Arbitraging Labor Markets*

Minrui Gong† Ernst Maug‡ Christoph Schneider§

June 12, 2025

Abstract

In this paper we develop a new rationale for the existence of business groups (BGs) and conglomerates that operate in multiple locations within the same country. We show that BG firms grow less if firms of the same group in other locations offer more attractive access to a local labor market, characterized by labor costs, labor supply, and labor fit between the firm and the local labor force. BG firms grow faster if they offer such access to other firms in the group. Relocation is concentrated in industries with low asset tangibility and in high-skilled jobs and in business groups with decentralized managerial functions that are not concentrated in one group firm. Local labor conditions are of similar importance to and distinct from general agglomeration economies. Internal flows of employees between BG firms account for only a small portion of the variation in employment growth rates. We conclude that business groups predominantly move jobs, but not employees, between their locations. As such, they arbitrage local labor markets.

Keywords: Business groups, location, employment, internal labor markets
JEL Classifications: G30, G34, J21, J24, J61, M51.

*We are grateful to Jo Danbolt, Laszlo Goerke, Yuna Heo, Ying Liang, Gordon Philipps, Lucy Wang, conference participants at the CSEF-RCFS Conference on Finance, Labor and Inequality, the European Financial Management Association, the GEABA Symposium, the German Finance Association, the Paris December Finance Meeting, the Swiss Finance Association, and seminar audiences at the Free University Berlin, University of Bristol, University of British Columbia, University of Duisburg-Essen, University of Mannheim, University of Münster, and the University of Washington. The authors acknowledge funding through DFG grants MA 3317/3-2 and GE 3342/1-2.

†University of Mannheim, 68131 Mannheim, Germany. Email: minrui.gong@uni-mannheim.de.
‡University of Mannheim, 68131 Mannheim, Germany. Email: ernst.maug@uni-mannheim.de.
§University of Münster, 48143 Münster, Germany. Email: christoph.schneider@wiwi.uni-muenster.de.

1 Introduction

Business groups and conglomerates form a large part of the economic activities of most developed economies. Why do business groups and conglomerates exist? The literature in finance and economics provides answers based on two mutually non-exclusive paradigms. The first group of answers argues for the superior efficiency of business groups because they operate internal markets for capital, goods, and labor, and these internal markets overcome frictions in the corresponding external markets. The second group is based on the notion that business groups are inefficient, but offer unique advantages to their owners to extract rents at the expense of other stakeholders by concentrating control rights through cross-ownership and pyramid structures. (See the discussion of the literature at the end of this Introduction.)

In this paper, we pursue a new explanation. We focus on business groups that operate in multiple locations and argue that the ability to shift operations across locations offers unique advantages. In principle, operating in multiple locations is costly because it involves additional monitoring costs.[1] The overarching hypothesis is that business groups choose their locations depending on how specific locations meet their resource requirements. The market for labor is special in this regard, since employees typically do not commute large distances, which sets labor markets apart from those for capital and goods.[2] Hence, differences between local labor markets regarding the availability, skills, and costs of employees can exist and persist over time. These differences create incentives for firms to move operations to new locations. We hypothesize that business groups that operate in different locations have a unique advantage in this setting, because they can move operations within the group without the fixed costs of setting up new establishments. Hence, the simple prediction is that BGs respond to variations in the costs and availability of employees across the locations in which they operate by expanding, shrinking, or exiting these locations. As such, they become arbitrageurs of local labor markets.

Our analysis studies a sample of around 23,000 firms affiliated to more than 7,000 business groups in Germany over the period from 2005 to 2017. Germany is an ideal laboratory to study this question, because company law and labor regulations are decided at the federal level and do not vary across local labor markets. We follow the literature and define a business group as a collection of firms - at least two - that share the same ultimate corporate owner.

[1] See John, Knyazeva, and Knyazeva (2011), Giroud (2013), and Alam et al. (2014) for findings consistent with this notion. Gumpert, Steimer, and Antoni (2021) show that firms insert additional layers of management to monitor distant locations.

[2] The choice of domicile is arguably one of the most significant investments in firm-specific human capital that an employee can make. See Alesina et al. (2010) for a study on geographic mobility of workers and Prager and Schmitt (2021), Azar, Marinescu, and Steinbaum (2022), and Rinz (2022) for studies that also define labor markets at the local level for the same reason.

We create an employer-employee matched data set and study the employment growth and job flows of business group firms across 400 German counties, which we identify as local labor markets. We characterize these local labor markets from the perspective of each business group firm along three dimensions: labor costs: how much it would cost for a BG firm to employ the same labor force at the wage costs of another location; labor market tightness: whether firms in other locations of the same group experience positive shocks to the labor supply of occupations employed by the firm; and labor fit: how well the labor force of another location in which the group is present matches the labor force requirements of the focal firm.[3] We refer to these three dimensions comprehensively as *local labor market conditions*. We find that the growth of business group firms depends systematically on how any particular firm relates to the other firms in the same group along all three dimensions: firms grow their workforce faster if they offer more attractive labor market conditions for the operations of other firms in the group, and BG firms grow more slowly if other firms in the BG offer more attractive conditions. We conclude that business group structures may create efficiency gains by arbitraging differences between local labor markets.

We begin by analyzing employment growth at the intensive margin, i.e., we ask how existing BG firms grow depending on their own and their BG members' local labor market conditions, holding the membership of the firm fixed. By contrast, we refer to growth through entering and exiting locations as growth at the extensive margin, which involves changes in the composition of the BG. In the first step, we analyze firms from the perspective of potential donors of jobs. We hypothesize that any focal firm grows more slowly if other firms in the same group offer better labor market conditions in the locations in which they operate. We find support for this hypothesis for all three measures of labor costs, labor supply, and labor fit: A BG firm grows more slowly if other firms in the same group operate in locations with lower labor costs, are subject to positive shocks to labor market supply, or have a skill composition of the local labor force that is more similar to the requirements of the focal firm in question. A one-standard deviation increase in our measures of labor costs, labor supply, and labor fit lead to a reduction of BG firms' employment growth of about 32 to 63 basis points: about one-fifth of the mean and two-fifth of the median employment growth. Hence, our findings on three labor dimensions are economically important and in line with our expectations.

In the second step, we analyze firms from the perspective of potential recipients of jobs from other firms in the same group. If the location in which a focal firm operates offers better

[3]The importance of the availability of workers with requisite skills is already recognized in Marshall (1890). Some recent contributions emphasize the skill match of the labor force for mergers and acquisitions (Lee, Mauer, and Xu, 2018; Tate and Yang, 2022) and for location decisions of start-ups (Glaeser and Kerr, 2009) and first-time foreign entrants (Alcacer and Chung, 2014).

labor market conditions for particular operations compared to other group firms, then the focal firm should attract these operations and it should grow faster. These analyses from the perspective of recipients confirm the findings from the donor perspective: Measures of labor-market supply and labor fit are of first-order importance, and the results for the benefits recipient firms offer to other group firms are of comparable size to those for the benefits offered by donor firms; at the same time, offering lower labor costs to other group firms is never significant.

The specifications in these analyses include a range of moderating and control variables and show that business group firms grow faster if they are smaller and younger; if they form the core of the business group; and if their workforce is more highly qualified and better educated. We interpret the last two measures as indicating higher knowledge intensity, so firms with more knowledge-intensive operations grow faster. An important confounding factor for the local labor market conditions on which we focus are agglomeration economies, which have been widely studied in the literature and build on the notion that larger concentrations of economic activities create positive externalities, in our context, specifically from improved matching in a larger local labor market.[4] We control for agglomeration economies in two ways: First, by including year times county and year times industry fixed effects in all regressions, which controls for time-varying economic conditions at the industry and at the county level. Second, by constructing measures of agglomeration benefits in relation to other business group firms in parallel to the three labor market measures. We find that the effects of our business-group level measures of agglomeration economies are comparable in size to those we find for our measures for local labor markets: A one-standard deviation increase in agglomeration economies offered by other BG firms reduces the employment growth at the focal firm by 74 basis points, and the combined economic effect of a one-standard deviation increase in labor supply and labor fit is similar to a one-standard deviation increase in agglomeration economies, increasing employment growth by approximately 69 basis points. Hence, the labor-related effects we document prevail in addition to agglomeration economies. Overall, our analyses of employment growth at the intensive margin reveal a coherent picture: BGs strategically choose the locations in which they grow their operations by exploiting the local availability and costs of employees with the requisite skills.

Next, we ask which type of operations is more likely to be moved between locations. We conjecture that BGs are more likely to move operations that involve lower physical reallocation costs. In a number of sample splits we provide evidence for this hypothesis. Operations involving lower capital intensity and tangible assets are more likely to be moved, as well as

[4]See Wheeler (2001), for a theoretical model and Dauth et al. (2022) for evidence for Germany; see also Duranton and Puga (2004); Melo, Graham, and Noland (2009); Combes et al. (2012).

operations that involve more high-skilled and complex jobs. We distinguish between business groups in which managerial capabilities such as human-resource management and accounting are skewed toward one group firm from those in which these functions are evenly distributed and find that relocation occurs predominantly in the latter subsample. Our interpretation of this finding is that relocation requires local expertise and managerial capabilities.

Further, we break up labor flows and distinguish between internal and external growth. We are interested in this distinction, because several recent papers have emphasized the importance of internal labor markets in BGs for the ability of these firms to capture growth opportunities or to provide employment insurance to their employees (Huneeus et al., 2021; Cestone et al., 2024; Beaumont, Hebert, and Lyonnet, 2023; Cestone et al., 2023). Specifically, we define growth as internal if it results from employees who migrate between firms that belong to the same BG, and as external if it results from separations to and the hiring of employees from the external labor market, e.g., other firms. Surprisingly, we find that the observations we report above are mostly driven by growth through the external labor market. About 80% of the size of the effects we report above come from external employment growth and only 20% can be attributed to internal transfers. From this observation we conclude that BGs mostly move jobs but not employees across locations.

In the final set of analyses, we address growth at the extensive margin and analyze BG's decisions to affiliate firms in new locations in which the group was not present before (referred to as *entry*), or disaffiliate firms and thereby leave locations altogether (referred to as *exit*). We expect that growth at the intensive and the extensive margins should respond to the same drivers. However, entry and exit decisions arguably involve higher fixed costs than reallocation decisions that affect only the intensive margin. Hence, we hypothesize that decisions at the extensive margin only respond to relatively persistent differences in labor conditions. We find that labor conditions are of first-order importance and highly significant for growth at the extensive margin. Business groups are more (less) likely to exit local labor markets with higher (lower) labor costs, worse (better) labor supply and labor fit. In the group-level analysis, a one-standard deviation increase in the opportunities to benefit from lower labor costs in another BG location reduces the likelihood of entry in a new location (increases the likelihood of exit from an existing location) by 2.5% (1.8%), which reflects about 120% (50%) of the sample mean. Labor fit has a similar economic significance. By contrast, labor shortages are quantitatively less important, although still significant, consistent with the notion that they are less persistent.

We provide some extensions and robustness checks to investigate potential shortcomings of our baseline analysis. Most importantly, we apply a wider definition of local labor markets, in which we assume that firms cannot only recruit workers from (or lose workers to other

firms in) the county in which they are located, but also from neighboring counties, using commuting zones. Our baseline analysis lacks a counterfactual, but we provide a robustness check in which we match business group firms to standalone firms to rule out the possibility that our findings could be attributed to economic or demographic factors that business group firms share with similar standalone firms. Finally, we investigate alternative measures for the fit of the workforce, labor supply, and agglomeration economies. The qualitative conclusions from our baseline analysis are not affected in these extensions and robustness checks. The quantitative deviations from the baseline analysis are mostly small and we discuss the few cases in which we observe larger deviations.

Discussion of the literature. This paper pursues a new explanation for the existence of business groups and conglomerates. Thus, our results complement the literature on internal markets, which argues that business groups add value by substituting internal markets for external markets when frictions reduce the efficiency of external markets. This argument goes back at least to Teece (1982) and has been made particularly in relation to emerging economies with less developed external markets (e.g., Khanna and Palepu, 2000). This literature has two major strands. The first and larger strand of this literature argues that internal capital markets can add value by allowing conglomerate firms to make better investment decisions than standalone firms (Gertner, Scharfstein, and Stein, 1994; Stein, 1997; Khanna and Tice, 2001); by improving risk-sharing (Khanna and Yafeh, 2005, but they reject this hypothesis); or by supplying capital when external markets become inaccessible (Matvos and Seru, 2014; Almeida, Kim, and Kim, 2015). While some studies emphasize efficiency gains (e.g., Maksimovic and Phillips, 2002), others put more weight on the costs from inefficient cross-subsidization and reduced responsiveness to investment opportunities (e.g., Shin and Stulz, 1998; Rajan, Servaes, and Zingales, 2000; Ozbas and Scharfstein, 2010). In their surveys of the large literature on internal capital markets, Maksimovic and Phillips (2007; 2013) conclude that recent evidence is mostly consistent with a neoclassical model in which conglomerates exploit their comparative advantages. We complement this literature by showing that business groups in Germany exploit their comparative advantage from operating in multiple locations by moving operations to more attractive labor markets. We complement the literature on conglomerates and the conglomerate discount, which analyzes how firms choose their industry portfolio and reallocate capital across industries, by showing how business groups reallocate operations across locations.

