



Labor diversity and firm productivity

Pierpaolo Parrotta^a, Dario Pozzoli^{b,*}, Mariola Pytlikova^{b,c}

^a Department of Economics, School of Business and Economics, Maastricht University, 6200 MD Maastricht, Netherlands

^b The Danish Institute for Regional Government Research (KORA), Denmark

^c VSB-Technical University of Ostrava, Czech Republic



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ABSTRACT

Using a matched employer–employee data-set, we analyze how workforce diversity associates with the productivity of firms in Denmark, following two main econometric routes. In the first one, we estimate a standard Cobb–Douglas function, calculate the implied total factor productivity and relate the latter to diversity statistics in a second stage. This reduced-form approach allows us to identify which types of labor heterogeneity appear to descriptively matter. In the second approach, we move toward a richer production function specification, which takes different types of labor as inputs and that allows for flexible substitution patterns, and possible quality differences between types. Both methods show that workforce diversity in ethnicity is negatively associated with firm productivity. The evidence regarding diversity in education is mixed.

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1. Introduction

Diversity in the labor force is an increasing reality in many developed countries. This diversity results from, among other things, the following major factors: policy measures that counteract population aging and anti-discrimination measures, the growth in immigration from diverse countries experienced in recent decades and the educational and skill upgrading of workforces.¹ All of these factors lead to increasing diversity within the labor force in terms of age, gender, ethnicity and skills.

* Corresponding author at: KORA, The Danish Institute for Regional Government Research, Købmagergade 22, Copenhagen 2220, Denmark.

E-mail addresses: p.parrotta@maastrichtuniversity.nl (P. Parrotta), dapo@kora.dk (D. Pozzoli), mapy@kora.dk (M. Pytlikova).

¹ Demographic projections by the United Nations suggest that during the next four decades, populations in Europe might *ceteris paribus* decline by 12% (United Nations, 2000). The main factor responsible for population aging is a large decline in the total fertility rate over the last half century. As a consequence of this trend, governments have adopted a number of measures to counteract the problem of population aging, including policies that encourage people to work longer, to increase female labor participation and to attract skilled immigrants. In many countries, governments have increased the regular and early retirement age, restricted access to early retirement by changing economic incentives and promoted anti-discrimination measures related to age. Female labor participation has grown in most of the world during the last century (OECD, 2005). This growth is partly due to policies encouraging women to work, e.g., better childcare and parental leave provisions and gender anti-discrimination measures. Furthermore, we can observe an increase in immigration, including to developed countries, and a broader diversity of immigrants with respect to their countries of origin (Adsera and Pytlikova, 2011; Pedersen et al., 2008). As a result of this change, the diversity of the workforce with respect to gender, age and ethnicity has increased. Finally, as a consequence of the worldwide globalization process and skill-biased technological changes, governments in many countries have taken steps to increase the skill level of the workforce (e.g., by increasing the supply of university-educated people and enhancing the availability of lifelong learning).

We observe increasing diversity across many workplaces and often hear about the importance of further internationalization and demographic diversification for firms. In many countries, firms' hiring decisions are affected by governmental affirmative action policies. Additionally, firms are under social pressure to increase diversity. At the same time, firms are challenged by the constantly changing demand for goods and services, as well as by new customers and markets, in today's globalized world. A diverse workforce may be a key factor in helping firms to understand and meet these new needs.

The popular press usually emphasizes workforce diversity as beneficial for firms, but is this really true? Do firms benefit from labor diversity and does it generate competitive advantage? What is the relationship between workplace labor diversity and firm performance? Although the issue is very important, there is considerable ambiguity surrounding this topic.

Economic theory suggests that workforce diversity may affect firm performance differently and through various channels. Diversity in skills and education may generate knowledge spillover among the employees within a firm (as long as workers' knowledge sets do not overlap and are relevant to one another), which positively affects firm performance (Lazear, 1999). However there are certain activities for which having workers with similar skills and education is preferable, as in the case of Kremer's O-ring production function, where profit-maximizing firms should match workers of similar skills/education together. Similarly, diversity in age can be beneficial to firms because the human capital of younger and older workers can complement each other. Younger employees have knowledge of new technologies and IT, and older employees have a better understanding of (and more experience with) intra-firm structures and the operating process (Lazear, 1998). However, Becker's model of co-worker discrimination suggests that demographic heterogeneity among workers may create communication friction if workers are prejudiced and may thus result in some productivity costs.

