Birds, Birds, Birds: Co-Worker Similarity, Workplace Diversity and Job Switches

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Abstract

We investigate how the demographic composition of the workforce along the sex, nationality, education, age and tenure dimensions affects job switches. Fitting duration models for workers' job-to-job turnover rate that control for workplace fixed effects in a representative sample of large manufacturing plants in Germany during 1975–2016, we find that larger co-worker similarity in all five dimensions substantially depresses job-to-job moves, whereas workplace diversity is of limited importance. In line with conventional wisdom, which has that birds of a feather flock together, our interpretation of the results is that workers prefer having co-workers of their kind and place less value on diverse workplaces.

1. Introduction

Empirical analyses of job mobility are at the heart of labour economics. Studies are legion that investigate which worker and which employer characteristics, such as workers' sex, age and education as well as firm size and industry (e.g. Anderson and Meyer 1994; Frederiksen 2008; Griffeth *et al.* 2000; Royalty 1998), drive worker turnover. Yet, up to now, little is known on how the demographic composition of the workforce along key dimensions, such as sex, nationality, education, age and tenure, affects individual workers' job switches. In other words, we lack evidence on workers' revealed preferences about workforce demography, specifically on whether workers value demographically diverse work environments and/or prefer having co-workers of their kind.

To be sure, there exists a broad management literature on the turnover effect of what has been termed 'organizational demography' (Pfeffer 1985)

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that documents lower turnover in demographically more homogenous work environments (see the surveys by Joshi *et al.* 2011; Williams and O'Reilly 1998). Moreover, turnover and especially worker-initiated voluntary turnover have been shown to harm firm performance (Park and Shaw 2013), so that 'wrong' workforce demography poses a possible threat to a firm's competitiveness. Usually, though, evidence on the influence of workforce demography on turnover comes from the laboratory or from small-scale field studies. One strand of contributions in the management literature considers how the demographic composition of teams affects team members' turnover, and these papers thus refer to very specific settings that render external validity questionable. Another strand of management papers consists of observational studies that aim at more general conclusions. These papers lack a credible research design in that data constraints prevent them from moving beyond mere correlations between workforce demography and turnover to causal effects.[1] In contrast, our article uses a large sample of workplaces and follows demographic changes and retention over several decades in these workplaces. It therefore contributes to the management literature on the effects of demography on turnover by providing a causal identification strategy for a broad set of employers.

Apart from these limitations in terms of internal and external validity, existing studies only examine single aspects of workforce demography. When it comes to measuring workforce demography, most studies thus ignore that it encompasses two related, yet distinct, components: overall workplace diversity and co-worker similarity at the workplace level from an individual worker's perspective. At the aggregate level of the workplace, the workforce may be more or less diverse, for example, along the age dimension with either a lot or just a little variation in workers' age. Yet at the same time, from an individual worker's perspective, he or she may have more or less same-age co-workers for any given level of age diversity at the workplace. Hence, whereas workplace diversity reflects the variation of a demographic characteristic in the entire workforce, co-worker similarity captured by the share of co-workers with the same characteristic mirrors the abundance of demographically similar co-workers there from an individual worker's perspective. Consequently, co-worker similarity is a distinct determinant of job switches on top of workplace diversity if workers prefer having co-workers of their kind, which is suggested by many analyses.

In this article, we move beyond the extant literature by investigating the impact of both workplace diversity and co-worker similarity on job switches along many different demographic dimensions for a large representative set of plants, that is, single production sites or workplaces, in the West German manufacturing industry. Our unique data contain information on more than 3,000,000 full-time jobs in almost 1,800 large workplaces over an observation window spanning the years 1975–2016 and thus more than four decades. The data allow us to examine in detail how workplace diversity and co-worker similarity along the sex, nationality, education, age and tenure dimension affect job switches based on duration models for workers' job-to-job turnover

rate that control for permanent workplace unobservables and an unusually broad set of further determinants of job-to-job moves.

Our main finding will be that co-worker similarity along all five dimensions significantly reduces job switches, whereas workplace diversity plays a less important and a less unanimous role. In line with conventional wisdom, which has that birds of one feather flock together, our interpretation of the findings is that workers prefer having co-workers of their kind, but place less value on working in diverse workplaces.

The remainder of this article is structured as follows. Section 2 builds our hypotheses and reviews some of the relevant literature on the turnover effect of workforce demography. Section 3 introduces our data and empirical strategy and discusses possible threats to identification. Section 4 presents and discusses our empirical results, and Section 5 concludes.

2. Theoretical considerations and empirical challenges

Empirical research on job mobility is abundant with numerous studies examining the drivers of worker turnover at the worker and the employer levels. Yet, convincing empirical evidence on how workforce demography affects worker turnover is still scant. In particular, little is known about its impact on workers' job switches, which in turn would allow inferring workers' preferences about workforce demography. Although there exists a well-established management literature on the turnover effect of workplace demography (see the surveys by Joshi *et al.* 2011; Williams and O'Reilly 1998), existing observational studies almost unanimously lack a credible research design, so that they hardly move beyond mere correlations, and typically present only a narrow picture in analysing only few aspects of workforce demography.

In terms of dimensions, most studies consider only a single dimension of workforce demography, such as workers' sex or race, or, at best, few such dimensions at the same time. In terms of aggregation, studies either analyse measures of workplace diversity that capture the variation of a demographic characteristic across the entire workforce, such as an entropy index of workers' race, or similarity measures between an individual worker and his or her co-workers, such as the share of same-race co-workers at a workplace. However, workplace diversity and co-worker similarity capture distinct components of workforce demography, such as group dissimilarity and relational demography (Garnero *et al.* 2014; Ilmakunnas and Ilmakunnas 2011; Leonard and Levine 2006). They are thus neither orthogonal nor likely to affect workers' job switches in the same way.

Taking the stance of an individual worker, we expect co-worker similarity to reduce job-to-job moves. Because of homophily (McPherson *et al.* 2001), demographically similar workers are likely to share attitudes, values and beliefs and for this reason are likely to feel attracted to each other. Hence, if demographically similar co-workers are less abundant, we expect an individual

worker to be more inclined to switch jobs unless he or she is compensated for the less favourable work environment by a higher wage. This expectation is also borne out of discrimination theory, where in-group bias gives rise to a taste for discrimination (Becker 1971). This taste for discrimination causes workers to suffer a disutility from being surrounded by dissimilar (out-group) workers, and we expect this disutility, absent a compensating wage differential, to increase workers' job-to-job moves.

That said, in a competitive labour market compensating wage differentials would equalize workers' utility across jobs and switching jobs would thus be futile. For unpleasant job characteristics to induce job switches, labour market competition has to be imperfect, as would be the case under considerable search frictions. In such a setting, search frictions provide employers with wage-setting power and enable them to not fully compensate workers for unpleasant job characteristics (Manning 2003), and job switches, in turn, enable workers to move to jobs with preferable characteristics. Consequently, observing job switches and their correlates allows inferring worker preferences for certain job characteristics. In line with the notion of partial compensating wage differentials, previous studies have documented that adverse working conditions not only result in substantially lower job satisfaction, but also give rise to additional on-the-job search that finally results in more job switches, even when controlling for workers' wages and thus for possible compensating differentials (Böckerman and Ilmakunnas 2009; Cornelissen 2009).

Turning to the workplace level, theoretical predictions on the effect of workplace diversity on workers' job switches are less clear-cut. On the one hand, having a more diverse workforce is expected to hamper communication and conflict resolution (Lang 1986) and is thus likely to translate into less cooperation, more conflict and more job-to-job moves. On the other hand, it has been argued that workers value diversity because they show a love for variety in social interactions (Breit and Horowitz 1995), which would depress job-to-job moves.

Furthermore, from the employer's perspective, dealing with a diverse workforce that is more prone to conflict is likely to involve higher transaction costs and to harm firm productivity (Breit and Horowitz 1995). However, a more diverse workforce may also raise productivity by enhancing decision making and problem solving (Kochan *et al.* 2003), by improving the firm's adaptability to diverse product market environments (Osborne 2000), through better knowledge transfer (Lazear 1999), or through increased knowledge creation (Berliant and Fujita 2008). And, arguably better firm performance, in turn, facilitates worker retention. Resonating these conflicting predictions, studies have reached mixed conclusions on the productivity effect of workforce diversity (e.g. Barrington and Troske 2001; Ozgen and De Graff 2013; Parrotta *et al.* 2014; Trax *et al.* 2015). Therefore, it remains unclear how diversity affects job switches.