The second strand of this literature argues that business groups operate internal labor markets, which allow them to provide more attractive jobs to their employees by organizing careers (Doeringer and Piore, 1966; Baker and Holmstrom, 1995; Huitfeldt et al., 2022; Fer-

reira and Nikolowa, 2022), provide insurance to employees (Faccio and O'Brien, 2021), take advantage of new business opportunities (Beaumont, Hebert, and Lyonnet, 2023; Cestone et al., 2024), allocate workers to jobs more efficiently (Huneeus et al., 2021; Tate and Yang, 2022), and bypass labor market frictions (Cestone et al., 2023).[5] In contrast to this literature, our study focuses on the movement of jobs and not on the movement of employees. As discussed, our findings suggest that most of the employment growth of firms, and most of the reallocation of growth opportunities across locations is through external labor markets and not through internal labor markets. Thus, our findings resonate those of Gehrke et al. (2023), who show that most of the employment turnover after M&As is through external labor markets.

Another paradigm for explaining the existence of business groups is based on the notion that business groups provide a specific form of corporate governance. Some of the contributions in this literature provide evidence for the efficiency advantages of business groups in providing effective forms of corporate control (e.g., Berglof and Perotti, 1994 on Japanese *kereitsu*). Other contributions see them as potentially inefficient forms of economic organization, which provide nonetheless unique advantages to their majority owners, in particular through building pyramids that increase the separation of ownership and control.[6] Our paper is complementary to this literature and argues for a potential source of economic gains of business groups that may coexist with the governance advantages (and disadvantages) highlighted in this literature.

There is a large and diverse literature on how firms choose their locations, often in an international context with an emphasis on foreign direct investment and the location choices of multinational enterprises, which cannot be surveyed here. Some contributors to this literature have emphasized labor costs (among other factors, see Carlton, 1983; Bellak, Leibrecht, and Riedl (2008)) and the proximity to a pool of skilled employees as important factors for location choice (e.g., Porter, 1994; see also the survey of Dunning, 2009). This literature has also analyzed a range of other factors for location choice, such as taxes (e.g., Giroud and Rauh, 2019), subsidies (e.g., Basile, Castellani, and Zanfei, 2008), infrastructure and proximity to consumers (Dudey, 1990; Fontagne and Mayer, 2005), and to firms operating related technologies (e.g., Chung and Alcacer, 2002), or more generally, agglomeration benefits (e.g., Glaeser and Kerr, 2009; Alcacer and Chung, 2014) which are not the focus of our analyses. We capture the influence of these factors through control variables and fixed effects. These

[5]See Silva (2021) for a study of the potential downsides of internal labor markets, which may force firms to pay higher wages to workers who compare themselves to more highly-paid workers in other parts of the same firm.

[6]See Morck (2010) for a discussion of pyramids; Bertrand, Mehta, and Mullainathan (2002) on Indian business groups; Bae, Kang, and Kim (2002) and Baek, Kang, and Lee (2006) on Korean *chaebols*; see also Claessens, Djankov, and Lang (2000) for a cross-country study and the survey by Khanna and Yafeh (2007).

studies are all different from ours by analyzing the choice of location for new establishments, which is what we refer to as the extensive margin, whereas our core results focus on the intensive margin. Moreover, while there are many cross-country studies, there are only few cross-regional studies within the same country that would hold many other factors of location choice constant; the few within-country studies focus on whether factor-price equalization obtains within countries (e.g., Hanson and Slaughter, 1999, on the U.S.; Bernard et al., 2003 on the United Kingdom; Tomiura, 2005, on Japan), which is a different question from ours.

There is a related literature on how the heterogeneity of labor regulation across locations matters for firms' location choices. John, Knyazeva, and Knyazeva (2015) show that the announcement returns to acquisitions are lower if targets are in locations with stronger employment protection, and Dessaint, Golubov, and Volpin (2017) show similar results in a cross-country study. Relatedly, Bai, Fairhurst, and Serfling (2019) show that stronger state-level labor protection lead to lower investment rates and lower sales growth. The effects shown in these studies are not present in our sample, in which the same labor regulations apply across the entire country. Thus, this literature is complementary to ours.

2 Data and methodology

2.1 Sample construction

We draw financial, ownership, and other descriptive information of all medium-sized and large German firms within the sample period 2005 through 2017 from the Orbis database.[7] We define a business group (BG) as a collection of at least two firms under common ownership. A firm is classified as a member firm of a BG if the ultimate owner of the BG holds more than 50% of the firm's voting shares, directly or indirectly.[8] Specially, we require the ultimate owner to also be a firm, as in Belenzon and Berkovitz (2010) and Belenzon and Tsolmon (2016). Furthermore, we drop all BGs with state-controlled entities and those ultimately controlled by a foreign owner. This leaves us with 482,909 firm-year observations involving 74,765 distinct firms and 20,466 distinct BGs.

Next, we draw administrative data from the IAB (Institute for Employment Research)

[7] We define medium-sized and large firms in a similar manner to the European Commission in Directive 2013/34/EU. More specifically, a firm is included in our sample if it satisfies at least two of the following three conditions simultaneously in at least one year throughout the sample period: 1) Total assets exceed 20 million euros (MEUR); 2) total revenues exceed 40 MEUR; and 3) the number of employees exceeds 250.

[8] Papers adopting the same definition include Altomonte, Ottaviano, and Rungi (2021), Boutin et al. (2013) and Cestone et al. (2020). Belenzon and Tsolmon (2016), and Belenzon and Berkovitz (2010) adopt the same definition for private firms but lower the voting share threshold to 20% for public firms. Given that private firms predominate in our sample - representing 99.78% of all observations, we apply the same definition to all firms.

for our sample firms. We mainly use of their Integrated Employment Biographies (IEB) data set and draw the career biographies of all employees who were ever employed by any sample firm at some date during the sample period. The IEB data set provides detailed demographic information and career histories of all employees who are employed by establishments residing in Germany and pay German social insurance taxes. After aggregating the employee-level data to the firm level, we use the Orbis-ADIAB record linkage key developed by Antoni et al. (2018) to merge the two data sets. We successfully merge 23,001 firms affiliated with 7,105 distinct BGs, totaling 149,117 BG-firm-year observations.

To investigate decision-making on the business group level, we further aggregate the firm-level sample to the business group level. For each BG-year, we either sum up the firm-level variables (e.g., for total assets), or we take labor-weighted averages of firm-level variables (e.g., for education scores). This process results in 46,925 BG-year observations involving 7,105 BGs.

To characterize local labor markets within German counties, we draw employment information of all German establishments within the sample period from IAB's Establishment History Panel ("Betriebshistorisches Panel," BHP).[9] We then aggregate the data to the county level. Finally, we complement the sample with county-level economic and demographic data collected from the Federal Statistical Office (Statistisches Bundesamt).

2.2 Research design

The main methodological challenge for investigating the location decisions of business groups is that the decision of BG b to enter, exit, or grow in county c at time t leads to a very large number of possible BG-county-year combinations. However, most BGs are not present in most counties most of the time, so for most of the BG-county-year combinations the activity levels are zero. We employ two different strategies to address this issue: The first conducts analyses at the firm level, whereas the second conducts analyses at the level of the business group. Each of these strategies has different advantages and limitations.

Firm-level analyses. For the firm-level analyses, we use the panel of German business group firms from 2005 to 2017 and analyze which business group, firm, and county characteristics influence employment growth. Hence, the unit of observation in this analysis is a BG-firm-year. We only consider the county-level data from the county where a firm's headquarters is located. Since 80% of the BG firms in the sample are active in only one county,

[9]The BHP is aggregated from the IEB to the establishment level. We use the IEB to infer firm-level employment on a more granular basis for our sample firms. We cannot infer county-level employment from the IEB due to technical limitations and data protection regulations.

such a simplification should not have material effects on our results. If a particular business group does not have a group firm in a particular county c in year $t-1$, then the growth rate between $t-1$ and t for this BG is not defined, and this BG-county-year combination does not contribute an observation to the sample. Put differently, we do not include observations in year t if the activity level in year $t-1$ is zero, which eliminates all the zero observations from the analysis. Hence, we cannot analyze BG's decisions to grow at the extensive margin by entering new locations at the BG-county-year level; accordingly, we refer to this strategy as the "intensive margin" analysis. However, we can analyze exit decisions at this level, which represent only a case of shrinkage, and for which the activity level in year $t-1$ is positive. The strength of this analysis is that it allows us to analyze the decisions of incumbent BG firms to expand, shrink in, or exit from a certain location, and consider BG characteristics and location characteristics in such an analysis. The limitation of this analysis is that we cannot analyze the decision to enter a certain location, which requires aggregation to the BG level.

Group-level analyses. Accordingly, we construct a BG-year panel to also study entry. For this sample, we can define entry and exit dummies for each BG-year and look at growth at the extensive margin. The strength of this analysis is that it allows for a detailed analysis of how time-varying BG characteristics influence the decisions of BGs to expand geographically However, it prevents us from analyzing firm-specific covariates.

2.2.1 Dependent variables

We are interested in characterizing the outcome of BG location decisions and therefore want to measure the employment growth of the firm (or BG) as well as entry and exit into/from counties.

Employment growth is defined as the one-year growth rate of employment E of firm i:

$$g_{it} = \frac{E_{it} - E_{it-1}}{0.5\,(E_{it} + E_{it-1})}, \tag{1}$$

following an established practice in the literature (see Davis et al., 2014; Antoni, Maug, and Obernberger, 2019).

2.2.2 Independent variables

The independent variables describe the characteristics that are likely to influence BGs decisions to expand, shrink, enter or exit certain locations. These variables can be separated into two groups. The first group characterizes local labor markets and is described in the

remaining part of this section. The second group of variables characterizes these markets in relation to the requirements and structure of a particular BG; these variables are described in Sections 3.1 and 3.2.

Characteristics of local labor markets. We define three measures to characterize local labor markets: labor costs, labor supply, and labor fit.

Labor costs. We only observe average wages and job composition at the establishment-level (using BHP, the IAB establishment panel), which means we need to estimate average wages by job categories at the level of local labor markets (counties). To infer wages for each occupation, we regress w_{et}, the total daily wage sum of establishment e in year t, on k_{elt}, the number of workers employed at establishment e in occupation l in year t:

$$w_{et} = \alpha + \sum_{l=1}^{12} \beta_{clt} k_{elt} + \epsilon_{et}. \tag{2}$$

Hence, we use c to index German counties, e to index establishments, i to index firms, l to index the 12 Blossfeld (1987) job categories, and t to index calendar years.[10] The regression estimates $\hat{\beta}_{clt}$ should then recover the wages of workers in occupation l in county c in year t. This regression is run for each county-year cross-section. Establishments for which more than 10% of the employees could not be assigned to any job category are excluded from the sample.

With these provisions, the expected labor cost of a firm that is active in industry s and located in county c in year t is calculated as follows. Let p_{clt} be the fraction of employees working in occupation l in county c in year t and let p_{sl} be the average fraction of employees working in occupation l in industry s across all sample years. Then we define labor costs for each industry-county-year as the employment-weighted average of the estimates for county-occupation-specific wages $\hat{\beta}_{clt}$ from running regression (2).

$$Cost_{sct} = \sum_{l} \hat{\beta}_{clt} \times p_{sl}. \tag{3}$$

Labor shortage. The measure for labor shortage assumes that labor supply within a labor market is relatively fixed in the short and medium term. Then tapping into the supply pool more heavily by some employer would lead to a shortage for the others: Any positive demand shock will lead to a shortage, and any negative demand shock will lead to

[10] Blossfeld (1987) classifies jobs into 12 distinct major occupations based on the German Classification of Occupations 1988 (KldB 1988). Table 1 on page 99 in Blossfeld (1987) provides a detailed overview on those 12 occupations and related ISCO codes.

a surplus. Hence, under these premises, shocks to county-level employment growth can be used to approximate shocks to the labor supply for individual firms. To implement this idea, we regress county-level employment growth rates per job category on their own lags over the past three years:

$$g_{clt} = \eta_{cl} + \lambda_1 g_{cl,t-1} + \lambda_2 g_{cl,t-2} + \lambda_3 g_{cl,t-3} + \mu_{clt}. \tag{4}$$

We then interpret the residuals $\hat{\mu}_{clt}$ from this regression as demand shocks to occupation l for county c in year t. The labor shortage in occupation l, county c and year t is calculated as an equally-weighted three-year average, $\bar{\mu}_{clt} = (\hat{\mu}_{clt} + \hat{\mu}_{cl,t-1} + \hat{\mu}_{cl,t-2})/3$. We proxy for the labor shortage of each firm by defining a measure of the labor shortage of the firm's industry s, and aggregate the labor-shortage measure $\bar{\mu}_{clt}$ by using the industry-level occupational shares p_{sl} again:

$$Short_{sct} = \sum_l \bar{\mu}_{clt} \times p_{sl}, \tag{5}$$

which measures the occupation-weighted labor shortage in industry s.

Labor fit. We follow prior literature (e.g., Glaeser and Kerr, 2009; Alcacer and Chung, 2014) and measure how well a county's labor force fits a firm's skill demand by the distance between the long-term job mix of the firm's industry and the current job mix of the county:

$$Fit_{sct} = -\sum_l \left| p_{sl} - p_{clt} \right|, \tag{6}$$

where p_{sl} and p_{clt} are defined as above. Fit_{sct} equals zero whenever the county-level supply and the industry-level demand of skills match perfectly.

Agglomeration. All three variables that characterize local labor markets might be related to the spatial agglomeration of industries, which provide BG firms with benefits from agglomeration economies, e.g., proximity to suppliers and customers. Therefore, we also define a variable that characterizes the degree of industrial agglomeration in local labor markets. Specifically, we denote the level of spatial agglomeration of industry s in county c in year t by Agg_{sct} and define it as the number of employees hired by establishments in industry s and in county c.[11] In Section 4.3.3 we provide additional robustness checks with alternative measures of agglomeration economies.