The expected contribution of ethnic and cultural diversity to firm performance is also unclear. Ethnic-cultural diversity may affect firm performance negatively because it may (i) hinder potential knowledge transfer among workers due to linguistic and cultural barriers, (ii) reduce peer pressure by weakening social ties and trust, and (iii) create non-pecuniary disutility associated with joining or remaining in an ethnically diverse firm (Lazear, 1999). A similar point regarding trust is made by Glaeser et al. (2000) and Alesina and La Ferrara (2002), who show that people often distrust members of other ethnic groups and tend to prefer interacting in culturally homogeneous communities. Conversely, ethnic diversity can be beneficial to firm performance, improving decision making and problem solving (Hong and Page, 2001, 2004), stimulating the creation of new ideas and favoring knowledge transfers (Berliant and Fujita, 2008). Further, workforce diversity may provide useful information to a firm about a product market, which can enhance the firm's ability to compete in global markets (Osborne, 2000; Rauch and Casella, 2003).

To the best of our knowledge, the empirical evidence concerning diversity and economic performance is fairly scarce, and most of the previous work in this area has employed case studies of one firm (e.g., Hamilton et al., 2003, 2004; Kurtulus, 2011; Leonard and Levine, 2006) or has used aggregate regional data (e.g., Ottaviano and Peri, 2006, 2012; Suedekum et al., 2009). The use of more comprehensive data in this field is fairly rare (Barrington and Troske, 2001; Iranzo et al., 2008; Navon, 2009; Grund and Westergaard-Nielsen, 2009; Garnero and Rycz, 2013). Furthermore, most previous studies have focused on only one dimension of diversity, with the studies reported by Barrington and Troske (2001), Kurtulus (2011) and Leonard and Levine (2006) being the only exceptions, and none of these studies has determined the effect of diversity on firm performance. Within this largely "explorative" and "descriptive" literature, there seems to be some consensus with respect to skill diversity as a positive factor in firm performance (Hamilton et al., 2003, 2004; Leonard and Levine, 2006; Iranzo et al., 2008; Navon, 2009; Kurtulus, 2011; Garnero and Rycz, 2013), but the evidence regarding diversity along ethnic and demographic lines is rather mixed. Case studies, for example, find that diversity with regard to age and race is negatively associated with firm performance (Hamilton et al., 2003, 2004; Leonard and Levine, 2006; Kurtulus, 2011), whereas studies using aggregated regional data find a positive correlation between ethnic diversity and performance (e.g., Ottaviano and Peri, 2006, 2012; Alesina and La Ferrara, 2005; Sparber, 2009; Suedekum et al., 2009; Peri, 2012). As this study, Fox and Smeets (2011) make use of the Danish matched employer–employee data-set and consider different skills levels of workers. Their work is primarily focused on quality dispersion within labor rather than on the role that diversity of inputs plays in making firms more or less productive.

In this paper, we use a unique register-based linked employer–employee data-set (LEED) from Denmark, which allows us to overcome many of the limitations of previous studies and to contribute to the literature in several ways. We follow two main econometric routes to investigate the association between diversity and firm productivity. First, we estimate a standard Cobb–Douglas function that includes labor as a single undifferentiated input, calculate the implied total factor productivity and in a second stage relate the latter to three relevant dimensions of diversity, i.e., cultural background, education and demographics, and using two alternative specifications of diversity, i.e., an aggregate and a disaggregate one. Implementing this "reduced-form" approach, we also explore the possible mechanisms through which workforce diversity affects firm productivity by attempting to test a set of hypotheses derived from existing theories. Specifically, we look at whether the impact of diversity on productivity arises from diversity within distinct occupational groups rather than the establishment's labor force in total, because we expect that diverse problem-solving abilities and creativity will be more strongly related to productivity in white-collar occupations than in blue-collar occupations. Additionally, we investigate the importance of communication costs and the costs of "cross-cultural dealing" by excluding certain groups of foreigners (i.e., individuals with tertiary education or those who speak a Germanic language) in calculating the ethnic diversity measures. The reduced-form approach allows us to identify which types of labor heterogeneity appear to descriptively matter but it does not formally take into account that the labor input is non-homogeneous in the production function, i.e.,

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