In terms of internal and external validity, '[c]onvincing studies are rare in part because it is challenging to measure the effects of workplace diversity' (Leonard and Levine 2006: 548). Problems arise not only because one needs

to have detailed information on the entire workforce to construct measures of co-worker similarity and workplace diversity along different demographic dimensions, but also because of workplace unobservables that influence worker turnover, such as local labour market conditions, management practices, job content, training opportunities. Absent truly random variation in workplace demography, omitting these workplace unobservables would yield bias, and to mitigate concerns, one would thus like to control for workplace fixed effects in longitudinal data, which are rarely available to researchers.

To the best of our knowledge, Leonard and Levine (2006) is the only study in the literature that investigates how co-worker similarity and workplace diversity along the sex, race and age dimension affect workers' overall turnover rate based on a credible research design. They analyse longitudinal data for over 800 workplaces of one large multi-establishment service-sector employer in the United States during an observation period of 30 months in 1996–1998. In contrast to existing observational studies, their data comprise many demographically varied workplaces and contain variation in workforce composition within workplaces, so that they can control for permanent unobserved workplace characteristics. Fitting linear probability models that account for workplace fixed effects, they find no consistent evidence that workplace diversity affects turnover, whereas co-worker similarity tends to lower the turnover rate.[2]

That said, Leonard and Levine's (2006) evidence, albeit superior to existing research in terms of internal validity, is still borne out of data for a single large employer from the service industry within a short observational window and thus refers to a very specific setting. In particular, the jobs under consideration are part-time jobs with very high turnover that only require basic skills and where workers receive only little training. It thus remains unclear whether their findings generalize to other settings, such as long-lasting jobs involving high (specific) human capital or jobs in different industries and occupations. What is more, they just examine overall turnover, but not job switches likely to reflect workers' on-the-job search. Yet, only investigating workforce demography's effect on job switches allows drawing conclusions on workers' preferences about workforce diversity and co-worker similarity. In contrast, our analysis considers all full-time jobs held at a representative sample of large workplaces in the West German manufacturing industry over an observation window spanning more than four decades and examines workers' job switches.

3. Data and empirical strategy

Administrative Linked Employer–Employee Data

In our empirical analysis of the impact of workplace demography on job switches, we will fit duration models for workers' job-to-job transition rate on administrative linked employer–employee data for West Germany that encompass the years 1975–2016. Our data stem from the Integrated

Employment Biographies (IEB) provided by the Institute for Employment Research (IAB) that are based on the notification procedure of the German health, pension and unemployment insurances (for details on the IEB, see Jacobebbinghaus and Seth 2007). This notification procedure requires employers to report all the information on their workers that is necessary to calculate social security contributions and thus renders these highly reliable data especially suited for analysing job durations and wages. Overall, the IEB covers about 80 per cent of all people employed in Germany and contains information on those workers' job durations (at daily frequency), daily gross wages (deflated by the consumer price index), occupation and individual characteristics (sex, age, education and nationality). Absent from the data are civil servants and the self-employed, who do not contribute to the social security system.

The IEB data further include identifiers that allow us to assign workers and their jobs to plants, that is, single production sites or workplaces, so that we can assume that there is interaction between workers at their workplaces (see also Cornelissen *et al.* 2017). To arrive at our sample, we select out of the universe of the IEB all workers holding jobs in a stratified 15 per cent random sample of large workplaces in the manufacturing sector in West Germany, where restricting to large workplaces allows workforce demography to vary smoothly along several of its dimensions.[3] We define five strata over plant size comprising the intervals 200–299, 300–399, 400–499, 500–999 and at least 1,000 workers, and assign a workplace to one of the size intervals whenever its minimum workforce during our period of observation lies within this interval. Furthermore, we exclude all workplaces that change their sector classification and that we observe for less than 10 years, which leads to a sample of workplaces where stable, long-lasting jobs are possible.

In the workplaces in our sample, we consider an inflow sample of all non-managerial jobs (based on occupational codes) that started after 1 January 1975, which is the first day observed in the IEB, and follow these jobs until they either end with the worker leaving the current employer (i.e. until a job separation) or until 31 December 2016, in which case, the job duration is right-censored at this point.[4] We further ignore job separations if the same employer recalls the worker within three months. In contrast to many studies on workers' job mobility — as well as to other papers using other data sets generated from the IAB data, such as Boockmann and Steffes (2010), Hirsch *et al.* (2010) and Schaffner (2011), the high frequency and the long time span of our data set allow us to fit duration models on an inflow sample of possibly long-lasting jobs, thereby accounting for left-truncation and right-censoring of job durations.

Whereas the information on job durations and daily gross wages included in our data is highly reliable, the data do not contain detailed information on hours worked. In addition, wages are top-coded at the social security contribution ceiling. Since we include workers' entry wage and wage growth as covariates in our duration models, we decided to deal with these drawbacks by considering jobs of full-time workers only, for whom wages are

comparable, and by imputing wages above the contribution ceiling using a heteroscedastic single imputation approach developed by Büttner and Rässler (2008) for the IAB data. Furthermore, information on workers' education is provided by employers on a voluntary basis and is therefore inconsistent or missing for some workers. To mitigate this problem, we impute the missing information on education by employing a procedure proposed by Fitzenberger *et al.* (2008) that allows inconsistent education information to be corrected.

Measuring Job Switches and Workforce Demography

Clearly, considering overall job separations mixes up both employer-initiated involuntary dismissals and worker-initiated job switches, where only voluntary switches following changing workplace demography are informative on workers' preferences. In our data, we cannot directly distinguish employer-initiated and worker-initiated separations, but we do observe whether jobs end with a separation to employment, which refers to a new job with another plant, or with a separation to non-employment, which refers to a subsequent period of registered unemployment or no observation in the IEB data at all.[5] In line with evidence from other German data sources (see, e.g. Hirsch 2016, for a comparison to the Socio-Economic Panel that allows us to distinguish between voluntary and involuntary separations), we argue that separations to employment primarily mirror worker-initiated job switches, whereas separations to non-employment predominantly mirror employer-initiated layoffs. We therefore consider workers' job-to-job separation rate and its relation to workforce demography as informative on their preferences, even though part of job switches may not be workers' voluntary choice. In a later check of robustness, we will scrutinize whether our findings are sensitive to restricting to job-to-job moves or carry over when considering overall turnover as well as turnover into non-employment.

In our data, we observe all workers in a workplace and, thus, we can use the information on individual workers to arrive at workplace-level and individual-level information on workforce demography, which we measure at yearly frequency as of 30th June in the respective year. In our analysis, we will consider workforce demography along the sex, nationality, education, age and tenure dimension both from the individual worker's perspective in terms of co-worker similarity and from the overall workplace perspective in terms of workforce diversity.

Specifically, for the three dimensions of workforce demography measured at nominal scale, we distinguish female and male workers, German and non-German workers as well as low-skilled (i.e. no vocational training), medium-skilled (i.e. with vocational training) and high-skilled (i.e. with academic education) workers. To capture co-worker similarity along these three dimensions, we consider the shares of same-sex, same-nationality and same-education workers in the workforce of the workplace. To measure workplace diversity, we use the Shannon diversity index

$$H = -\sum_{j=1}^{J} p_j \ln p_j,$$

where p_j denotes the share of workers belonging to group j at workplace level, for example, the share of low-skilled workers, and J denotes the overall number of groups, for example, the number of education groups. To facilitate interpretation, we normalize all Shannon diversity indices by dividing them by their maximum value, that is, by the log number of groups $\ln J$.

For the two metric dimensions of workforce demography, age and tenure, we capture co-worker similarity by considering the share of co-workers with the same age, that is, co-workers neither older nor younger than two and a half years compared to the worker, and the share of co-workers with the same tenure, that is, neither longer nor shorter tenure than six months compared to the worker. As measures of workplace diversity, we use the standard deviation in workers' age and tenure at workplace level.[6]

Econometric Approach

To investigate how workforce demography affects workers' job-to-job turnover rate, we fit hazard rate models for the duration of non-managerial jobs including our measures of co-worker similarity and workplace diversity. As a baseline specification, we model the instantaneous job-to-job separation rate of non-managerial job i at workplace $j(i)$ held by worker $m(i)$ as a Cox model

$$s_i\left[t|\mathbf{x}_{m(i)}(t),\mathbf{z}_{j(i)}(t)\right] = s_0(t)\exp\left[\mathbf{x}_{m(i)}(t)'\boldsymbol{\beta} + \mathbf{z}_{j(i)}(t)'\boldsymbol{\gamma}\right],$$

where $s_0(t)$ denotes the baseline hazard depending on job duration t (in days), $\mathbf{x}_{m(i)}(t)$ is a vector of worker covariates including our measures of co-worker similarity, $\mathbf{z}_{j(i)}(t)$ is a vector of workplace covariates including our measures of workforce diversity and $\boldsymbol{\beta}$ and $\boldsymbol{\gamma}$ are vectors of coefficients. Our main point of interest are the coefficients of our measures of workforce demography (observed at yearly frequency) that inform us on how larger co-worker similarity and workplace diversity along the sex, nationality, education, age and tenure dimension affect job switches.