[11] See Combes and Gobillon (2015) for a survey of empirical research on agglomeration economies and Donovan et al. (2024) for a recent meta-study. There are different dimensions of agglomeration economies and mechanisms in which they generate externalities (Duranton and Puga, 2004). In their Section 3.1, Combes and Gobillon (2015) argue that different measures are often too highly correlated to be able to distinguish different dimensions.

2.3 Descriptive statistics

Table 1 provides descriptive statistics for our sample at the firm level (Panel A) and at the group level (Panel B). Table OA1 in the Online Appendix provides the correlations between all main variables of our analysis. The average BG firm in our data set is 26 years old and has 8.3 million euro of assets. The mean (median) Industry Q is 1.8 (1.7). On average 0.8% of BG firms are divested per year. Similar to Gehrke et al. (2023), we observe that the internal labor market (ILM) of BGs is much less active compared to the external labor markets (ELM). There is a factor of 45 (1.893/0.042=45.071) between the means of *External employment growth* and *Internal employment growth*. We also observe that increased activity in the ILM is positively correlated (0.083, $p<0.01$) with increased activity in the ELM. The average BG in our sample is 30 years old, has 3.3 member firms with a total of 977 employees. These numbers are comparable to Belenzon and Tsolmon (2016), who report that BGs in their sample from 15 European countries have on average 4 member firms and 973 employees. The average BG firm in our sample is 26 years old and has 271 employees. The BG firms in Belenzon and Tsolmon (2016) are somewhat younger (17 years) and smaller (92 employees) on average. Belenzon, Berkovitz, and Rios (2013) use a similar sample of European BGs but require than BG firms have at least $10 million in sales. Their average BG firm is 25 years old and has 392 employees, which is very similar to our numbers. According to Cestone et al. (2020), French BG firms are somewhat smaller on average (158 employees).[12] The probability of a BG to enter (exit) a new location is 3.6% (2.1%) per year.

Figure 1a shows the geographical distribution of BG firms relative to all firms in our sample. Figure 1b (1c) provides the ratio of BG firm assets (employees) to assets (employees) of all firms in our sample. Across all three maps we observe substantial variation across German counties but no particular geographical patterns in the distribution of BG firms, assets, or the number of employees. For example, BG firms are generally not more or less prevalent in the south or east of Germany. However, we observe that BG firms cluster in metropolitan areas, which indicates that BG firms prefer agglomeration centers.

[12]We use the terms affiliating and disaffiliating instead of acquiring and divesting BG firms, as we want to highlight the difference between an acquisition (divestiture) and an affiliation (disaffiliation). An affiliation (disaffiliation) implies that an acquired (divested) company remains (was) a legally independent entity after (before) the acquisition (divestiture). Hence, we treat firms that are acquired and then completely integrated by one of the business group firms as organic employment growth, and similarly for divestitures of formerly integrated operations.

3 Analysis

The analysis proceeds in four steps. We begin by analyzing growth at the intensive margin at the firm-year-county level and distinguish two perspectives. We analyze the operations of each focal firm from the donor perspective and from the recipient perspective, depending on the direction in which the business group can realize improvements in the location of its operations. To begin, we ask if the business group may benefit from relocating production from the focal firm to other firms within the same group; we refer to this analysis as the *donor* perspective (Section 3.1). Then we ask if the business group benefits from from other group firms to the focal firm; we refer to this analysis as the *recipient* perspective (Section 3.2). In the next step, we decompose employment growth at the intensive margin into *Internal employment growth*, which results only from labor flows between BG firms, and *External employment growth*, which results only from flows between BG firms and the external labor market (Section 3.4.1). Finally, we analyze growth at the extensive margin by moving the analysis to the BG-county-year level looking at entry and exit decisions of BGs (Section 3.7).

3.1 The donor perspective

In this section, we ask whether business group benefits from moving operations from the focal firm to another group firm in the same group in a different location. Hence, we ask whether BG firms can reduce their labor costs, gain better access to employees, improve the skill match between the the local workforce and the firm, or exploit agglomeration economies by relocating their operations to another county in which another firm of the same group is already present. We label this perspective the *donor* perspective, because the focal firm is a potential donor of operations, jobs, and employees to other firms in the same group. Our hypothesis implies that a focal firm should grow less if the business group would benefit from relocating the operations of the focal firm to other firms within the same group. For this analysis, we take the group structure as given, i.e., we only ask whether BGs shift operations across firms that already belong to the group. The rationale for this analysis is that affiliating new member firms involves fixed costs, so that firms can move some or all of their operations at a lower cost to a county where the BG is already present, compared to a county in which the BG is not (yet) present. In Section 3.7, we ask whether group firms would benefit from relocating operations to counties in which the group is not yet present.

Hence, for each business group b at time t, we define the set of all firms that belong to that business group as $BG_b(t)$. We index counties by $c \in C$, where C is the set of all German counties. Let $C_b(t)$ be the set of all counties in which business group b has at least one member firm at time t. Hence, $C_b(t) \subseteq C$. We define the donor benefits of the BG firm

from reallocating jobs from the focal firm i to other firms $j \neq i \in BG_b(t)$ of the same BG as the upside potential offered by the other group firms in relation to focal firm i.

Measuring donor benefits. We define three variables to measure the potential benefits from reallocating operations to another county, and we refer to these benefits as *donor benefits*. Donor benefits measure, respectively, donor benefits from reducing labor costs ($Cost^{Don}$), from moving operations to a local labor market with less labor shortage ($Short^{Don}$), from moving to a local labor market that offers a better labor fit to the firm (Fit^{Don}), and from moving to a local market that offers more agglomeration economies (Agg^{Don}).

Recall that $Cost_{ict}$ represents the expected labor costs of firm i if it produces in county c at time t. We define the donor benefits from saving labor costs, $Cost_{it}^{Don}$, as the hypothetical percentage reduction in the wage bill of firm i at time t from relocating all its operations from county c, where it is currently located, to the county that minimizes its wage costs. Here, the minimum is calculated across all counties in which the business group to which i belongs is already present at time t. Given our definitions above, the lowest possible wage bill can be calculated as $min\{Cost_{int}\}_{n \in C_b(t)}$, and $Cost_{it}^{Don}$ is defined as

$$Cost_{it}^{Don} = max\left\{ln(Cost_{ict}) - ln(Cost_{int}), 0\right\}_{n \in C_b(t)}. \tag{7}$$

Hence, $Cost_{it}^{Don}$ is the hypothetical percentage reduction in the wage bill if firm i were to relocate all its operations to the county that minimizes its overall wage bill, while holding the proportions of its labor force constant. Note that this definition does not describe the further reduction of labor costs that firm i could achieve from moving to counties without presence of the BG so far, or from adjusting its production technology and changing the proportions between different categories of workers. Similarly, a firm may relocate only a part of its production or it may divide its operations between multiple counties. These additional margins of improvement are not captured here.

We construct analogous estimates for the other two characteristics of local labor markets, namely, labor shortage and labor fit. In particular, we define the donor benefits from relieving labor shortages based on our measure of labor shortage, $Short_{ict}$, as

$$Short_{it}^{Don} = max\{Short_{ict} - Short_{int}, 0\}_{n \in C_b(t)}. \tag{8}$$

Similarly, we define the donor benefits from improving the labor fit based on our measure of the quality of labor fit, Fit_{ict}, as

$$Fit_{it}^{Don} = max\{Fit_{int} - Fit_{ict}, 0\}_{n \in C_b(t)}. \tag{9}$$

Similar to $Cost^{Don}$, these measures are both constructed on the hypothetical scenario that the focal firm relocates its entire operations to one other county without changing the proportions in its labor force. All variables that measure the potential benefits from reallocation are defined so that a higher value indicates higher potential gains for relocation, i.e., less (more) advantageous conditions in the local labor markets of donors (recipients). All variables are standardized with zero mean and unit standard deviation.

Finally, we define the donor benefits from relocating operations of the business group to regions with a higher level of industrial agglomeration as

$$Agg_{it}^{Don} = max\left\{ln(Agg_{int}) - ln(Agg_{ict}), 0\right\}_{n \in C_b(t)}. \tag{10}$$

Note that all four proxies for reallocation benefits involve a maximization across counties and will therefore tend to increase in the number of counties in which a BG is present. Mechanically, a larger geographic dispersion of the BG will be associated with higher measures of reallocation benefits.

Regression specification. To investigate the relationship between employment growth of BG firms, g_{it} (see equation (1)) and our donor benefits, we estimate the following panel regression model:

$$g_{it} = \mathbf{I}_{it-1}^{Don} \cdot \boldsymbol{\beta} + \mathbf{X}_{it-1} \cdot \boldsymbol{\gamma} + \mathbf{Z}_{sct} \cdot \boldsymbol{\delta} + \eta_{ct} + \theta_{st} + \varepsilon_{icst}, \tag{11}$$

where subscript i denotes an individual firm, c denotes the county where firm i is headquartered, s denotes the industry (two-digit NACE Rev. 2 codes) of firm i, and t denotes the calendar year. $\mathbf{I}_{it-1}^{Don} = (Cost_{it-1}^{Don}, Short_{it-1}^{Don}, Fit_{it-1}^{Don}, Agg_{it-1}^{Don})$ is a vector of four variables that describe the relationship between firms and locations, i.e., the three measures of labor-related benefits and the control variable for agglomeration economies. The vector$\mathbf{X_{it-1}}$ contains firm-level time-varying control variables; $\mathbf{Z_{sct}}$ is a vector of county-industry-level time-varying control variables; η_{ct}denotes county-year fixed effects and θ_{st} industry-year fixed effects, which we include to remove all time-varying confounding factors within counties and within industries. As firm-level control variables, $\mathbf{X}_{it}$, we include firm size (log of total assets), firm age, and indexes of average employee education qualification. To account for the relative importance of a BG firm among its affiliates, we compute the fraction of assets a focal firm accounts for in the group. In Germany, smaller firms are subject to more lenient labor regulations. To address this heterogeneity, we further include a dummy variable *Small firm* that equals one if a firm employs at most ten employees, and zero otherwise.[13] For county-industry level

[13]Firms with less than ten (five) employees are exempt from the *Protection against Unfair Dismissal Act*

controls, we include labor cost, labor shortage, labor fit, and the level of agglomeration. The results are presented in Table 2, column 1.

Results on donor benefits. To begin, we note that all four proxies for donor benefits reduce *Employment growth* at the focal firm, as predicted. Only the result for labor fit, Fit_{it-1}^{Don}, is not statistically significant. The coefficient estimate for $Cost_{it-1}^{Don}$, our measure for saving labor costs, is negative and significant at the 10% level. A one-standard deviation increase in $Cost_{it-1}^{Don}$ reduces *Employment growth* by 25 bp. This impact is economically meaningful and represents about 13% of the mean (1.936%, see Table 1) and 23% of the median (1.096%) of *Employment growth*. This result obtains after controlling for time-varying economic conditions in the focal firm's county and industry as well as firm characteristics. Hence, BGs move operations away from locations characterized by higher labor costs compared to other counties where the same group is active in.

Similarly, the coefficient estimates for $Short_{it}^{Don}$, our measure of donor benefits from labor shortages, has a significantly negative impact, as predicted. The size of the effect is similar to that of $Cost_{it-1}^{Don}$ and economically meaningful: A one-standard deviation increase in $Short_{it-1}^{Don}$ reduces *Employment growth* by 21 bp. Hence, BGs move operations away from locations that are characterized by more stringent labor shortages compared to other counties where the same group is active in.

Finally, donor benefits from agglomeration economies, Agg_{it-1}^{Don}, also reduce *Employment growth* by 38 bp. As predicted, BGs make relocation decision not only based on labor considerations but take into account other location characteristics that are important in their respective industry.

Overall, we conclude that BG firms grow less in locations that are disadvantageous in terms of local labor costs, labor supply, and agglomeration economies to other counties, where the same group is active in. By contrast, donor benefits from improving labor fit do not have a measurable impact.

3.2 The recipient perspective

In this section, we ask the same question as in the previous section, but now we take the perspective of a recipient firm. These are the firms that generate potential benefits to the BG by moving the operations to the focal firm i from *other* (donor) firms $j \neq i \in BG_b(t)$ in the same business group, where improvements result again from lower labor costs, labor

(*Works Constitution Act*). Above these thresholds, employees can only be dismissed because of a specific reason after six months of employment (cannot elect a works council). See Wiedemann (1980) and Guertzgen and Hiesinger (2020) for more details.

shortages, labor fit, and agglomeration economies. We refer to these improvements that BG firms offer as recipient benefits. Thus, recipient benefits form the flip-side of donor benefits. Whereas donor benefits are defined from the perspective of one donor firm in relation to multiple potential recipients, recipient benefits are defined from the perspective of one recipient firm in relation to multiple potential donors. Our hypothesis implies that firms should grow more if the BG would benefit from relocating operations to them, which move away from other firms within the same group.

Measuring the recipient benefits. We have to compare the potential benefits a focal firm can offer to the benefits other member firms could offer in relation to the same candidate donor firm. Specifically, consider any firm i that offers recipient benefits to relocate jobs from a donor firm j in the group. While these benefits may be attractive, there could be a third member firm k, such that the recipient benefits offered by k are even more attractive compared to those offered by j. We begin by assuming that business groups resolve this issue by simply choosing the best relocation opportunity within the group, i.e., the firm with the highest recipient benefits. Hence, our measures implicitly assume a "winner takes it all" contest in the internal competition for attractive locations within the BG.

