Routledge.

Ottaviano, G. and Peri, G. (2006). The economic value of cultural diversity: Evidence from US cities. *Journal of Economic Geography*, 6(1):9.

Ottaviano, G. I. P. and Peri, G. (2012). Rethinking the effect of immigration on wages. *Journal of the European Economic Association*, 10(1):152–197.

Ozgen, C., Nijkamp, P., and Poot, J. (2013). The impact of cultural diversity on firm innovation: evidence from dutch micro-data. *IZA Journal of Migration*, 2(1):18.

Page, S. (2008). *The difference: How the power of diversity creates better groups, firms, schools, and societies*. Princeton University Press.

Pennant, R. (2005). Diversity, trust and community participation in England. Technical report, Home Office Research Development and Statistics Directorate Paper.

Poterba, J. (1997). Demographic structure and the political economy of public education. *Journal of Policy Analysis and Management*, 16(1):48–66.

Putnam, R. (2000a). *Bowling alone: The collapse and revival of American community*. Simon and Schuster.

Putnam, R. D. (2000b). Bowling alone: America's declining social capital. In *Culture and politics*, pages 223–234. Springer.

Rodríguez-Pose, A. (1999). Innovation prone and innovation averse societies: Economic performance in europe. *Growth and Change*, 30(1):75–105.

Rodríguez-Pose, A. (2013). Do institutions matter for regional development? *Regional Studies*, 47(7):1034–1047.

Rodríguez-Pose, A. and Di Cataldo, M. (2014). Quality of government and innovative performance in the regions of europe. *Journal of Economic Geography*, 15(4):673–706.

Rodríguez-Pose, A. and Storper, M. (2006). Better rules or stronger communities? on the social foundations of institutional change and its economic effects. *Economic geography*, 82(1):1–25.

Rodrik, D. (1999). Where did all the growth go? External shocks, social conflict, and growth collapses. *Journal of Economic Growth*, 4(4):385–412.

Roupakias, S. and Dimou, S. (2018). Impact of cultural diversity on local labor markets. evidence from greece's "age of mass migration".

Storper, M. and Venables, A. J. (2004). Buzz: face-to-face contact and the urban economy. *Journal of Economic Geography*, 4(4):351–370.

Suedekum, J., Wolf, K., and Blien, U. (2014). Cultural diversity and local labour markets. *Regional Studies*, 48(1):173–191.

Thomas, D. and Ely, R. (1996). Making differences matter. *Harvard Business Review*, 74(5):79–90.

Trax, M., Brunow, S., and Suedekum, J. (2015). Cultural diversity and plant-level productivity. *Regional Science and Urban Economics*, 53:85–96.

Westlund, H. (2006). *Social Capital in the Knowledge Economy: Theory and empirics*. Springer.

Woolcock, M. et al. (2001). The place of social capital in understanding social and economic outcomes. *Canadian journal of policy research*, 2(1):11–17.

Woolcock, M. and Narayan, D. (2000). Social capital: Implications for development theory, research, and policy. *The World Bank Research Observer*, 15(2):225–249.

7 Appendix

Table 8: Correlation

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log wage	(1)	1.000								
Fract firm	(2)	0.073*	1.000							
Share of foreigners firm	(3)	-0.054*	0.009*	1.000						
Fract region	(4)	0.149*	0.064*	0.092*	1.000					
Share of foreigners region	(5)	0.294*	0.078*	0.335*	0.277*	1.000				
Firm size	(6)	0.221*	0.302*	0.039*	0.130*	0.134*	1.000			
Regional size	(7)	0.203*	0.092*	0.225*	0.570*	0.671*	0.203*	1.000		
Share edu.reg	(8)	0.241*	0.091*	0.222*	0.527*	0.679*	0.190*	0.874*	1.000	
Share edu.firm	(9)	0.328*	0.088*	0.0169*	0.195*	0.257*	0.203*	0.344*	0.381*	1.000