As worker controls, we include groups of dummies for age (in five-year intervals), education, and occupation; a sex dummy; and a dummy for non-German citizenship, the worker's log entry wage as well as the log wage growth, that is, the log difference between the current and the entry wage. On top of standard demographic drivers of worker turnover identified in the previous literature (briefly surveyed in Section 2), inclusion of entry wages and wage growth is important because previous research, in particular the seniority wage literature initiated by Lazear (1979), has shown that high-wage (growth) employers experience less turnover (Bronars and Famulari 1997; Zwick 2012) and because we have to control for possible wage differentials compensating

for unpleasant work conditions (Böckerman and Ilmakunnas 2009; Manning 2003).

Workplace controls include groups of share variables that capture the composition of the workforce along the sex, nationality, education, age and tenure dimension (the latter two in five-year intervals) as of 30th of June of each year, dummies for two-digit industry and plant size, a full set of year dummies and two dummy variables indicating an expanding or a shrinking workforce (by more than 10 per cent), respectively.[7] The latter two variables are meant to control for employers' hiring and firing behaviour. Previous studies, such as Varejão and Portugal (2007), have established marked non-convexities in employment adjustment costs, meaning that labour adjustment is expected to be lumpy and that phases of active hiring and firing are visible from large changes in the workforce. Such phases of active employment adjustment, in turn, may not only trigger changes in workforce demography but also changes in (unobserved) worker quality with, as a case in point, 'surviving' workers during a phase of active firing being high-quality workers likely to have better outside options and thus more job switches. To avoid bias stemming from such active hiring and firing, we control for large changes in the workforce.

One obvious concern with our Cox regression is omitted variables bias stemming from unobserved workplace characteristics that are correlated with job switches. To address these omitted factors, in a second specification, we model the instantaneous job-to-job separation rate of non-managerial jobs as a stratified Cox model

$$s_i\left[t|\mathbf{x}_{m(i)}\left(t\right),\mathbf{z}_{j(i)}\left(t\right)\right] = s_{0j(i)}(t)\exp\left[\mathbf{x}_{m(i)}(t)'\boldsymbol{\beta} + \mathbf{z}_{j(i)}(t)'\boldsymbol{\gamma}\right],$$

where $s_{0j(i)}(t)$ now denotes a baseline hazard that is specific to workplace $j(i)$ and thus encompasses unobserved permanent workplace characteristics.[8] To estimate the stratified Cox model, we adopt the stratified partial likelihood estimator. This estimator allows us to sweep out the workplace-specific baseline hazard without the need to identify it and, thus, allows us to estimate the covariates' coefficients $\boldsymbol{\beta}$ and $\boldsymbol{\gamma}$ while controlling for permanent workplace unobservables in a similarly convenient way as with the within estimator in linear fixed-effects models (Ridder and Tunalı 1999). Stratified partial likelihood estimation does so by resting identification on within variation at the workplace level and therefore requires multiple jobs per workplace. It is feasible with our data because we observe an inflow sample of all non-managerial full-time jobs at large workplaces in the manufacturing industry and thus sufficient within-workplace variation to obtain precise estimates.

When interpreting the estimated coefficients, however, we have to bear in mind the source of identification. The coefficients of the workforce demography variables are now identified from variation in the demographic composition of the workforce within workplaces and, thus, inform us on how workers' job switches respond to workplace-level changes in co-worker

similarity and workplace diversity controlling for many observable worker and workplace characteristics as well as permanent workplace unobservables.

Threats to Identification

Yet, one may still wonder whether it is legitimate to consider the responses in workers' job switches to varying workforce demography as causal effects. In other words, one may doubt the exogeneity of the co-worker similarity and workforce diversity variables in the stratified Cox regression because we lack credible quasi-experimental variation in these.

Clearly, within-workplace changes in workforce demography could be regarded as exogenous if employers hired workers without giving thought on how these workers' demographic characteristics feed back into workplace demography and job switches and if workers entered jobs without caring for workforce demography, either. Turning to employers, they may simply neglect such side effects of recruiting because in adjusting their employment, they mainly react to the current labour market situation or the (expected) demand for their goods (as argued by Pfeffer 1985). Furthermore, the identifying transient fluctuations of workforce demography (around the permanent levels controlled for by the fixed workplace effects) may stem from sources outside the employer's control, such as labour market imperfections originating in information asymmetries and mobility costs or worker voice institutions such as works councils.

Crucially, though, even if they wanted to, employers could not simply change single components of workforce demography in isolation. As a case in point, increasing co-worker similarity for one type of workers, for example, for high-skilled workers, inevitably decreases co-worker similarity for other types of workers, namely, for low-skilled and medium-skilled workers. Similarly, changing workplace diversity necessarily involves raising co-worker similarity for some types of workers and lowering co-worker similarity for other types. Hence, any employment adjustment will imminently induce temporary fluctuations in workforce demography that affect workers' job switches. We suspect employers not to care much — or to be able to do so — about such transient fluctuations in workforce demography since these yield (unintended) temporary costs that are likely to be small (permanent differences are taken care of by the workplace fixed effects).

That said, the last decades have seen increased interest in the 'business case for diversity' from managers and scientists alike (see Kochan *et al.* 2003, for a detailed discussion) and more engagement in diversity-management practices. Employers' attempts to manage diversity may thus render workplace diversity in part endogenous, although controlling for time and workplace fixed effects takes care of general economy-wide trends towards more workforce diversity as well as permanent differences in diversity across workplaces. Yet, we cannot rule out that our estimated effects of workplace diversity still suffer from some bias (though, somewhat reassuringly, we observe little trending in average workplace diversity over time, see below). At a minimum, we argue

TABLE 1
Jobs and Turnover (Percentages in Parentheses)

Jobs	3,356,018
Job separations (turnover)	3,034,172 (90.4)
... to employment	1,323,338 (39.4)
... to non-employment	970,810 (51.0)
Right-censored job durations	275,630 (9.6)
Observations	19,399,797
Workers	2,634,091
Workplaces	1,780

that workplace diversity measures serve as suitable control variables when turning to the effects of co-worker similarity from the individual worker's perspective that cannot be managed by employers but is closely intertwined with workplace-level changes in diversity.

Turning to workers, one may wonder whether workers who, as we hypothesized, prefer demographically similar co-workers may select into jobs based on workforce demography. This self-selection of workers, however, hinges on workforce demography being observable to workers *before* starting the job, and workforce demography is arguably hard to assess from the outside. What is more, workers applying for a job are unlikely to select themselves into jobs based on transient fluctuations in workforce demography, with permanent differences across workplaces controlled for in the stratified Cox regression.

In summary, we feel confident that given the non-experimental nature of our data, the stratified Cox regression comes as close as possible to credibly identify the causal effect of co-worker similarity and, perhaps to a somewhat lesser degree, the causal effect of workplace diversity on workers' job switches. Hence, we think that our estimates permit us to shed light on workers' preferences about workforce demography, in particular, about co-worker similarity.

4. Results

Descriptive Analysis

Before turning to the Cox regressions, we present some descriptive evidence based on the inflow sample of all the 3,356,018 non-managerial jobs held by 2,634,091 workers during the period 1975–2016 in our representative sample of 1,780 large manufacturing workplaces in West Germany. As is seen from Table 1, about 40 per cent of jobs end with a separation to employment, that is, a job switch, roughly 50 per cent involve a separation to non-employment and 10 per cent are right-censored, in that, they did not end before 31 December 2016 (for further descriptive statistics, see Table 2).