To begin, we ask by how much the labor costs, respectively, labor shortage, labor fit, and agglomeration economies of the operations of BG firm $j \in BG_b(t)$ in county n would improve if it were to relocate these operations to the county c in which the focal firm $i \in BG_b(t)$, which belongs to the same BG, is located. We obtain four measures of recipient benefits:

$$Cost_{it}^{Rec} = \sum_{j \in BG(t)} max_{j \in BG(t)} \{ln(Cost_{jnt}) - ln(Cost_{jct}), 0\} \frac{E_{jnt}}{E_{ict}}, \tag{12}$$

$$Short_{it}^{Rec} = \sum_{j \in BG(t)} max_{j \in BG(t)} \{Short_{jnt} - Short_{jct}, 0\} \frac{E_{jnt}}{E_{ict}}, \tag{13}$$

$$Fit_{it}^{Rec} = \sum_{j \in BG(t)} max_{j \in BG(t)} \{Fit_{jct} - Fit_{jnt}, 0\} \frac{E_{jnt}}{E_{ict}}, \tag{14}$$

$$Agg_{it}^{Rec} = \sum_{j \in BG(t)} max_{j \in BG(t)} \{ln(Agg_{jct}) - ln(Agg_{jnt}), 0\} \frac{E_{jnt}}{E_{ict}}. \tag{15}$$

The rationale for all four measures is the same, and we discuss that for the $Cost_{it}^{Rec}$ measure in more detail, which proxies for the recipient benefits of BG firm i in offering lower labor costs to other BG firms $j \neq i$ of the same business group. For each of these firms, relocation to county c in which firm i is located presents an opportunity for improvement if two conditions are satisfied: (1) the hypothetical costs firm j would have in county c,

$Cost_{jct}$, are lower than its expected costs in county n, $Cost_{jnt}$; (2) there is no other firm k in the group, $k \neq j$ and $k \neq i$, that provides even lower labor costs to firm j than firm i, so that firm i offers the highest recipient benefits within the same group to firm j. The first condition is expressed in the term $max\left\{\frac{Cost_{jnt}-Cost_{jct}}{Cost_{jnt}}, 0\right\}$, which is positive if and only if the BG can reduce the labor costs of the operations of firm j in county n by relocating these operations to county c, where firm i is located. The second condition is expressed by taking the maximum of the ratio $\frac{Cost_{jnt}-Cost_{jct}}{Cost_{jnt}}$ over all firms $j \neq i$ of the same business group. If the focal firm i cannot offer a reduction in labor costs to the operations of any other BG firm j, then $\frac{Cost_{jnt}-Cost_{jct}}{Cost_{jnt}} < 0$ for all $j \neq i$, and $Cost_{it}^{Rec} = 0$. If the focal firm offers the lowest labor costs to at least one other BG firm, then $Cost_{it}^{Rec} > 0$. Note that labor costs (labor shortages, labor fit, agglomeration economies) of firm j in county c, $Cost_{jct}$ are calculated with respect to the proportions of the labor force of firm j, not with respect to those of firm i. Finally, we multiply by $\frac{E_{jnt}}{E_{ict}}$, because the potential growth of a candidate recipient firm depends on its size relative to that of the potential donor firms in the same group. The larger the size of the donor relative to the recipient, the more the recipient could potentially grow. Therefore, we weight the potential cost reduction by the relative employment size of the donor (E_{jnt}) to the recipient firm (E_{ict}). All variables that measure recipient benefits are standardized with zero mean and unit standard deviation.

The definitions introduced above all rely on the assumption that BGs relocate always to their best possible location, and that the size of all other opportunities does not play a role. We believe this is the most plausible assumption, however, it is possible that other considerations play a role as well, and there may well be trade-offs between the four dimensions considered here.

To investigate the relationship between firm-level employment activities and our measures of recipient benefits, we re-estimate Equation (11), but replace the vector of variables of interest $\mathbf{I}_{it-1}^{Don}$with $\mathbf{I}_{it-1}^{Rec} \equiv (Cost_{it-1}^{Rec}, Short_{it-1}^{Rec}, Fit_{it-1}^{Rec}, Agg_{it-1}^{Rec})$.

Results on recipient benefits from reallocation. Table 2, column 2 includes the four proxies for recipient benefits described above, along with the same control variables discussed before. It turns out that the recipient benefits from offering lower labor costs to other group firms, $Cost_{it}^{Rec}$, are not significant, hence, we do not find evidence that BGs move jobs to the cheapest BG location with respect to labor costs. By contrast, the measure for recipient benefits from increased labor supply, $Short_{it}^{Rec}$, is always highly significant and positive at the 1% level. A one-standard deviation increase in $Short_{it}^{Rec}$ increases the growth rate of the firm by 46 bp, about one-quarter of the mean of *Employment growth*, and almost half of its median growth rate. The estimates for the proxy for improved matching quality, Fit_{it}^{Rec}, are

also significant and even slightly larger than those for $Short_{it}^{Rec}$. A one-standard deviation increase in Fit_{it}^{Rec} increases *Employment growth* by 37 bp. Agglomeration economies have a strong impact on relocation decisions: A one-standard deviation increase in Agg^{Rec} increases *Employment growth* by 79 bp.

Combined analysis. The analyses in Table 2, columns 1 and 2 enter variables for donor benefits and for recipient benefits separately. In columns 3 to 5, we enter them jointly in the same regression to analyze each firm simultaneously as a potential donor and as a potential recipient of jobs that may be transferred to or from other group firms to the focal firm.

The most important insight from columns 3 to 5 of Table 2 is that the results for the variables of interest that proxy for donor benefits and for recipient benefits remain similar to those found in columns 1 and 2. As of now, we will refer to donor and recipient benefits comprehensively as *reallocation benefits*. In fact, all coefficient estimates become statistically and economically larger if we enter both sets of variables simultaneously and combine the donor perspective with the recipient perspective. This is unsurprising, given that the pairwise correlations between variables in the former group and those in the latter group are always positive but never large, with the highest value being 51%. (See Table OA1 in the Online Appendix for correlations.) Hence, it appears that entering the effects from donor and recipient benefits separately in Table 2 creates a bias in absolute value. The largest increase in the size of the effects is for the variables that measure the quality of the skill match, Fit^{Don} and Fit^{Rec}. Fit^{Don} increases about nine-fold in absolute value in column 4 relative to the corresponding estimates in column 1 and becomes highly significant. It seems reasonable to assume that only looking at the donor or the recipient perspective leads to omitted variable biases. A potential donor on one dimension might simultaneously be a potential recipient on another. For instance, a firm might attract inflows of administrative jobs for low labor costs while, at the same time, lose technical jobs due to insufficient labor supply. Consequently, job inflows and outflows attributable to different dimensions net out. Therefore, including only the donor or the recipient perspective should bias the coefficients towards zero.

The combined analysis shows that the proxies for reallocation benefits all have the predicted sign and seven out of eight are statistically and economically significant. On average, a one standard deviation increase in a measure of donor (recipient) benefits decreases (increases) employment growth by about 0.4%, which is about 20% (40%) of the mean (median) employment growth. These results confirm our hypothesis that business groups move operations in order to arbitrage local labor markets.

Control variables. The size and statistical significance of the coefficients for the control variables remain more or less unchanged across the different specifications in Table 2. In general, larger and older firms grow slower, in line with the findings in prior literature (e.g., Mansfield, 1962; Harhoff, Stahl, and Woywode, 1998). *Age* and *Size* have both have a negative impact on growth: A one-standard deviation in *Size* (*Age*) reduces *Employment growth* by 117-203 bps (78-109 bps), with the coefficient on *Size* increasing toward the upper end of its range in those specifications that control for the quality of the work force. Since larger firms have a more educated and qualified workforce, adding these controls removes the confounding positive influence of these variables on growth from *Size*.[14]

We control for the importance of a firm for the entire group by using the variable *Relative size*, which is the percentage of the focal firm's assets in the assets of the entire group. Firms with a higher value of *Relative size* are more likely part of the core segments of the group and thus more important for the group than peripheral firms with a lower *Relative size* (see Maksimovic and Phillips (2002) for a related notion and results that support this assumption). This variable has the strongest impact if we enter it along measures of recipient benefits (columns 2 to 5): A one-standard deviation increase in *Relative size* (33%) increases *Employment growth* by 12bp (column 1) to 144bp (column 5). Hence, core BG firms grow faster than peripheral firms. In addition, we observe that firms with less than ten employees grow significantly less by about 11 to 16 pp. Hence, even though labor-market regulations are more lenient for small firms, these do not attract more operations.

Labor cost and *Labor shortage* itself have no significant impact on *Employment growth*. Surprisingly, *Labor fit* and *Agglomeration* have a negative impact on *Employment growth*. *Education* and *Qualification* both have a strong and positive impact on *Employment growth*. We hypothesize that firms in knowledge-intensive industries and with more knowledge-intensive and skill-intensive technologies grow faster. However, we note that all regressions already control for industry-year fixed effects. Hence, the effects of *Education* and *Qualification* describe within-industry-year variation and are thus surprisingly strong. A one-standard deviation increase in the scores for *Education* (*Qualification*) is associated with about 2.4 (0.6) percentage point higher *Employment growth*.

Summary. Our main question is how BGs move jobs between firms in different locations as a function of the variation in labor market conditions. We find that BGs move jobs across counties if the destination county has lower labor costs, higher labor supply, and if it has more employees with skills that match the requirements of the firm. The proxies for reallocation

[14] *Size* is defined as the logarithm of total assets. From Table 1, one standard deviation of *Size* is 1.85 and its inter-quartile range is 2.04. Hence, a one-standard deviation increase in *Size* corresponds to an increase of total assets by a factor of 6.3.

benefits measure potential benefits to BGs from moving production across group firms in addition to any time-varying industry or county characteristics, and the time-varying firm characteristics captured by firm-level control variables. Hence, we provide evidence for labor-related benefits from reallocation *in addition* to these controls, and that they are distinct from the benefits from agglomeration economies.

3.3 Which operations are moved?

In this section we ask which operations are more likely to be moved in response to changing labor-market conditions and investigate the influence of asset tangibility (Section 3.3.1) and the skill compositions of the jobs involved (3.3.2).

3.3.1 Moving tangible versus intangible assets

Arguably, reallocation benefits are strongly influenced by the costs of physically relocating operations. These physical relocation costs are mainly determined by the costs of moving the fixed assets of the firm (e.g., building a new plant, moving machinery). Therefore, we hypothesize that firms with (1) less tangible assets relative to total value added (*Tangibility*), (2) less tangible assets relative to employment size (*Capital intensity*), and (3) operations that are more likely to allow employees to work remotely (*Remote work*), measured by the ratio of gross software investment to tangible assets, are more sensitive to labor reallocation benefits. We test this hypothesis by splitting our sample at the median of (1) *Tangibility,* (2) *Capital intensity,* and (3) *Remote work,* and rerun the regression of Table 2, column 5 for each subsample. Results are presented in Table 3. In line with our hypothesis we find that the sensitivity of employment growth to donor benefits ($Cost^{Don}$, $Short^{Don}$, Fit^{Don}) and to recipient benefits ($Short^{Rec}$, Fit^{Rec}) is significantly larger for the subsamples of firms with lower physical relocation costs, i.e. lower *Tangibility* (column 2), lower *Capital intensity* (column 4), and higher potential for *Remote work* (column 6). Interestingly, we observe the opposite for the sensitivity to agglomeration benefits. Agg^{Don} is stronger in the subsamples with high *Tangibility* (column 1), high *Capital intensity* (column 3), and low potential for *Remote work* (column 5). We observe a similar pattern for Agg^{Rec}, but to a lesser extent. These results imply that labor reallocation benefits are mainly important for firms with relatively low physical relocation costs, whereas the opposite applies to agglomeration benefits. Table OA2 in the Online Appendix provides a breakdown of the results from Table 2 (column 5) into manufacturing industries, service industries, and other industries. With a couple of minor exceptions, all results are concentrated in service industries, which reinforces the finding above that operations are more likely to be moved if physical reallocation costs are

lower.

3.3.2 Moving high-skilled versus low-skilled jobs

Since reallocation benefits depend on the type of operation that is moved, we conjecture that they may also be associated with the characteristics of the jobs that are moved. Hence, we use the occupational classifications of our data provider and break up employment growth into subgroups of jobs defined by employees' education, qualification, and the complexity of their jobs. More specifically, we use indices for three different characteristics and group them into terciles (low, middle, high): education, qualification, and task complexity. We provide a detailed explanation how these variables are defined on the employee level in and the precise definitions for the variables used in the analysis in Appendix A.3. In addition, we differentiate managerial from non-managerial jobs using the Blossfeld (1987) job categories. Then we ask how the reallocation benefits affect the employment growth of the different subgroups of employees, by replacing $E_{it} - E_{it-1}$ in the numerator of equation (1) by $E_{it}^{cat} - E_{it-1}^{cat}$, where the superscript "cat" refer to employment in a particular category, e.g., highly-educated employees.

Table 4 presents the results. The most remarkable insight from breaking up employment growth is that the effects of donor benefits are concentrated in the top tercile: The coefficient estimates for donor benefits in the highest terciles of education (column 3), qualification (column 6), and task complexity (column 9) are always highly significant, whereas those for the lowest terciles (columns 1, 4 and 7) are mostly not significant; $Short^{Don}$ and Fit^{Don} is twice significant for the middle terciles (columns 2 8, and 2, 5). By contrast, there is no clear pattern for recipient benefits across these three dimensions. Our interpretation is that operations involving high-skilled jobs are more likely to be moved to different locations if the current (donor) location becomes less suitable regarding labor market conditions. However, if operations are moved to a different location then the additional growth of the labor force in the recipient firm is different from the corresponding lower growth in the donor firm.