Remarkably and in contrast to recent contributions claiming that workplace diversity shows a secular upward trend (e.g. Kochan *et al.* 2003; Parrotta

TABLE 2
Selective Descriptive Statistics

Variable	Mean	Std. dev.
Workforce demography		
Share of same-sex co-workers	0.701	0.241
Share of same-nationality co-workers	0.761	0.257
Share of same-education co-workers	0.584	0.249
Share of same-age co-workers	0.137	0.053
Share of same-tenure co-workers	0.139	0.181
Sex diversity index	0.676	0.235
Nationality diversity index	0.547	0.243
Education diversity index	0.632	0.153
Standard deviation of workers' age	10.526	1.005
Standard deviation of workers' tenure	5.566	2.740
Worker characteristics		
Female (dummy)	0.230	0.421
Non-German nationality (dummy)	0.164	0.370
Low-skilled (dummy)	0.212	0.409
Medium-skilled (dummy)	0.680	0.467
High-skilled (dummy)	0.108	0.310
Age (years)	36.655	11.055
Tenure (years)	5.580	6.526
Log entry wage (€)	4.403	0.450
Log wage growth (€)	0.167	0.312
Workplace characteristics		
Share of female workers	0.241	0.177
Share of non-German workers	0.153	0.115
Share of low-skilled workers	0.207	0.165
Share of medium-skilled workers	0.682	0.155
Share of high-skilled workers	0.111	0.125
Share of workers aged up to 20 years	0.009	0.011
Share of workers aged 21–25 years	0.078	0.048
Share of workers aged 26–30 years	0.113	0.048
Share of workers aged 31–35 years	0.130	0.044
Share of workers aged 36–40 years	0.140	0.039
Share of workers aged 41–45 years	0.145	0.037
Share of workers aged 46–50 years	0.142	0.040
Share of workers aged 51–55 years	0.128	0.045
Share of workers aged 56–60 years	0.089	0.041
Share of workers aged more than 60 years	0.026	0.025
Share of workers with tenure up to 5 years	0.445	0.237
Share of workers with tenure 6–10 years	0.237	0.184
Share of workers with tenure 11–15 years	0.154	0.151
Share of workers with tenure 16–20 years	0.088	0.111
Share of workers with tenure 21–25 years	0.044	0.072
Share of workers with tenure 26–30 years	0.021	0.043
Share of workers with tenure 31–35 years	0.009	0.025
Share of workers with tenure more than 35 years	0.003	0.013
Plant size	6,091	13,910
Employment growth by more than 10% (dummy)	0.136	0.342
Employment decline by more than 10% (dummy)	0.070	0.254
Observations	19,399,797	
Jobs	3,356,018	
Workers	2,634,091	
Workplaces	1,780	

TABLE 3
Median of Workplace Diversity Measures by Year

Year	Shannon diversity index			Standard deviation	
	Sex	Nationality	Education	Age	Tenure
1975	0.668	0.516	0.668	11.027	0.032
1976	0.657	0.511	0.669	10.712	0.284
1977	0.647	0.504	0.662	10.581	0.629
1978	0.650	0.496	0.665	10.672	0.991
1979	0.644	0.496	0.666	10.703	1.396
1980	0.645	0.511	0.665	10.832	1.831
1981	0.651	0.509	0.667	10.696	2.141
1982	0.647	0.502	0.667	10.813	2.480
1983	0.631	0.476	0.665	10.640	2.696
1984	0.639	0.475	0.666	10.660	3.094
1985	0.642	0.474	0.664	10.784	3.591
1986	0.640	0.463	0.664	11.130	4.131
1987	0.639	0.465	0.663	11.122	4.484
1988	0.643	0.458	0.664	10.959	4.783
1989	0.652	0.464	0.667	10.938	5.116
1990	0.652	0.503	0.662	11.057	5.508
1991	0.651	0.514	0.657	11.012	5.854
1992	0.653	0.514	0.650	10.862	6.053
1993	0.644	0.515	0.649	10.517	6.213
1994	0.639	0.499	0.645	10.277	6.334
1995	0.624	0.528	0.641	10.145	6.584
1996	0.623	0.526	0.641	10.057	6.724
1997	0.629	0.517	0.636	9.997	6.909
1998	0.657	0.512	0.630	10.075	7.094
1999	0.705	0.549	0.647	10.155	7.288
2000	0.669	0.518	0.633	10.074	7.457
2001	0.675	0.536	0.629	10.060	7.571
2002	0.667	0.519	0.630	10.004	7.613
2003	0.673	0.515	0.627	9.920	7.738
2004	0.684	0.513	0.636	9.851	7.631
2005	0.661	0.512	0.649	9.877	7.527
2006	0.680	0.499	0.633	9.881	7.477
2007	0.674	0.509	0.630	9.971	7.510
2008	0.673	0.506	0.628	10.137	7.699
2009	0.669	0.491	0.632	10.031	7.783
2010	0.677	0.485	0.634	10.073	7.805
2011	0.683	0.492	0.634	10.260	8.013
2012	0.677	0.510	0.641	10.489	8.159
2013	0.684	0.503	0.642	10.597	8.336
2014	0.694	0.507	0.658	10.844	8.515
2015	0.708	0.508	0.672	10.959	8.612
2016	0.713	0.511	0.677	11.069	8.660

et al. 2014), we do not observe such a secular rise in our data. Based on yearly medians of our workplace diversity measures across workers along the sex, nationality, education, age and tenure dimension reported in Table 3, we see little trending at all. For the typical worker, workplace diversity did not change much over our four decades of data. The sole exception is the tenure dimension, but the apparent upward trend here simply reflects a data artefact borne out of the fact that workers' tenure is left-censored at 1 January

1975 (i.e. the starting date of the IEB data records). Our inflow sample results in overstated tenure similarity and understated tenure diversity in early years and thus contaminates descriptive analyses. In our Cox regressions, this problem is taken care of by the year fixed effects, and we also checked whether confining our analysis to the later part of our observational window, where the censoring loses bite, altered our findings, which it did not (see footnote 10). Notably, the absence of clear trending in our diversity measures is at odds with the notion that employers' diversity-management practices led to a rise in workplace diversity and alleviates concerns to some extent that active diversity management poses a major threat to identification, as discussed in the previous section.[9]

Turning to co-worker similarity (see Table 4), we do not see much trending either, with the exception of the education (and, again, by construction the tenure) dimension. The median share of same-education co-workers rises from about 55 per cent to 65 per cent in the first one and a half decades of our observational window and then oscillates between 65 per cent and 70 per cent. The initial rise is likely to mirror the impact of education expansion in Germany during the 1960s and 1970s on the inflow of workers starting new jobs in our sample of workplaces.

To get a first impression whether co-worker similarity and workplace diversity are related to workers' job switches, Figures 1 and 2 show separate Kaplan–Meier curves for jobs with above-median and below-median co-worker similarity or workforce diversity in the sex, nationality, education or age dimension, respectively. (We do not present descriptive evidence for tenure similarity and tenure diversity for the reasons discussed in the penultimate paragraph.) Figure 1 documents substantially larger survival rates for workers with high co-worker similarity along the sex, nationality and education dimensions. Along the age dimension, we see only little differences with survival curves diverging in the first 10 years or so of job duration and then converging again.

Turning to workplace diversity, the descriptive evidence shown in Figure 2 is quite mixed. Along the sex and education dimensions, high workplace diversity comes along with lower survival rates, though Kaplan–Meier curves converge again at high job durations of more than 20 years or so. For the nationality and the age dimensions, there is no clear pattern with intersecting survival curves. Our descriptive findings are thus in line with our theoretical predictions that high co-worker similarity depresses job switches and workplace diversity has less clear-cut effects.

Multivariate Evidence from the Cox Regression

We now turn to the results of our econometric analysis of how workforce demography affects workers' job switches. As a baseline specification, we run a Cox regression for the job-to-job turnover rate including the worker and workplace covariates detailed in the 'Econometric Approach' section. In particular, we include our measures for co-worker similarity and

TABLE 4
Median of Co-worker Similarity Measures by Year

Year	Share of workers with the same				
	Sex	*Nationality*	*Education*	*Age*	*Tenure*
1975	0.789	0.876	0.550	0.133	1.000
1976	0.798	0.878	0.548	0.135	0.906
1977	0.805	0.878	0.593	0.136	0.807
1978	0.801	0.888	0.591	0.136	0.722
1979	0.798	0.884	0.587	0.135	0.621
1980	0.799	0.881	0.589	0.134	0.518
1981	0.800	0.884	0.588	0.134	0.452
1982	0.803	0.889	0.585	0.134	0.385
1983	0.813	0.895	0.593	0.136	0.333
1984	0.811	0.898	0.600	0.135	0.242
1985	0.811	0.895	0.607	0.133	0.175
1986	0.811	0.898	0.621	0.132	0.150
1987	0.808	0.895	0.633	0.133	0.132
1988	0.806	0.894	0.639	0.134	0.117
1989	0.798	0.894	0.642	0.134	0.112
1990	0.798	0.887	0.649	0.133	0.108
1991	0.802	0.880	0.657	0.134	0.104
1992	0.803	0.872	0.665	0.135	0.097
1993	0.807	0.877	0.674	0.140	0.088
1994	0.813	0.879	0.683	0.144	0.083
1995	0.813	0.874	0.685	0.146	0.081
1996	0.814	0.876	0.688	0.147	0.078
1997	0.812	0.877	0.692	0.148	0.074
1998	0.802	0.874	0.685	0.146	0.073
1999	0.776	0.858	0.670	0.145	0.075
2000	0.791	0.869	0.691	0.145	0.080
2001	0.792	0.863	0.691	0.145	0.080
2002	0.790	0.871	0.691	0.145	0.077
2003	0.792	0.875	0.693	0.147	0.073
2004	0.787	0.875	0.690	0.148	0.071
2005	0.789	0.875	0.689	0.149	0.068
2006	0.788	0.881	0.686	0.149	0.066
2007	0.790	0.877	0.690	0.148	0.063
2008	0.790	0.876	0.696	0.145	0.062
2009	0.789	0.881	0.690	0.146	0.061
2010	0.785	0.882	0.692	0.146	0.058
2011	0.780	0.883	0.695	0.144	0.057
2012	0.779	0.882	0.689	0.140	0.057
2013	0.782	0.878	0.680	0.138	0.057
2014	0.780	0.873	0.670	0.135	0.058
2015	0.771	0.872	0.662	0.134	0.058
2016	0.780	0.868	0.653	0.133	0.059

workforce diversity along the sex, nationality, education, age and tenure dimension.

Our core results are shown in Table 5 that presents estimates for the covariates capturing workforce demography. Remarkably, all dimensions of co-worker similarity are negatively related to job switches and statistically significant at the 1 per cent level. A 10 percentage points larger share of same-sex co-workers is associated with a fall in the job-to-job turnover rate

FIGURE 1
Kaplan–Meier Curves by Co-Worker Similarity. [Colour figure can be viewed at wileyonlinelibrary.com]
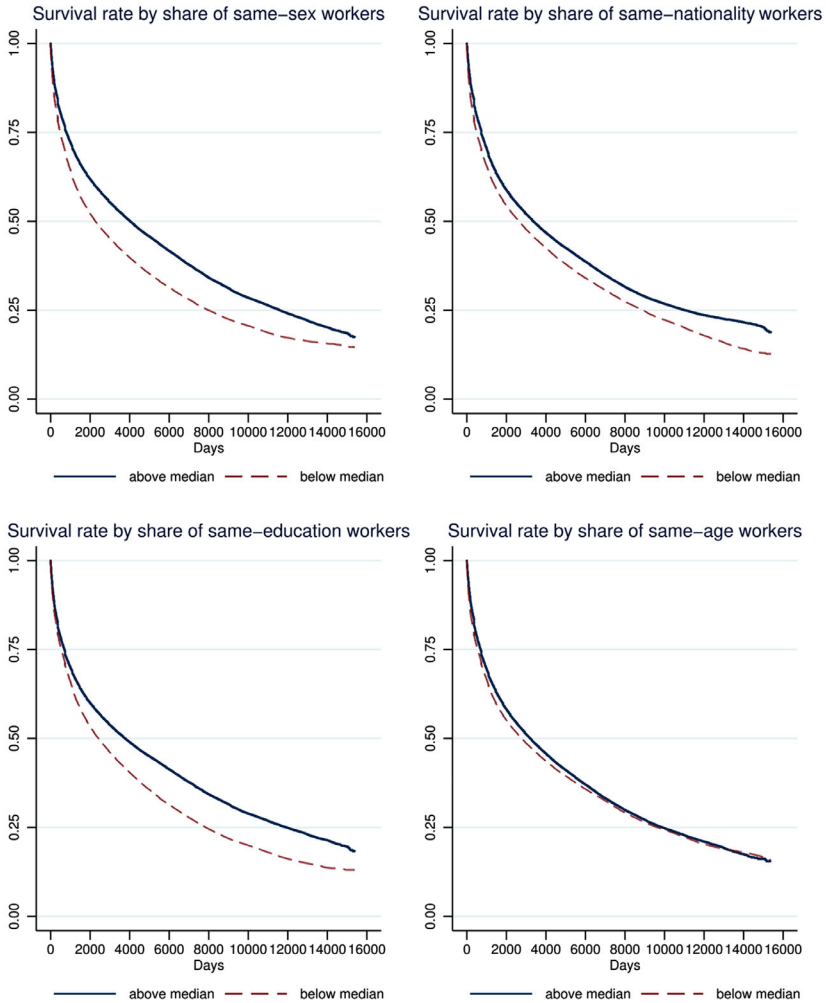
by 1.5 per cent.[10] Furthermore, a 10 percentage points larger share of same-nationality (same-education) co-workers comes along with a fall in the job-to-job turnover rate by 1.2 (1.9) per cent, and a 10 percentage points larger share of same-age (same-tenure) co-workers is associated with a larger drop of the rate by 8.0 (6.5) per cent. Note, however, that there is considerably less variation in co-worker similarity in age and tenure (see Table 2), meaning that standardized effect sizes do not differ that much across our five dimensions of co-worker similarity. Specifically, a one standard deviation increase in any of our five measures of co-worker similarity is associated with a decrease of the

FIGURE 2

Kaplan–Meier Curves by Workplace Diversity. [Colour figure can be viewed at wileyonlinelibrary.com]
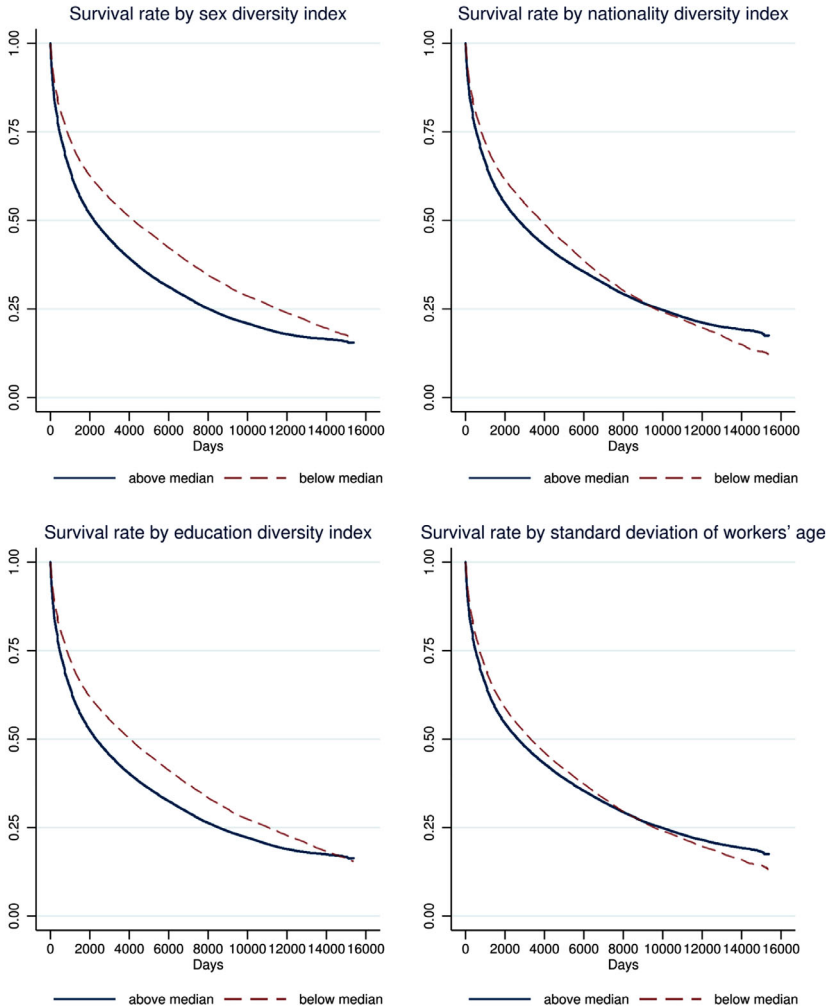
job-to-job turnover rate by 3.1–11.5 per cent. Standardized effect sizes of co-worker similarity are comparable along the sex (3.6 per cent), nationality (4.8 per cent), education (3.1 per cent) and age (4.3 per cent) dimension, whereas the standardized effect of tenure similarity is somewhat larger (11.5 per cent).