A second observation from Table 4 is that the patterns for agglomeration benefits differ from those for the labor-related reallocation benefits. For example, the donor benefits from agglomeration are significant only for the lowest terciles of education (column 1) and qualification (column 4), and for the lowest and middle terciles of task complexity (columns 7 and 8). Thus agglomeration benefits matter precisely for those terciles for which the donor benefits from labor reallocation are not significant, which mirrors the results for tangible and intangible assets.

Finally, we distinguish managerial from non-managerial occupations (for details see Appendix A.2). The main finding is that all effects are concentrated in the growth of non-

managerial employment (column 10), whereas the estimates for managers are economically and statistically insignificant (column 11). We infer that the movement of operations involves the movement of operational jobs but not of managerial jobs.

Summary. BGs are more likely to realize reallocation benefits the easier it is to move physical operations and the more high-skilled the jobs involved are in the donor location. Reallocation involves operational jobs but not managerial jobs. By contrast, movements of operations to benefit from agglomeration economies show the opposite patterns: They involve operations that are harder to move and low-skilled jobs. Hence, BGs realize labor-related benefits and agglomeration benefits for different types of operations.

3.4 Decomposing growth

In this section, we explore the mechanisms through which BGs transfer operations within their member firms by decomposing employment growth into growth through internal transfers versus external labor markets (3.4.1) and into hiring and separations (3.4.2).

3.4.1 External and internal growth

In this section, we break down employment growth into one component that captures the labor flows between firms that belong to the same business group, and a second component that captures the labor flows between BG firms and the outside labor market. Specifically, we define *Internal employment growth*, g_{it}^I, as the growth rate that results only from those changes in employment that involve firms of the same group, i.e., separations from firm i when its employees are hired by another group firm, and hirings of firm i of employees from other group firms. Similarly, *External employment growth*, g_{it}^X, is the growth rate from changes in employment that involve flows between group firm i and the external labor market, which includes flows to and from domestic firms that do not belong to the same group, foreign firms, training, retirement, or unemployment. We provide more precise definitions in Appendix A.1 and show that these growth rates decompose *Employment growth* such that

$$g_{it} = g_{it}^I + g_{it}^X. \tag{16}$$

Table 5 reports the same regression specification as before, but use *Internal employment growth* (columns 1 to 3) and *External employment growth* (columns 4 to 6) separately as dependent variables. We include variables for donor and recipient benefits simultaneously. (See columns 3 to 5 of Table 2.) To gauge the relative importance of internal growth and external growth, column 7 reports the ratio of the coefficient estimates in column 6 to the

sum of the coefficients of columns 3 and 6. Since internal and external growth rates add up as in equation (16), the sum of the coefficients in columns 3 and 6 of Table 5 is equal to the corresponding coefficients in column 5 of Table 2. Hence, we treat the ratios reported in column 7 as a measure of the relative importance of internal labor markets for realizing benefits from reallocation.

Results. Column 7 shows that for most independent variables, about 70% to 90% of their impact can be attributed to *External employment growth*, whereas only 10% to 30% can be attributed to *Internal employment growth.* In almost all cases in which the coefficient in column 5 of Table 2 is statistically and economically significant, the corresponding coefficient for external flows in column 6 of Table 5 is also significant, whereas the coefficients for internal flows in column 3 are often insignificant. Hence, the corresponding independent variable is associated with significant changes in *External employment growth*, but not with corresponding changes in *Internal employment growth.*

These results imply that internal labor markets are of minor importance for BGs and that BGs tend to move jobs rather than employees across locations.[15]

3.4.2 Hiring and separations

The analysis so far uses net employment growth as a dependent variable. In this section, we ask whether changes in employment growth result from changes in the hiring rate or the separation rate. For example, higher net employment growth may result either from more hiring or from fewer separations. To address this question, we define by H_{it} and S_{it} the number of new hires, respectively, separations of firm i in period t. These flow measures are related to the employment levels as

$$E_{it} - E_{it-1} = H_{it} - S_{it}. \tag{17}$$

We can then define hiring and separation rates as:

$$Hiring\ rate \equiv \frac{H_{it}}{0.5\left(E_{it} + E_{it-1}\right)}; \quad Separation\ rate \equiv \frac{S_{it}}{0.5\left(E_{it} + E_{it-1}\right)}. \tag{18}$$

Table 6 shows the results with the hiring rate and the separation rate as dependent variables. The impact of reallocation benefits differ strongly between hiring and separations. On the

[15]The discussion here is based on coefficients for the association of variables that measure reallocation benefits on employment growth. The differences between the unconditional means of *Internal employment growth* and *External employment growth* are even more extreme: From Table 1, average *Employment growth* is 1.936%, of which 1.893 pp (98%) is external and 0.042 pp (2%) is internal.

donor side, labor costs reduce the hiring rate, but do not strongly affect separations, whereas labor shortages and labor fit increase the separation rate, but do not affect hiring.

Interestingly, on the recipient side, higher cost benefits reduce separations, but they also reduce hiring. Hence, BG firms in locations that offer benefits from lower labor costs to group firms reduce employee turnover. This finding helps explain the insignificant results we found for $Costs^{Rec}$ in Table 2, where the simultaneous effects on hiring and separations cancel each other. The estimates for $Short^{Rec}$ and Fit^{Rec} reveal that benefits from a better fit of the county's labor force are realized only through additional hiring - recipient firms can recruit from a better local pool of workers, whereas the benefits from a lower labor shortage are realized through fewer separations. The last observation is particularly interesting, because it suggests that a better supply of workers in the local labor market implies that recipient firms lose fewer employees to other firms, not that they recruit additional employees.

3.5 Managerial capabilities

In this section, we split the sample according to different types of BGs depending on measures of their managerial capabilities. The argument in this paper suggests that BGs move operations that can be operated more efficiently by recipient firms than by donor firms. However, to move operations, BGs must identify them in the donor firm, relocate them to the recipient firm, and recipient firms then have to integrate and manage these new operations. All these are managerial functions, and based on the literature on managerial capabilities and processes (e.g., Atalay, Hortacsu, and Syverson, 2014; Bloom, Sadun, and Reenen, 2017) we expect that managerial capabilities are necessary to transfer operations across firms. However, theoretical work does not provide specific hypotheses and we see two principal ways in which BGs may effect these transfers. BGs may organize themselves as a network with a hub in which one firm serves as a coordinator for the entire group. Then managerial capabilities would be concentrated in this coordinating firm, which then organizes transfers across BG member firms. Alternatively, BGs can be less centralized, such that member firms have more autonomy and managerial capabilities of their own, which may have the advantage that each firm collects information and monitors the conditions in its local labor market. Hence, we explore the role of managerial capabilities and whether centralized or decentralized BGs are more responsive to changes in local labor market conditions.

To measure managerial capabilities, we use the number of employees in the following enabling functions, which we identify from occupational codes: management, office workers, human resources, and accounting.[16] Let $E^{EF}_{i,t}$ be the number of employees in these functions

[16]See Bias et al. (2024) for a similar argument. However, their definition of enabling functions is more comprehensive and used for a different purpose.

in firm i at time t and let $E_{bt}^{EF} \equiv \sum_{j \in BG_b(t)} E_{jt}^{EF}$ be the same number for the whole BG b. The measure of managerial capabilities, mc_{it}, is the employment share of the focal firm i for enabling functions (superscript "EF") relative to the whole group:

$$mc_{it} \equiv \frac{E_{it}^{EF}}{\sum_{j \in BG_b(t)} E_{jt}^{EF}} = \frac{E_{it}^{EF}}{E_{bt}^{EF}}, \tag{19}$$

Table 7 shows the results for a sample split at the median of mc_{it} in columns 1 and 2. Observe that the donor benefits from labor fit and labor shortage are insignificant for above-median firm-years, and those for labor costs show only one-third of the size of the coefficient compared to the below-median firms. Hence, it appears that firms with lower managerial capacities are more likely to lose operations. However, the matching move of operations to firms with higher managerial capacities obtains only for labor costs and not for the other dimensions of reallocation benefits.

The distribution of mc is highly skewed, across business groups, but also within business groups (Mean: 0.3236; Median: 0.2031). Hence, some BGs concentrate their enabling functions in one firm, probably the apex firm that owns the other BG member firms, and we conjecture that it may serve as a hub or coordinator such that the other member firms focus on operations. To explore this question further, we define two measures of the concentration of enabling functions in member firms, one at the firm level and one at the group level. The firm-level concentration measure simply subtracts the employment share of focal firm i in its group from the corresponding share for enabling functions:

$$con_{it} \equiv \frac{E_{it}^{EF}}{E_{bt}^{EF}} - \frac{E_{it}}{E_{bt}} = mc_{it} - \frac{E_{it}}{E_{bt}}, \tag{20}$$

where $E_{bt} \equiv \sum_{j \in BG_b(t)} E_{jt}$ is the total employment of BG b at time t and $\frac{E_{it}}{E_{bt}}$ is the employment share of firm i in the group. For BG firms that serve a coordinating function for the group, this measure should be high and negative for all the other firms. By contrast, for BGs in which the enabling functions are devolved to the member firms, con_{it} should be close to zero. Table 7 shows the results for a sample split based on con_{it} with below median-concentration firms in column 3 and above median-concentration firms in column 4. Interestingly, the results for donor benefits show that the loss of operations is concentrated in firms with *more* managerial capacities. This finding contradicts the notion that firms become donors if they have low managerial capacities.

To analyze this question further, we observe that high values of *con* obtain for two types of firms: Those that serve a coordinating function in their BG, and those whose BG does not have a coordinating firm and employees in enabling functions are distributed relatively

evenly across the member firms. The mean and median of *con* are both negative: Low values obtain for the firms in BGs in which another firm has a coordinating function. We analyze the imbalance of managerial capacities at the group level by constructing an employment-weighted average of the absolute values of *con*, which provides a measure of the imbalance of enabling functions across BG firms:

$$imb_{bt} \equiv \sum_{j \in BG_b(t)} \frac{E_{jt}}{E_{bt}} \cdot \left| \frac{E_{jt}^{EF}}{E_{bt}^{EF}} - \frac{E_{jt}}{E_{bt}} \right| = \sum_{j \in BG_b(t)} \frac{E_{jt}}{E_{bt}} \cdot |con_{it}| \,, \tag{21}$$

Hence, if the share of employees in enabling functions of group firm j relative to the whole group, $\frac{E_{jt}^{EF}}{E_{bt}^{EF}}$, is the same as the share of the same firm's total employment in the group, $\frac{E_{jt}}{E_{bt}}$, then con_{it} equals zero. Accordingly, for groups in which the enabling function is distributed evenly across BG firms, the employment-weighted average of $|con_{it}|$ in (21) is low. By contrast, BGs that concentrate the enabling functions in one firm have a high value of con_{it} in the coordinating firm and low values, i.e, high absolute values, in the other firms; these BGs have a high value of imb_{bt}. If we split the sample according to this measure (columns 5-6, Table 7), donor benefits for labor fit and labor shortage are now concentrated in the firms with a low imbalance *imb*. Hence, BGs that devolve enabling functions to the member firms reallocate operations more than those that concentrate them in one firm, which supports the notion that labor reallocation requires managerial capacities at the donor and at the recipient firms. BGs with a more hierarchical structure in which enabling functions are centralized therefore do not reallocate operations as much.

3.6 When do business groups exit?

The analysis so far is focused entirely on the intensive margin of job flows between locations and takes the membership of the business group at each point in time as given. In the next step, we analyze decisions in which business groups exit or enter certain locations. In this section, we analyze exits. Note that in our context, an exit refers to a BGs decision to divest or dissolve an existing firm, i.e., to leave a location in which it has been present so far. We analyze exit decisions on the firm-level with two different dependent variables: (1) using an exit dummy variable and perform linear probability regressions, (2) using the fraction of employees leaving the BG and perform OLS regressions. The dummy variable $Exit_{ict}$ equals one if firm i in county c is disaffiliated from a BG in year t and, consequently, if the BG loses its presence in county c, and zero otherwise. It is arguably easier for geographically more dispersed BGs to exit local markets because exiting one county has a less disruptive impact on the overall operations. Therefore, we define a second exit variable that weights the

exit decision with its economic importance (i.e., fraction of employees affected) for the BG. *Exit* LW_{ict} is the fraction of employees leaving the BG if firm i in county c is disaffiliated from a BG in year t (i.e., *Exit* equals one), and zero otherwise.

The results are presented in Table 8. Since a complete exit from a location is an extreme form of shrinking the operations in that location, our baseline assumption is that the coefficients with *Exit* as the dependent variable are significant whenever those with *Employment growth* are significant, albeit with opposite signs. This prediction is supported for most independent variables. The estimates for all measures of donor benefits and for the recipient benefits from labor costs always have the predicted signs in columns 1 to 3 of Table 8; they also have the corresponding opposite signs in the intensive-margin regressions in Table 2. They are also economically significant: A one standard deviation change of these proxies for donor (recipient) benefits increases (decreases) the probability of exit by about 13 to 23 basis points, which is between 16% and 29% of the unconditional sample mean of *Exit* (0.8 pp from Table 1). By contrast, the variables for the recipient benefits from labor fit and labor shortage have counter intuitive positive signs, potentially because the dummy variable *Exit* overweighs exits from operations that are small in relation to the overall BG.