Turning to workplace diversity, four out of five dimensions of diversity show no statistically significant association with job switches. The sole exception is age diversity, where an increase in the standard deviation of workers' age by one, which coincides with the standard deviation of age diversity in our sample (see Table 2), is associated with a 9.8 per cent lower job-to-job transition rate, which is statistically significant at the 1 per cent level.

TABLE 5
Cox Regression for Workers' Job-to-Job Turnover Rate

Variable	Coefficient	SE
Share of same-sex co-workers	−0.152***	(0.024)
Share of same-nationality co-workers	−0.191***	(0.025)
Share of same-education co-workers	−0.125***	(0.026)
Share of same-age co-workers	−0.836***	(0.121)
Share of same-tenure co-workers	−0.673***	(0.088)
Sex diversity index	−0.031	(0.098)
Nationality diversity index	0.212	(0.133)
Education diversity index	−0.037	(0.150)
Standard deviation of workers' age	−0.103***	(0.022)
Standard deviation of workers' tenure	−0.019	(0.021)

Note: Estimates come from a Cox regression for the job-to-job turnover rate. Worker covariates included are (groups of) dummy variables for sex, non-German citizenship, education, age and one-digit occupation, as well as the log entry wage and the log difference between the current and the entry wage. Workplace covariates are (groups of) dummy variables for plant size, two-digit industry, employment growth and decline by more than 10%, the shares of female, foreign, high-skilled and low-skilled workers, as well as groups of share variables capturing the age and tenure of the workforce. Standard errors are clustered at the workplace level. ***/**/* indicates statistical significance at the 1%/5%/10% level.

In line with theory and our descriptive findings, estimates from the Cox regression point at a clear negative association between co-worker similarity and job switches. Moreover, job switches show little association with workplace diversity, which is consistent with our inconclusive descriptive evidence and the mixed theory predictions.

Note that the omitted estimates for the other worker and workplace covariates show no surprises (with detailed results available upon request). In line with previous studies, we find, for example, higher job-to-job turnover rates for males, more skilled and younger workers and those employed in large plants. Further, job-to-job moves are less frequent for non-German workers and those with higher entry wages and more pronounced wage growth.

Multivariate Evidence from the Stratified Cox Regression

Yet, our estimates from the simple Cox regression may suffer from bias rooted in permanent workplace unobservables. In the next step, we therefore redo our analysis running a stratified Cox regression that controls for workplace fixed effects and that rests identification on within-workplace variation in workforce demography across jobs. As argued in detail in section 'Threats to Identification', these estimates are likely to be informative on the causal effect of co-worker similarity and workforce demography because they rely on transient fluctuations in workforce demography that are unlikely to affect employers' hiring decisions and workers' self-selection into jobs.

As Table 6 makes clear, all measures of co-worker similarity still significantly negatively affect workers' job switches, both from a statistical and an economic

TABLE 6
Stratified Cox Regression for Workers' Job-to-Job Turnover Rate

Variable	Coefficient	SE
Share of same-sex co-workers	−0.184***	(0.024)
Share of same-nationality co-workers	−0.217***	(0.030)
Share of same-education co-workers	−0.168***	(0.024)
Share of same-age co-workers	−0.895***	(0.088)
Share of same-tenure co-workers	−0.788***	(0.072)
Sex diversity index	0.218	(0.143)
Nationality diversity index	0.023	(0.185)
Education diversity index	−0.401**	(0.189)
Standard deviation of workers' age	−0.174***	(0.021)
Standard deviation of workers' tenure	−0.028	(0.023)

Note: Estimates come from a stratified Cox regression for the job-to-job turnover rate at workplace level. Worker covariates included are (groups of) dummy variables for sex, non-German citizenship, education, age and one-digit occupation, as well as the log entry wage and the log difference between the current and the entry wage. Workplace covariates are (groups of) dummy variables for plant size, employment growth and decline by more than 10%, the shares of female, foreign, high-skilled and low-skilled workers, as well as groups of share variables capturing the age and tenure of the workforce. Standard errors are clustered at the workplace level. ***/**/* indicates statistical significance at the 1%/5%/10% level.

point of view. Notably, (standardized) effect sizes of all similarity measures change only little compared to the simple Cox regression. A rise in the shares of same-sex, same-nationality or same-education workers by 10 percentage points lowers the job-to-job turnover rate by 1.7–2.2 per cent, and a 10 percentage points rise in the share of same-age (same-tenure) workers leads to a fall in the rate by 7.6 (8.6) per cent.

Turning to workplace diversity, we see some changes in the estimated effects *vis-à-vis* the simple Cox regression, although the overall picture remains similar. Three out of five diversity measures — related to sex, nationality and tenure diversity — show no statistically significant effect on workers' job switches. Other than in the simple Cox model, an increase in the education diversity index by 0.15, that is one standard deviation in our sample, leads to a statistically significant (at the 5 per cent level) drop in the job-to-job turnover rate by 5.8 per cent. Similar to the simple Cox model, we find that a one-standard-deviation increase in the standard deviation of workers' age (by about one) lowers the job-to-job turnover rate by 16.0 per cent, which is again statistically significant at the 1 per cent level.[11]

In summary, we see that higher co-worker similarity along all five dimensions significantly reduces job switches. This finding is consistent with both theory and our descriptive results, and it is also in line with conventional wisdom, which has that birds of one feather flock together. In contrast, our results for workforce diversity are mixed, which is again in line with theory that points at opposing effects and the mixed descriptive evidence. Together, our results imply that workers prefer having co-workers of their kind and place less value on working in diverse workplaces.

TABLE 7
Stratified Cox Regressions for Workers' Overall Turnover Rate and Workers' Turnover Rate into Non-Employment

Variable	Overall turnover		Turnover into non-employment	
	Coefficient	SE	Coefficient	SE
Share of same-sex co-workers	–0.189***	(0.021)	–0.126***	(0.018)
Share of same-nationality co-workers	–0.204***	(0.027)	–0.175***	(0.034)
Share of same-education co-workers	–0.052**	(0.025)	0.015	(0.045)
Share of same-age co-workers	–1.123***	(0.077)	–1.222***	(0.082)
Share of same-tenure co-workers	–0.839***	(0.048)	–0.867***	(0.045)
Sex diversity index	0.050	(0.089)	–0.109	(0.095)
Nationality diversity index	–0.074	(0.120)	–0.136	(0.119)
Education diversity index	–0.147	(0.112)	0.174	(0.108)
Standard deviation of workers' age	–0.100***	(0.019)	–0.025*	(0.015)
Standard deviation of workers' tenure	–0.046***	(0.016)	–0.055***	(0.013)

Note: Estimates come from a stratified Cox regression for the overall turnover rate or the turnover rate into non-employment, respectively, at workplace level. Worker covariates included are (groups of) dummy variables for sex, non-German citizenship, education, age and one-digit occupation, as well as the log entry wage and the log difference between the current and the entry wage. Workplace covariates are (groups of) dummy variables for plant size, employment growth and decline by more than 10%, the shares of female, foreign, high-skilled and low-skilled workers, as well as groups of share variables capturing the age and tenure of the workforce. Standard errors are clustered at the workplace level. ***/**/* indicates statistical significance at the 1%/5%/10% level.

Checks of Robustness

One of the advantages of our data is that we observe whether a job separation involves a job-to-job move and is thus likely to reflect job switches initiated by the worker, or instead a transition to non-employment, likely to be initiated by the employer. We also argued that changes in job switches are thus informative on workers' preferences about workplace demography, even though part of these may not be workers' voluntary choice. In order to investigate our results' robustness, we now re-estimate our preferred stratified Cox specification for workers' overall turnover rate as well as their turnover rate into non-employment.

As Table 7 makes clear, our conclusions for job-to-job turnover carry over to overall turnover. Still, all five dimensions of co-worker similarity affect turnover in a statistically significant way, with very similar effect sizes. Only the effect of education similarity becomes markedly smaller. This result is borne out of the fact that (except for education similarity) co-worker similarity also affects turnover into non-employment significantly negatively. These findings do make sense against the background of our theoretical considerations in Section 2, where we identified homophily and in-group bias as likely factors behind workers' preference for similar co-workers. If these are important, co-worker dissimilarity is expected to hamper communication and conflict resolution, and increased conflict and deteriorating communication, in turn, are expected to harm performance and thus provide employers with

TABLE 8
Stratified Cox Regressions for Workers' Job-to-Job Turnover Rate When Only Including
Workforce Diversity or Co-Worker Similarity Measures

Variable	Coefficient	SE
Share of same-sex co-workers	−0.199***	(0.026)
Share of same-nationality co-workers	−0.213***	(0.034)
Share of same-education co-workers	−0.140***	(0.027)
Share of same-age co-workers	−0.670***	(0.107)
Share of same-tenure co-workers	−0.746***	(0.070)
Sex diversity index	0.312**	(0.142)
Nationality diversity index	0.153	(0.191)
Education diversity index	−0.286	(0.190)
Standard deviation of workers' age	−0.160***	(0.022)
Standard deviation of workers' tenure	−0.012	(0.024)

Note: Estimates come from stratified Cox regressions for the job-to-job turnover rate at workplace level that only include measures of either co-worker similarity or workforce diversity, respectively. Worker covariates included are (groups of) dummy variables for sex, non-German citizenship, education, age and one-digit occupation, as well as the log entry wage and the log difference between the current and the entry wage. Workplace covariates are (groups of) dummy variables for plant size, employment growth and decline by more than 10%, the shares of female, foreign, high-skilled and low-skilled workers, as well as groups of share variables capturing the age and tenure of the workforce. Standard errors are clustered at the workplace level. ***/**/* indicates statistical significance at the 1%/5%/10% level.

the incentive to lay off those workers at the heart of the problem, that is workers surrounded by few similar co-workers. Hence, if workers prefer having co-workers of their kind, we also expect transitions to non-employment to be negatively related to co-worker similarity, which still reflects worker preferences. That said, we cannot rule out the possibility that workers actually like having dissimilar co-workers and that the increase in transitions to non-employment stems from deteriorating employer performance as workers, despite their goodwill, struggle to co-operate effectively.

As argued previously, workforce diversity and co-worker similarity are two distinct theoretical aspects of workforce demography that are nonetheless closely intertwined. One may thus wonder how different the two concepts in practice really are and whether including both kinds of measures as covariates in our stratified Cox regressions may give rise to a collinearity problem. Descriptively, we observe a non-trivial, yet far from perfect negative correlation between the share of co-workers with the same demographic characteristic and the respective diversity measure for all five dimensions of workforce demography that ranges between −0.55 and −0.22. Hence, the two groups of variables seem far from capturing the same thing. To rule out that part of our findings are driven by collinearity, Table 8 presents two stratified Cox regressions for workers' job-to-job transition rate that only include either measures of co-worker similarity or measures of workforce diversity. Reassuringly, both effect sizes and the precision of estimates change little compared to the stratified Cox regression that includes both aspects of workforce demography simultaneously.

We also experimented with alternative diversity measures. Specifically, we re-estimated our preferred stratified Cox specification using Herfindahl diversity indices for both the nominal and the metric dimensions of workforce diversity, where we obtained Herfindahl indices for the latter by defining five-year bins of workers' age and tenure. Doing so had little impact on our findings and did not change any of our conclusions (results available upon request). Notably, we observe large positive correlations (ranging from 0.75 to 0.99) between the Herfindahl indices and our preferred diversity measures, which underscores that these two groups of measures are very similar indeed.

Heterogeneity Analysis

So far, our stratified Cox regressions restricted the impact of workforce demography on job switches to be the same for all workers. Yet, it is tempting to expect that workers' preference for having co-workers of their kind varies with their own socio-demographic characteristics. Therefore, in a next step, we estimate stratified Cox regressions separately for female and male workers, for German and non-German workers as well as for low-skilled, medium-skilled, and high-skilled workers, restricting our attention to the impact of the five dimensions of co-worker similarity.[12] As already stressed in footnote 6, identifying the effect of a change in the share of co-workers with the same demographic characteristic in essence rests on an interaction effect of a dummy indicating that the individual worker holds this characteristic and the share of workers in the workforce with this characteristic (e.g. an interaction term of a female dummy with the share of female workers). In consequence, the resulting collinearity renders it impossible to check for heterogeneous effects of co-worker similarity in one dimension across sub-groups of workers differing along this dimension. When conducting the sub-group analysis for, say, male and female workers, we therefore drop the share of same-sex co-workers from the model.

Table 9 shows the core results of our sub-group analysis and makes clear that all dimensions of co-worker similarity significantly negatively affect job switches for all sub-groups of workers, the only exception being high-skilled workers, for whom three out of four dimensions of co-worker similarity lose statistical significance. The latter finding is consistent with the conjecture that highly educated individuals are more open and tolerant when it comes to dissimilar co-workers than less educated workers, for whom co-worker similarity significantly influences job switches. Notably, co-worker similarity's impact on job switches is, with the exception of the tenure dimension, generally more pronounced for female compared to male workers and for non-German compared to German workers. As females and foreigners are the usual suspects when it comes to holding a minority position, this finding is in line with the notion that co-worker similarity in one dimension gets more important when being in a minority position in another dimension.[13]

TABLE 9
Stratified Cox Regressions for Workers' Job-to-Job Turnover Rate for Sub-Groups of Workers

Variable	Low-skilled workers		Medium-skilled workers		High-skilled workers	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
Share of same-sex co-workers	−0.362***	(0.038)	−0.148***	(0.022)	−0.021	(0.059)
Share of same-nationality co-workers	−0.272***	(0.048)	−0.168***	(0.035)	−0.005	(0.069)
Share of same-age co-workers	−2.239***	(0.178)	−0.515***	(0.078)	−0.247	(0.166)
Share of same-tenure co-workers	−0.712***	(0.075)	−0.798***	(0.071)	−0.577***	(0.137)
	Non-German workers		German workers			
Share of same-sex co-workers	−0.243***	(0.045)	−0.161***	(0.024)		
Share of same-education co-workers	−0.289***	(0.033)	−0.139***	(0.026)		
Share of same-age co-workers	−0.966***	(0.138)	−0.908***	(0.088)		
Share of same-tenure co-workers	−0.555***	(0.080)	−0.831***	(0.075)		
	Female workers		Male workers			
Share of same-nationality co-workers	−0.356***	(0.057)	−0.184***	(0.033)		
Share of same-education co-workers	−0.125***	(0.032)	−0.092***	(0.028)		
Share of same-age co-workers	−1.657***	(0.128)	−0.557***	(0.089)		
Share of same-tenure co-workers	−0.637***	(0.077)	−0.840***	(0.075)		

Note: Estimates come from stratified Cox regressions for the job-to-job transition rate of the respective sub-group of workers at workplace level. Worker covariates included are (groups of) dummy variables for sex, non-German citizenship, education, age and one-digit occupation, as well as the log entry wage and the log difference between the current and the entry wage. Workplace covariates are (groups of) dummy variables for plant size, employment growth and decline by more than 10%, the shares of female, foreign, high-skilled and low-skilled workers, as well as groups of share variables capturing the age and tenure of the workforce. Standard errors are clustered at the workplace level. ***/**/* indicates statistical significance at the 1%/5%/10% level.

This latter suggestion naturally leads to the question whether co-worker similarity matters more for workers in a strong minority position where they have just very few co-workers of their kind. If in-group bias and/or homophily are important, we might hypothesize that an increase in co-worker similarity increases workers' inclination to stay in a more pronounced way when they are 'isolated' with only few similar co-workers around than in a situation where at least some modest level of co-worker similarity is achieved (Leonard and Levine 2006). To capture this latter possibility and to tie our results close to theory, we re-estimate our stratified Cox specification including our co-worker similarity measures and interactions of these with dummy variables that indicate jobs in the first decile of the respective co-worker similarity distribution across all jobs in the respective year.

In line with expectations, all but one of the interaction effects are negative, and two of them are also statistically significant at the 1 per cent level (see

Variable	Coefficient	SE
Share of same-sex co-workers	−0.200***	(0.035)
× First decile of same-sex co-workers	−0.078	(0.103)
Share of same-nationality co-workers	−0.263***	(0.033)
× First decile of same-nationality co-workers	−0.375***	(0.125)
Share of same-education co-workers	−0.176**	(0.032)
× First decile of same-education co-workers	−0.044	(0.151)
Share of same-age co-workers	−0.645***	(0.099)
× First decile of same-age co-workers	1.364***	(0.153)
Share of same-tenure co-workers	−0.838***	(0.076)
× First decile of same-tenure co-workers	−1.461***	(0.287)

Note: Estimates come from a stratified Cox regression for the job-to-job turnover rate at
workplace level. Worker covariates included are (groups of) dummy variables for sex, non-
German citizenship, education, age and one-digit occupation, as well as the log entry wage
and the log difference between the current and the entry wage. Workplace covariates are the
workplace diversity measures from previous regressions, (groups of) dummy variables for plant
size, employment growth and decline by more than 10%, the shares of female, foreign, high-skilled
and low-skilled workers, as well as groups of share variables capturing the age and tenure of
the workforce. Standard errors are clustered at the workplace level. ***/**/* indicates statistical
significance at the 1%/5%/10% level.