The regressions in columns 4 to 6 of Table 8 use the continuous exit measure *Exit LW* and confirm this hypothesis. With this variable, we obtain the predicted sign across all proxies for reallocation benefits. Economic significance is also slightly higher: A one standard deviation change in each of our proxies for donor (recipient) benefits increases (decreases) the probability of exit by about 1 to 4 basis points, which is between 10% and 40% of the unconditional sample mean of *Exit LW.* In these regressions, measures of labor fit (labor cost) have the highest coefficient estimates for donor (recipient) benefits. Hence, lower labor costs and a better labor fit in other BG locations increases the probability of exit the most.

Age, and *Relative size* both reduce the probability of exit, in line with the notion that BGs are unlikely to divest mature or core businesses. Hence, larger firms grow less at the intensive margin, but they are also less likely to be divested. Different from the intensive-margin analyses, *Education and Qualification* have no or only a marginal impact; these variables matter only at the intensive margin.

3.7 Entry: Growth at the extensive margin

We continue with the discussion of entry decisions. In our context, entry refers to a BGs decision to acquire an existing firm or a green field investment in a location in which it has not been present so far, and we refer to BG growth through acquisitions as growth at the extensive margin. As mentioned above, while we can analyze exit decisions at the firm level, we cannot do the same for entry decisions, since firm-level analyses presume that a firm

already is a member of a BG. Accordingly, we perform the analysis of entry decisions at the group level and define three different group-level variables that measure extensive growth: (1) *Entry dummy* (*Exit dummy*) , which equal one in a year in which the BG enters (exits from) at least one new county, *Entry count* (*Exit count*), which is the number of counties a BG enters (exits) in a particular year, and (3) *Entry LW* (*Exit LW*), which is the fraction of employees joining (leaving) the BG because it enters (exits) from the respective counties. We aggregate the measures of donor benefits to the BG level by taking the employment-weighted average for each BG-year. We do not include measures of recipient benefits in the regressions, since they contain the same information as the measures for donor benefits when aggregated to the BG level.

Our hypothesis does not distinguish between growth at the extensive and at the intensive margin. In particular, BGs may enter a new location that promises better conditions, i.e., lower labor costs, fewer shortages, and a better labor fit, just as much as it can transfer operations to an existing location. The main difference between entering new locations through an acquisition compared to using already existing locations is that the former requires the group to identify a target and invest the additional time and fixed costs for completing an additional acquisition. If these costs are significant, the hurdle for entry is accordingly higher, and we would expect entries into new locations only if the prospects of the new location are significantly better than those of all existing locations.

Table 9 presents the results for the group-level analyses. Columns 1 to 3 (4 to 6) show results for the three exit (entry) variables as the dependent variable. All columns include year and BG-level fixed effects, thus rely only on the within-group variation. As a baseline, we expect that the results for *Exit* are similar to those in Table 8, whereas those for *Entry* have the opposite signs.

To begin, we focus on the results for *Exit*. These results fully conform to our expectations. All three labor variables ($Cost^{BG}$, $Short^{BG}$, Fit^{BG}) as well as agglomeration (Agg^{BG}) have the predicted positive signs in line with the results from Table 8. Most importantly, benefits from saving labor costs through moving operations across locations, $Cost^{BG}$, now turn out to be statistically and economically significant and of first-order importance: The probability of exiting a county increases by 1.8% for a one-standard deviation increase in $Cost^{BG}$, which represents about 35% of the unconditional sample mean of *Exit* of 5.2% (see Panel B of Table 1). These results affirm our prior conclusion that labor costs are highly relevant for location decisions of BGs. The results for benefits from improved labor fit are of comparable magnitude: A one-standard deviation increase in Fit^{BG} increases the likelihood of exit by 2.3% (44% of the sample mean). In contrast, the results for labor shortage are economically somewhat weaker: A one-standard deviation increase in $Short^{BG}$ increases the likelihood of

exit by 0.6%.

The results for the proxies for donor benefits in the *Entry* regressions have the opposite sign of those found in the *Exit* regressions and the magnitudes are comparable, as expected. For BGs with larger donor benefits, we find lower probabilities to enter new locations. The economic significance is again large, in particular with respect to labor costs and labor fit. A one-standard deviation increase in $Cost^{BG}$ (Fit^{BG}) decreases the likelihood of entry by 2.5% (2.2%), which is 48% (42%) of the sample mean. A one-standard deviation increase in $Short^{BG}$ reduces the likelihood of entry by 1.3%. Overall, we conclude that the impact of labor-related reallocation benefits is qualitatively similar at the extensive and the intensive margins, but with notable quantitative differences: Labor costs matter mostly at the extensive margin and less at the intensive margin, whereas the opposite holds for labor shortages.

4 Extensions and robustness

In this section we extend our baseline model to address additional questions and to provide robustness checks on our baseline modeling choices. Specifically, we modify our definition of local labor markets (Section 4.1); we construct a counterfactual to business group firms from standalone firms (Section 4.2); and we use alternative definitions of the main variables for reallocation benefits and enter additional control variables (Section 4.3).

4.1 The definition of local labor markets

Our baseline specifications use counties to define local labor markets. However, Germany has 400 counties with an average population of about 200,000, which makes the average county relatively small. Too narrow a definition of local labor markets may overlook two issues: First, employees are often willing to commute to work from neighboring counties, thus adding to the labor supply of adjacent counties. Second, employees who live in the border region of a county have about equal access to firms in their own as well as their neighboring county and thereby form part of the labor supply of both counties. Other studies of local labor markets use a broader definition of local labor markets and divide Germany into 50 commuting zones (Kropp and Schwengler, 2016; Popp, 2023).[17] However, this strategy addresses only the first but not the second issue, which applies equally well to employees who live in the border region of two commuting zones.

[17]Studies on US data also use both definitions: Rinz (2022)) and Bai et al. (2022) use commuting zones, whereas and Kim (2020) Kim (2020) and Benmelech, Bergman, and Kim (2022) use the more granular county level.

We use a different approach and define the local labor market to which firms have access as comprising their own county as well as all neighboring counties. More specifically, for any firm j located in county c at time t, the local labor market in relation to which we define the measures of labor costs, labor supply, and labor fit comprises all employees who live either in county c or in any other county $g \neq c$ that has a common border with county c. Note that in this way, local labor markets are necessarily overlapping, since the workers located in county g contribute to the labor supply of firms in county c, whereas the workers located in county c contribute to the labor supply of firms located in county g. The advantage of this strategy is that it provides a more satisfactory treatment of workers and firms located in the border areas of two counties.

Based on this notion of overlapping local labor markets, we define the measures of labor market characteristics and agglomeration benefits for a firm $j$located in county c as employment-weighted averages of the respective measures for county c and all its adjacent counties. The definitions of all other variables remains unchanged. We report the results in Table 10. Panel A reports firm-level regressions and reproduces Tables 2 (column 5), 5 (columns 3 and 6), and 8 (columns 3 and 6); Panel B reports group-level regressions and reproduces Table 9.

All results are qualitatively robust and show that none of our conclusions above depends on the way in which we define local labor markets. The results are quantitatively similar, but two variables show noteworthy changes. In particular, the coefficients on Fit^{Don}, which measures the benefits from improving the fit of local labor markets, becomes more negative throughout and thereby economically and statistically more significant. Hence, the regressions in Table 2 appear to underestimate the donor benefits, since they do not account for the fact that group firms have not only access to the workers in their counties, but can also lure workers from neighboring counties and thereby improve labor market access for the operations that are currently undertaken by the focal firm. Differently from the baseline analysis in Table 5 (columns 1 to 3), the coefficient for *Internal employment growth* in column 2 of 10 now becomes weakly significant. Hence, business groups can improve labor fit by relying less on internal transfers and instead attracting new workers to another group firm.

By contrast, the coefficients on $Short^{Rec}$, which measure the impact of labor shortages from the recipient's side, decline by about 40% relative to those in the baseline specification. We attribute this decline to attenuation bias: If we measure labor shortage in the local labor market of the recipient firm, then the measurement is more accurate if we use a narrower definition of local labor markets, since the wider definition seems to incorrectly assume that additional labor supply in neighboring counties helps the focal firm. Overall, these results suggest that there is not much to choose between the narrower and the wider definition of

local labor markets.

4.2 Constructing a counterfactual

The baseline analysis only considers business group firms and provides an analysis of the cross-sectional variation in employment growth of these firms, but it does not compare BG firms to standalone firms. In this robustness check, we extend the baseline analysis by constructing a counterfactual from matching standalone firms. If the relative patterns of employment growth documented in Section 3 could be attributed to general regional patterns of the migration of jobs and operations, which may occur for reasons related to demographics, changes in transport systems, or structural changes in the economy, then these patterns should be shared by standalone firms as well. To identify matching standalone firms, we adopt a two-step procedure. In the first step, we require that standalone firms perfectly match the BG firm on a set of categorical variables. Specifically, we define cells based on the full cross-product of counties (400 units), calendar years (12), 2-digit industry codes (84), and the number of establishments (4 categories: 1, 2-5, 6-10, above 10). Among the firms that provide a perfect categorical match, we then pick that standalone firm as a match that minimizes the Euclidean distance to its matching standalone firm based on six continuous variables: firm size, measured as beginning-of-year log employment, log firm age, log average worker age, percentage of female workers, percentage of highly qualified workers, and percentage of medium-qualified workers. All continuous variables are standardized.

We can match about 70% of the firm-year observations in our sample. Table OA3 shows the matching results and reports the mean and median of firm size and firm age for the matched BG firms ($N = 68,977$), the unmatched BG firms ($N = 27,814$) and the matched standalone firms. The Imbens-Wooldridge statistic for relative differences (Imbens and Wooldridge, 2009), which measures the economic rather than the statistical significance of the difference between BG firms and matching standalone firms, is below the recommended threshold of 0.25 for all six variables reported in Table OA3. We observe the largest measure of relative differences for the percentage of highly-qualified employees: BG firms have, on average, more highly-qualified and fewer medium-qualified employees compared to their standalone matches.

Table 11 reproduces the main results for the regressions with *Employment growth* as the dependent variable. Comparing the regressions for matched BG firms (columns 1 and 3) with those for standalone firms (columns 2 and 4) shows that the patterns observed in Table 2 can be attributed entirely to the BG status of firms and not to demographic or structural factors that are common to BG firms and matching standalone firms. In fact, all measures of labor-related benefits are insignificant for standalone firms, whereas the results for the

subset of BG firms we can match is not only qualitatively but for almost all variables also quantitatively similar to what we find for the whole sample in Table 2.

4.3 Measurement and control variables

In this section, we discuss additional robustness checks that use alternative definitions of some key independent variables. Specifically, we provide alternative definitions for the measurement of labor shortage, labor fit (Section 4.3.1), and for agglomeration benefits. In all cases, we replicate the regressions from Table 2 (column 5), Table 5 (columns 3 and 6), Table 8 (columns 3 and 6), and from Table 9 (columns 1 to 6). All tables are relegated to the Online Appendix.

4.3.1 Labor fit

As an alternative to Fit, we use the cosine similarity measure for human-capital relatedness introduced by Lee, Mauer, and Xu (2018). However, whereas Lee, Mauer, and Xu (2018) measure the relatedness between the labor force of target and acquirer in a merger, we measure the similarity between the labor force of firm i and that of all employees located in county c. Appendix A.4 provides a detailed description and formal definition of this measure and Table OA4 in the Online Appendix shows the results, the coefficients have the predicted signs. However, the economic and statistical significance for HCR is smaller across the board, which suggests that HCR is a noisier measure of labor fit compared to Fit.

4.3.2 Labor shortage

To construct an alternative measure of labor shortage, we build on Cestone et al. (2024) and use establishment closures in a county as a source of exogenous shocks to the labor supply of other firms. As in our baseline measure, the idea is that for each focal firm, changes in the labor demand of all other firms represent a change in labor supply. Hence, we measure shocks to labor shortage by counting all employees in occupation l in county c in year t that are separated from their firms because of establishment closures, which are reported by our data provider. Separated employees are then scaled by the beginning-of-year county-level employment in the same occupation. The resulting numbers then replace the regression residuals $\hat{\mu}_{clt}$ in equation (4). Accordingly, they are averaged over three years and inserted in equation (5) to provide an alternative measure of labor shortage.

Table OA5 shows the results, which are qualitatively and quantitatively similar to the baseline results for analyses of the intensive margin. The largest change is for the donor benefits from labor shortage, $Short^{Don}$, which shift more strongly toward external labor markets

(84.6% instead of 61.5% of the effect are attributable to internal transfers). For the entry and exit regressions, there are some larger changes in both directions. The most significant difference relative to the baseline results is for the BG level (Panel B), for which labor shortage is completely insignificant with the new measure, potentially because establishment closures do not provide a sufficiently persistent supply of labor to trigger exits and entry. This impact on significance may also account for the sign changes for the labor fit and agglomeration variables.

4.3.3 Agglomeration benefits

We measure how attractive a location is based on the proximity to customers and suppliers. Being closer to customers and suppliers offers several agglomeration benefits, such as lower transportation costs and more information spillovers. We follow the literature in regional economics (Glaeser and Kerr 2009; Alcacer and Chung, 2014) and define two additional variables, Buy_{sct} and Sup_{sct}, which measure the buyer fit and the supplier fit of county c at time t for a firm that operates in industry s. Both measures are constructed from industry-level input-output tables for Germany and increase if the industries from (to) which a focal firm buys (sells), account for a larger fraction of the employment in its county. Appendix OA6 provides a detailed description and formal definitions of these measures and Table OA6 in the Online Appendix shows the results. *Buy* and *Sup* show the predicted signs consistently across almost all specifications, but only about half of these coefficients are statistically and economically significant. Overall, these results imply that firms have a tendency to relocate their operations to counties that have a higher density of potential customer and supplier firms, but this aspect does not seem to be of first order importance. Moreover, adding buyer and supplier fit has only a minor impact on the estimates for the measures of reallocation benefits that are the focus of our analysis.

5 Conclusion

This paper studies the intensive and extensive employment growth of business groups and of firms that are affiliated with business groups. We explore a specific hypothesis about how business groups may add value: By operating firms in multiple locations, they can move operations and jobs between affiliated firms, thus avoiding the fixed costs of greenfield investments and setting up new firms. Incentives to move operations may arise if critical resources are available more abundantly and more cheaply in some locations than others. Specifically, we explore how firms move jobs across local labor markets and measure the attractiveness of local labor markets along three dimensions: the costs of labor, the tightness

of the labor market, and the labor fit of BG firms to the local labor market. We find that all three dimensions are of first order importance for growth at the intensive and extensive margins. We find that labor conditions are of similar importance for location decisions of BG firms as agglomeration economies.

References

Alam, Zinat S., Mark A. Chen, Conrad S. Ciccotello, and Harley E. Ryan. 2014. "Does the Location of Directors Matter? Information Acquisition and Board Decisions." *Journal of Financial and Quantitative Analysis* 49 (1):131–164.

Alcacer, Juan and Wilbur Chung. 2014. "Location Strategies for Agglomeration Economies." *Strategic Management Journal* 35 (12):1749–1761.

Alesina, Alberto F., Yann Algan, Pierre Cahuc, and Paola Giuliano. 2010. "Family Values and the Regulation of Labor." *NBER Working Paper* (15747).

Almeida, Heitor V., Chang Soo Kim, and Hwanki Brian Kim. 2015. "Internal Capital Markets in Business Groups: Evidence from the Asian Financial Crisis." *The Journal of Finance* 70 (6):2539–2586.

Altomonte, Carlo, Gianmarco Ottaviano, and Armando Rungi. 2021. "Business Groups as Knowledge-Based Hierarchies of Firms." *CEPR Discussion Paper* (DP16677).

Antoni, Manfred, Andreas Ganzer, and Philipp Vom Berge. 2016. "Sample of Integrated Labour Market Biographies (SIAB) 1975-2014." *FDZ Datenreport* (04/2016).

Antoni, Manfred, Katharina Koller, Marie-Christine Laible, and Florian Zimmermann. 2018. "Orbis-ADIAB: From record linkage key to research dataset : Combining commercial company data with administrative employer-employee data." FDZ-Methodenreport 201804 (en), Institut fuer Arbeitsmarkt- und Berufsforschung (IAB), Nuernberg [Institute for Employment Research, Nuremberg, Germany].

Antoni, Manfred, Ernst G. Maug, and Stefan Obernberger. 2019. "Private Equity and Human Capital Risk." *Journal of Financial Economics* 133 (3):634–657.

Atalay, Enghin, Ali Hortacsu, and Chad Syverson. 2014. "Vertical Integration and Input Flows." *American Economic Review* 104 (4):1120–48.

Azar, Jose, Ioana Marinescu, and Marshall Steinbaum. 2022. "Labor Market Concentration." *Journal of Human Resources* 57 (S):S167–S199.

Bae, Kee-Hong, Jun-Koo Kang, and Jin-Mo Kim. 2002. "Tunneling or Value Added? Evidence from Mergers by Korean Business Groups." *Journal of Finance* 57 (6):2695–2740.

Baek, Jae-Seung, Jun Koo Kang, and Inmoo Lee. 2006. "Business Groups and Tunneling: Evidence from Private Securities Offerings by Korean Chaebols." *Journal of Finance* 61 (5):2415–2449.

Bai, John, Douglas Fairhurst, and Matthew Serfling. 2019. "Employment Protection, Investment, and Firm Growth." *The Review of Financial Studies* 33 (2):644–688.

Bai, John (Jianqiu), Massimo Massa, Chi Wan, and Yan Wang. 2022. "Local Labor Market Competition and Capital Structure Decisions." *INSEAD Working Paper* (2022/40/FIN).

Baker, George and Bengt Holmstrom. 1995. "Internal Labor Markets: Too Many Theories, Too Few Facts." *The American Economic Review* 85 (2):255–259.

Basile, Roberto, Davide Castellani, and Antonello Zanfei. 2008. "Location Choices of Multinational Firms in Europe: The Role of EU Cohesion Policy." *Journal of International Economics* 74 (2):328–340.

Beaumont, Paul, Camille Hebert, and Victor Lyonnet. 2023. "Build or Buy? Human Capital and Corporate Diversification." *Fisher College of Business Working Paper* (2019-03-018).

Belenzon, Sharon and Tomer Berkovitz. 2010. "Innovation in Business Groups." *Management Science* 56 (3):519–535.

Belenzon, Sharon, Tomer Berkovitz, and Luis A. Rios. 2013. "Capital Markets and Firm Organization: How Financial Development Shapes European Corporate Groups." *Management Science* 59 (6):1326–1343.

Belenzon, Sharon and Ulya Tsolmon. 2016. "Market Frictions and the Competitive Advantage of Internal Labor Markets." *Strategic Management Journal* 37 (7):1280–1303.

Bellak, Christian, Markus Leibrecht, and Aleksandra Riedl. 2008. "Labour Costs and FDI Flows into Central and Eastern European Countries: A Survey of the Literature and Empirical Evidence." *Structural Change and Economic Dynamics* 19 (1):17–37.

Benmelech, Efraim, Nittai K. Bergman, and Hyunseob Kim. 2022. "Strong Employers and Weak Employees: How Does Employer Concentration Affect Wages?" *Journal of Human Resources* 57 (S):S200–S250.

Berglof, Erik and Enrico Perotti. 1994. "The Governance Structure of the Japanese Financial Keiretsu." *Journal of Financial Economics* 36 (2):259–284.

Bernard, Andrew B., Stephen Redding, Peter K. Schott, and Helen Simpson. 2003. "Relative Wage Variation and Industry Location." *NBER Working Paper* (9998).

Bertrand, Marianne, Paras Mehta, and Sendhil Mullainathan. 2002. "Ferreting out Tunneling: An Application to Indian Business Groups." *Quarterly Journal of Economics* 117 (1):121–148.

Bias, Daniel, Benjamin Lochner, Stefan Obernberger, and Merih Sevilir. 2024. "Going Public and the Internal Organization of the Firm." *Working Paper, Vanderbilt University* .

Bloom, Nicholas, Raffaella Sadun, and John Van Reenen. 2017. "Management as a Technology?" *NBER Working Paper Series* (22327).

Blossfeld, Hans-Peter. 1987. "Labor-Market Entry and the Sexual Segregation of Careers in the Federal Republic of Germany." *American Journal of Sociology* 93 (1):89–118.

Bontadini, Filippo, Carol A. Corrado, Jonathan Haskel, Massimiliano Iommi, and Cecilia Jona-Lasinio. 2023. "EUKLEMS & INTANProd: Industry Productivity Accounts with Intangibles." *Working Paper, LUISS University* .

Boutin, Xavier, Giacinta Cestone, Chiara Fumagalli, Giovanni Pica, and Nicolas Serrano-Velarde. 2013. "The Deep-Pocket Effect of Internal Capital Markets." *Journal of Financial Economics* 109 (1):122–145.

Carlton, Dennis W. 1983. "The Location and Employment Choices of New Firms: An Econometric Model with Discrete and Continuous Endogenous Variables." *The Review of Economics and Statistics* 65 (3):440–449.

Cestone, G., C. Fumagalli, F. Kramarz, and G. Pica. 2024. "Exploiting Growth Opportunities: The Role of Internal Labor Markets." *The Review of Economic Studies* 91 (5):2676–2716.

Cestone, Giacinta, Chiara Fumagalli, Francis Kramarz, and Giovanni Pica. 2020. "Insurance between Firms: The Role of Internal Labor Markets." *CSEF Working Paper* (386).

———. 2023. "Bypassing Labor Market Frictions in Bad Times: The Role of Internal Labor Markets." *Working Paper, Bayes Business School* .

Chung, Wilbur and Juan Alcacer. 2002. "Knowledge Seeking and Location Choice of Foreign Direct Investment in the United States." *Management Science* 48 (12):1534–1554.

Claessens, Stijn, Simeon Djankov, and Larry H. P. Lang. 2000. "The Separation of Ownership and Control in East Asian Corporations." *Journal of Financial Economics* 58 (1):81–112.

Combes, Pierre-Philippe, Gilles Duranton, Laurent Gobillon, Diego Puga, and Sebastien Roux. 2012. "The Productivity Advantages of Large Cities: Distinguishing Agglomeration from Firm Selection." *Econometrica* 80 (6):2543–2594.

Combes, Pierre-Philippe and Laurent Gobillon. 2015. *Chapter 5 - The Empirics of Agglomeration Economies*. Elsevier, 247–348.

Dauth, Wolfgang, Sebastian Findeisen, Enrico Moretti, and Jens Suedekum. 2022. "Matching in Cities." *Journal of the European Economic Association* 20 (4):1478–1521.

Davis, Steven J., John Haltiwanger, Kyle Handley, Ron Jarmin, Josh Lerner, and Javier Miranda. 2014. "Private Equity, Jobs, and Productivity." *American Economic Review* 104 (12):3956–90.

Dessaint, Olivier, Andrey Golubov, and Paolo Volpin. 2017. "Employment Protection and Takeovers." *Journal of Financial Economics* 125 (2):369–388.

Doeringer, Peter B. and Michael J. Piore. 1966. *Internal Labor Markets, Technological Change, and Labor Force Adjustment*. Cambridge, MA.

Donovan, Stuart, Thomas de Graaff, Henri L. F. de Groot, and Carl C. Koopmans. 2024. "Unraveling Urban Advantages - a Meta-Analysis of Agglomeration Economies." *Journal of Economic Surveys* 38 (1):168–200.

Dudey, Marc. 1990. "Competition by Choice: The Effect of Consumer Search on Firm Location Decisions." *The American Economic Review* 80 (5):1092–1104.

Dunning, John H. 2009. "Location and the Multinational Enterprise: A Neglected Factor?" *Journal of International Business Studies* 40 (1):5–19.

Duranton, Gilles and Diego Puga. 2004. *Chapter 48 - Micro-Foundations of Urban Agglomeration Economies*. Elsevier, 2063–2117.

Faccio, Mara and William J. O'Brien. 2021. "Business Groups and Employment." *Management Science* 67 (6):3468–3491.

Ferreira, Daniel and Radoslawa Nikolowa. 2022. "Prestige, Promotion, and Pay." *Working Paper, London School of Economics* .

Fontagne, Lionel Gerard and Thierry Mayer. 2005. "Determinants of Location Choices by Multinational Firms: A Review of the Current State of Knowledge." *Applied Economics Quarterly* 51:9–34.

Gehrke, Britta, Ernst Maug, Stefan Obernberger, and Christoph Schneider. 2023. "Post-merger Restructuring of the Labor Force." *ECGI Finance Working Paper* (753/2021).

Gertner, Robert H., David S. Scharfstein, and Jeremy C. Stein. 1994. "Internal versus External Capital Markets." *The Quarterly Journal of Economics* 109 (4):1211–1230.

Giroud, Xavier. 2013. "Proximity and Investment: Evidence from Plant-Level Data." *Quarterly Journal of Economics* 128 (2):861–915.

Giroud, Xavier and Joshua Rauh. 2019. "State Taxation and the Reallocation of Business Activity: Evidence from Establishment-Level Data." *Journal of Political Economy* 127 (3):1262–1316.

Glaeser, Edward L. and William R. Kerr. 2009. "Local Industrial Conditions and Entrepreneurship: How Much of the Spatial Distribution Can We Explain?" *Journal of Economics & Management Strategy* 18 (3):623–663.

Guertzgen, Nicole and Karolin Hiesinger. 2020. "Dismissal Protection and Long-term Sickness Absence - First Evidence from Germany." *ZEW Centre for European Economic Research Discussion Paper* (20-040).

Gumpert, Anna, Henrike Steimer, and Manfred Antoni. 2021. "Firm Organization with Multiple Establishments." *The Quarterly Journal of Economics* 137 (2):1091–1138.

Hanson, Gordon H. and Matthew J. Slaughter. 1999. "The Rybczynski Theorem, Factor-Price Equalization, and Immigration: Evidence from U.S. States." *NBER Working Paper* (7074).

Harhoff, Dietmar, Konrad Stahl, and Michael Woywode. 1998. "Legal Form, Growth and Exit of West German Firms - Empirical Results for Manufacturing, Construction, Trade and Service Industries." *The Journal of Industrial Economics* 46 (4):453–488.

Huitfeldt, Ingrid, Andreas Kostol, Jan Nimczik, and Andrea Weber. 2022. "Internal Labor Markets: A Worker Flow Approach." *CESifo Working Paper* (9227).

Huneeus, Federico, Borja Larrain, Mauricio Larrain, and Mounu Prem. 2021. "The Internal Labor Markets of Business Groups." *Journal of Corporate Finance* 69:102017.

Imbens, Guido W. and Jeffrey M. Wooldridge. 2009. "Recent Developments in the Econometrics of Program Evaluation." *Journal of Economic Literature* 47 (1):5–86.

John, Kose, Anzhela Knyazeva, and Diana Knyazeva. 2011. "Does Geography Matter? Firm Location and Corporate Payout Policy." *Journal of Financial Economics* 101 (3):533–551.

———. 2015. "Employee Rights and Acquisitions." *Journal of Financial Economics* 118 (1):49–69.