Table 10). For 'isolated' workers in the nationality dimension, an increase in
the share of same-nationality co-workers by 10 percentage points leads to a
fall in the job-to-job turnover rate by 6.2 per cent whereas the fall accounts
to just 2.6 per cent for 'non-isolated' workers. Further, for 'isolated' workers
in the tenure dimension, an increase in the share of same-tenure co-workers
by 10 percentage points leads to a marked drop in the job-to-job turnover
rate by 20.5 per cent, whereas the fall in the rate for 'non-isolated' workers is
8.0 per cent.

The exception to this pattern is co-worker age similarity where the
interaction effect is statistically significantly positive at the 1 per cent level
and such large in magnitude that it even reverses the effect of co-worker
age similarity for 'isolated' workers (Table 10). Specifically, for 'non-isolated'
workers, a rise in the share of same-age co-workers by 10 percentage points
leads to a fall in the job-to-job turnover rate by 6.2 per cent. In contrast, for
'isolated' workers, an even smaller share of same-age co-workers is followed
by a fall rather than a rise in job-to-job turnover. Although these results
seem puzzling at first sight, one explanation, which we unfortunately cannot
substantiate in our data, may be rooted in the observation that for given
tenure (controlled for by the baseline hazard), being part of a very small age
cohort disproportionately raises the probability of being promoted in internal
labour markets (as put forward by Keyfitz 1973; Stewman and Konda 1983).
Despite homophily and in-group bias, age isolation may thus be beneficial to
workers in terms of career progress and this side effect may decrease their job
switches.

5. Conclusions

This article has investigated how workforce demography along the sex, nationality, education, age and tenure dimension affects workers' job switches. To that end, we fitted duration models for workers' job-to-job turnover rate on a unique rich administrative data set for the years 1975–2016 that comprises all the full-time jobs in a stratified 15 per cent random sample of large single production sites or workplaces in the West German manufacturing industry. In the duration models, we included the shares of similar co-workers in the five demography dimensions to capture co-worker similarity from the individual worker's perspective as well as Shannon diversity indices (for nominal variables) or standard deviations (for metric variables) as measures for overall workplace diversity.

In a stratified Cox regression that controls for permanent workplace unobservables, we documented that all five dimensions of co-worker similarity significantly depress workers' job-to-job turnover rate, and tend to exert a larger effect for 'isolated' workers in a strong minority position with only very few similar co-workers around. In a sub-group analysis, we further found that all dimensions of co-worker similarity are negatively related to job switches for all sub-groups with the exception of high-skilled workers, and more so for female compared to male workers and non-German compared to German workers. While highly educated workers may arguably be more tolerant towards dissimilar co-workers, female and foreign workers are those groups usually in a minority position for whom, in turn, co-worker similarity in other dimensions may be more important. In contrast to co-worker similarity, results for workplace diversity are mixed with only two dimensions affecting job switches in a significant way. In a check of robustness, we further saw that effects are very similar for the overall turnover rate as well as the turnover rate into non-employment, which makes sense if tensions within the workforce provide employers with the incentive to lay off those workers at the heart of the problem, that is, workers surrounded by few co-workers of their kind.

Although we lack credible quasi-experimental variation in workforce demography, we argue that our estimates are likely to be informative on the causal effect of co-worker similarity and workplace diversity on job switches because they rely on transient fluctuations in workforce demography that are unlikely to affect employers' hiring decisions and workers' self-selection into jobs. Albeit superior to previous estimates in terms of internal validity, when interpreting these estimates one should bear in mind that they come from a representative sample of large manufacturing workplaces and thus relate to long-lasting jobs with large employers that do not necessarily generalize to other settings. Our interpretation of the findings is that workers prefer having co-workers of their kind, yet place less value on working in diverse workplaces. This interpretation is in line with conventional wisdom, which has that birds of one feather flock together, and underscores the relevance of in-group bias (Becker 1971) and homophily (McPherson *et al.* 2001) in employment relationships. That said, we lack direct information on worker

preferences about co-worker similarity and workplace diversity that would permit us to rule out other explanations, for instance, that increased turnover is driven by deteriorating performance as workers, despite their goodwill, struggle to co-operate effectively with dissimilar co-workers. We leave it to future research relying on such information to arrive at stronger conclusions.

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Notes

1. The only paper that relies on a similar approach, we are aware of, is the study by Leonard and Levine (2006) whose panel data permit the authors to control workplace fixed effects (we will discuss their study in some detail in the following section).
2. In a companion paper using the same data and the same research design, Giuliano *et al.* (2011) find that workers have lower turnover and higher promotion rates when staff and managers are of the same race. This points at the racial composition of superiors as another relevant dimension of workforce demography.
3. We exclude East German workplaces because information on the jobs held in these is only available from 1992 onward.
4. Note that we disregard all those jobs started on 1 January 1975 because for these, job durations would be left-censored as we do not know whether they actually started on this or at an earlier date.
5. The latter implies either that the worker has changed to non-employment without receiving unemployment benefits or that he or she has become, for instance, self-employed and is not recorded in the IEB data. Although our data do not permit us to disaggregate this category of unknown destination, information from other German data sets suggests that the vast majority of workers in this category have indeed moved into non-employment and misclassification is only a minor issue (see, e.g. Hirsch *et al.* 2018, for a comparison of the administrative data we use to the German Socio-Economic Panel that entails, for example, self-employment).
6. In a check of robustness, we also consider the Herfindahl index as an alternative measure of workplace diversity (see section 'Checks of Robustness').
7. Hence, the Cox regression includes a dummy variable indicating whether a job belongs to an individual worker who, say, is female, the share of female workers in the workforce and the share of same-sex workers in the workforce at individual level. Intuitively, this means that in essence the impact of co-worker sex similarity is identified from the differential effect of the share of female workers for male and female workers or, in other words, from an interaction effect of the female dummy and the female share. Yet, we decided against including this interaction in the Cox regressions and stuck to the share of same-sex workers because estimating the interaction effect renders interpretation very cumbersome. As a side remark,

since identification of the effect of co-worker sex similarity in essence rests on an interaction effect of the female dummy and the female share, the resulting collinearity renders it impossible to check for heterogeneous effects for female and male workers in separate Cox regressions, and analogously for other dimensions of workforce demography.

8. Note that by allowing for a workplace-specific baseline hazard, the proportionality assumption inherent to the stratified Cox model needs to hold only for jobs at the same workplace but may very well be violated across jobs at different workplaces without invalidating identification (Kalbfleisch and Prentice 2002: 118–19). As a consequence, our estimates relying on stratified Cox models do not suffer from the widely raised criticism against proportional hazard models.

9. Following the suggestion by a referee, we checked whether there is some heterogeneity in diversity trends across workplaces of different size hidden behind the non-trending overall workplace diversity. When calculating medians of our workplace diversity measures across workers holding jobs in workplaces of similar size (i.e. within the five size categories 200–299, 300–399, 400–499, 500–999 and at least 1,000 employees), we find some such heterogeneity in the trends of diversity along the sex and nationality dimension. Median sex diversity is shrinking somewhat in the four smaller size categories and is rising in the largest size category, while it is the other way round for diversity along the nationality dimension. Absent any strong general pattern, though, we do not think that these trends suggest a serious threat to identification.

10. We obtain the percentage change in the job-to-job turnover rate by exponentiating a tenth of the respective coefficient and subtracting one.

11. As observed by a referee, our observational window spans 40 years and thus our stratified Cox models may be subject to bias if important workplace unobservables changed over time. To check whether such changes are likely to pose a big problem, we fitted stratified Cox models on an inflow sample of jobs started at 1 January 2000 or later, that is, we restricted the inflow sample to the last 16 years of our observational window. Reassuringly, this sample reduction had little impact on our estimates and did not change any of our conclusions.

12. We also checked whether effect sizes differ for jobs held in workplaces of different size, but found just small differences in the effects of co-worker similarity across sub-groups without any clear pattern evolving.

13. To check this notion of a complementarity between single dimensions of co-worker similarity more formally, we followed the suggestion by a referee and checked for interaction effects by adding interaction terms of single dimensions of co-worker similarity to our stratified Cox regression. We found that the majority of the interaction effects were insignificant without any clear pattern evolving.

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