Khanna, Naveen and Sheri Tice. 2001. "The Bright Side of Internal Capital Markets." *The Journal of Finance* 56 (4):1489–1528.

Khanna, Tarun and Krishna Palepu. 2000. "Is Group Affiliation Profitable in Emerging Markets? An Analysis of Diversified Indian Business Groups." *The Journal of Finance* 55 (2):867–891.

Khanna, Tarun and Yishay Yafeh. 2005. "Business Groups and Risk Sharing around the World." *The Journal of Business* 78 (1):301–340.

———. 2007. "Business Groups in Emerging Markets: Paragons or Parasites?" *Journal of Economic Literature* 45 (2):331–372.

Kim, Hyunseob. 2020. "How Does Labor Market Size Affect Firm Capital Structure? Evidence from Large Plant Openings." *Journal of Financial Economics* 138 (1):277–294.

Kropp, Per and Barbara Schwengler. 2016. "Three-Step Method for Delineating Functional Labour Market Regions." *Regional Studies* 50 (3):429–445.

Lee, Kyeong Hun (Kyle), David C. Mauer, and Qianying (Emma) Xu. 2018. "Human Capital Relatedness and Mergers and Acquisitions." *Journal of Financial Economics* 129 (1):111–135.

Maksimovic, Vojislav and Gordon Phillips. 2002. "Do Conglomerate Firms Allocate Resources Inefficiently?" *Journal of Finance* 57:721–767.

———. 2007. *Conglomerate Firms and Internal Capital Markets*. Handbooks in Finance. Elsevier, North Holland, 423–480.

———. 2013. "Conglomerate Firms, Internal Capital Markets, and the Theory of the Firm." *Annual Review of Financial Economics* 5:225–244.

Mansfield, Edwin. 1962. "Entry, Gibrat's Law, Innovation, and the Growth of Firms." *The American Economic Review* 52 (5):1023–1051.

Marshall, Alfred. 1890. "Principles of Economics." *London: MacMillan* :1–627.

Matvos, Gregor and Amit Seru. 2014. "Resource Allocation within Firms and Financial Market Dislocation: Evidence from Diversified Conglomerates." *Review of Financial Studies* 27 (4):1143–1189.

Melo, Patricia, Daniel Graham, and Robert Noland. 2009. "A Meta-Analysis of Estimates of Urban Agglomeration Economies." *Regional Science and Urban Economics* 39 (3):332–342.

Morck, Randall. 2010. *The Riddle of the Great Pyramids*. Oxford: Oxford University Press, 602–628.

Ozbas, Oguzhan and David S. Scharfstein. 2010. "Evidence on the Dark Side of Internal Capital Markets." *Review of Financial Studies* 23 (2):581–599.

Popp, Martin. 2023. "Minimum Wages in Concentrated Labor Markets." *Working Paper, Institute of Employment Research* .

Porter, Michael E. 1994. "The Role of Location in Competition." *International Journal of the Economics of Business* 1 (1):35–40.

Prager, Elena and Matt Schmitt. 2021. "Employer Consolidation and Wages: Evidence from Hospitals." *American Economic Review* 111 (2):397–427.

Rajan, Raghuram, Henri Servaes, and Luigi Zingales. 2000. "The Cost of Diversity: The Diversification Discount and Inefficient Investment." *The Journal of Finance* 55 (1):35–80.

Rinz, Kevin. 2022. "Labor Market Concentration, Earnings, and Inequality." *Journal of Human Resources* 57 (S):S251–S283.

Shin, Hyun-Han and Rene M. Stulz. 1998. "Are Internal Capital Markets Efficient?" *Quarterly Journal of Economics* 113 (2):531–552.

Silva, Rui C. 2021. "Internal Labor Markets, Wage Convergence, and Investment." *Journal of Financial and Quantitative Analysis* 56 (4):1192–1227.

Stein, Jeremy C. 1997. "Internal Capital Markets and the Competition for Corporate Resources." *Journal of Finance* 52 (1):111–133.

Tate, Geoffrey A. and Liu Yang. 2022. "The Human Factor in Acquisitions: Cross-industry Labor Mobility and Corporate Diversification." *US Census Bureau Center for Economic Studies Paper* (CES-WP-15-31).

Teece, David J. 1982. "Towards an Economic Theory of the Multiproduct Firm." *Journal of Economic Behavior & Organization* 3 (1):39–63.

Tomiura, Eiichi. 2005. "Factor Price Equalization in Japanese Regions." *The Japanese Economic Review* 56 (4):441–456.

Wheeler, ChristopherÂ H. 2001. "Search, Sorting, and Urban Agglomeration." *Journal of Labor Economics* 19 (4):879–899.

Wiedemann, Herbert. 1980. "Codetermination by Workers in German Enterprises." *American Journal of Comparative Law* 28 (1):79–92.

A Appendix

A.1 Growth rates

We use the following definitions:

Symbol	Definition
E_{ict}	Number of all employees employed in firm i located in county c at the end of year t.
H_{ict}	Number of employees who enter firm i located in county c in period t, i.e. between the end of year $t-1$ and the end of year t.
S_{ict}	Number of employees who are separated from firm i located in county c in period t, i.e. between the end of year $t-1$ and the end of year t.

A.1.1 Internal and external growth rates

From our definitions above, we obtain

$$\Delta E_{ict} \equiv E_{ict} - E_{ic,t-1} = H_{ict} - S_{ict}. \tag{22}$$

Hence, we can rewrite the growth rate (1) as:

$$g_{ict} = \frac{H_{ict} - S_{ict}}{0.5\left(E_{it} + E_{i,t-1}\right)}. \tag{23}$$

We define one-year hiring rates and separation rates as

$$h_{ict} = \frac{H_{ict}}{0.5\left(E_{ict} + E_{ic,t-1}\right)},\ s_{jt} = \frac{S_{ict}}{0.5\left(E_{ict} + E_{ic,t-1}\right)}. \tag{24}$$

From (22), (23), and ((24)), we have

$$g_{ict} = h_{ict} - s_{ict}. \tag{25}$$

Next, we decompose hirings and separations into an internal component and an external component:

$$\begin{aligned} H_{it} =& H_{it}^{I} + H_{it}^{X} \\ S_{it} =& S_{it}^{I} + S_{it}^{X} \end{aligned}, \tag{26}$$

where the superscript "I" refers to internal flows and the superscript "X" refers to external flows. We define a flow as internal whenever an employee moves jobs between two firms that

belong to the same BG at the time of the move. Accordingly, we define *Internal employment growth* as

$$g_{it}^{I} = \frac{H_{it}^{I} - S_{i,t-1}^{I}}{0.5\,(E_{it} + E_{i,t-1})}, \tag{27}$$

and *External employment growth* as

$$g_{it}^{X} = \frac{H_{it}^{X} - S_{i,t-1}^{X}}{0.5\,(E_{it} + E_{i,t-1})}. \tag{28}$$

With these definitions, we obtain equation (16) in the text from (23) and (26).

A.2 Variables derived from the Integrated Employment Biographies

The employee level data used in our analyses are derived from the Integrated Employment Biographies (IEB) database. The IEB contains every dependent employee in Germany, i.e. all regular employees since 1975 in West Germany and since 1992 in East Germany as well as all marginally employed workers since 1999.[18] The data are structured in terms of spells, i.e. employment relationships, and the data source reports starting and ending dates of these spells on a daily basis. If employment relationships continue into the following calendar year, a notification is given by the employer at the end of each year. The continued employment relationship is represented by a new spell in the following calendar year. For categorical variables such as education, qualification, and establishment affiliation, we use the information from the latest spell in a calendar year.

A.2.1 Occupation-related variables based on Blossfeld (1987)

All occupation-related variables follow the definitions of Blossfeld (1987), who classifies jobs into 12 distinct major occupations based on the German Classification of Occupations 1970 ("Klassifikation der Berufe 1970"). Table 1 on page 99 in Blossfeld (1987) provides a detailed overview on those 12 occupations and related ISCO codes. We sort the occupational groups presented in Blossfeld (1987) into three groups according to the level of their qualification. Low qualification: Simple manual occupations, simple services, simple commercial and administrative occupations. Medium qualification: Skilled manual occupations, qualified services, semi-professions, qualified commercial and administrative occupations. High qualification: technicians, engineers, professions, managers. The *Qualification* variable reports the

[18] The IEB does not cover civil servants and the self-employed. However, these groups are irrelevant for the companies in our sample. For more details on the sources and structure of IAB's administrative data, see Antoni, Ganzer, and Vom Berge (2016).

average employee qualification level of an entity at the end of the calendar year. We assign a value of one for each low qualification, two for each medium qualification, and three for each high qualification employee. We also use the Blossfeld classification to distinguish between managerial and non-managerial occupations. The latter are all 11 Blossfeld occupations that are not managers.

A.2.2 Education index

Education is based on a categorical variable in the IEB database, which records the following education milestones: no school leaving certificate or intermediate school leaving certificate (ISLC), ISLC with vocational training, upper secondary school leaving certificate (USSLC) with or without vocational training, college, university degree. *Education* reports the average employee education level of an entity at the end of the calendar year. We assign a value of one for each employee with only ISLC, two for each employee with ISLC and vocational training, three for each employee with USSLC with or without vocational training, four for each employee with college or university degree at the end of the calendar year.

A.3 Occupation characteristics

We observe three occupational characteristics at the employee level, education, qualification and task complexity. Therefore, our measures for education, qualification and task complexity not only varies across occupations, but also across industries, counties and years. In order to isolate the variation across occupations, we adopt a three step procedure:

1. Calculate the average education, qualification, and task complexity across all employees within a county for each sector (1-digit NACE Rev. 2 industry code) and year. Then subtract the respective mean from the measures of education, qualification, and task complexity. For each employee e, we calculate

$$\dot{v}_{et} = v_{et} - \frac{1}{M_{cdt}} \sum_{e \in I_{cdt}} v_{et},$$

   where I_{cdt} is the set of all employees in county c, sector d, and calendar year t; M_{cdt} is the number of employees in I_{cdt}; v measures education, qualification, or task complexity.

2. Across all employee-years, calculate the time-invariant characteristic of occupation o as

$$\bar{v}_o = \frac{1}{N_o} \sum_{e \in I_o} \dot{v}_{et},$$

where I_{cdt} consists of all employee-years of occupation o; N_o is the number of employee-years in I_o.

3. Split E_{it}, the number of employees for each firm i, into three groups according to $\bar{v}_o$: $E_{it} = E_{it}^1 + E_{it}^2 + E_{it}^3$. The breakpoints are determined by the terciles of $\bar{v}_o$ across all sample employees across all sample years (constant across all sample years). This allows us the decompose the employment growth g_{it} into three components:

$$g_{it}^{cat} = \frac{E_{it}^{cat} - E_{i,t-1}^{cat}}{0.5(E_{it} + E_{i,t-1})},$$

where $cat \in \{1, 2, 3\}$. Intuitively, $g_{it} = g_{it}^1 + g_{it}^2 + g_{it}^3$.

A.4 Defining human-capital relatedness

HCR is calculated as the cosine similarity between a firm's job vector $\mathbf{k}_{it}$ and a county's job vector $\mathbf{k}_{ct}$. The vector $\mathbf{k}_{it} \equiv (k_{i1t}, k_{i2t}, ..., k_{i12t})$ gives the number of firm employees in each of the twelve Blossfeld occupations analogously the vector $\mathbf{k}_{ct}$ represents the composition of the labor force at the county level.

$$HCR_{ict} = \frac{\mathbf{k}'_{it}\mathbf{k}_{ct}}{\sqrt{\|\mathbf{k}_{it}\| \cdot \|\mathbf{k}_{ct}\|}}. \tag{29}$$

HCR_{ict} achieves its maximum value of 1 if the vectors $\mathbf{k}_{it}$ and $\mathbf{k}_{ct}$ are exactly proportional to each other so that $\mathbf{k}_{it} = \phi\mathbf{k}_{ct}$ for some positive constant ϕ. In that case, firm i employs workers across occupational categories in exactly the same proportions in which they appear in county c's labor force. We obtain the following measures for donor and recipient benefits:

$$HCR_{it}^{Don} = max\{HCR_{int} - HCR_{ict}, 0\}_{n \in C_b(t)}, \tag{30}$$

$$HCR_{it}^{Rec} = \sum_{j \in BG(t)} max_{j \in BG(t)} \{HCR_{jct} - HCR_{jnt}, 0\} \frac{E_{jnt}}{E_{ict}}. \tag{31}$$

A.5 Defining suppler and buyer fit

We follow Glaeser and Kerr (2009) and Alcacer and Chung (2014) and define buyer fit as:

$$Buy_{sct} = \left[\sum_{r=1,...,S} output_{s \to r} \frac{E_{rct}}{E_{rt}} \right] \frac{E_{ct}}{E_t}, \tag{32}$$

where $output_{s \to r}$ is the share of industry s's outputs that goes to industry r, E_{rct} is the employment of industry r in county c at time t, E_{rt} is total employment for industry r across

locations at time t, E_{ct} is the total employment (across industries) for county c at time t, and E_t is total employment across location and industries (national employment) at time t. We measure *output* using the German input-output table from year 2010 through 2017 provided by the Federal Statistical Office of Germany. Following Glaeser and Kerr (2009) and Alcacer and Chung (2014), we define supplier fit as:

$$Sup_{sct} = \sum_{r=1,\ldots,R} \left| input_{s \leftarrow r} - \frac{E_{rct}}{E_{ct}} \right|, \tag{33}$$

where $input_{s \leftarrow r}$ is the share of industry s's inputs that come from industry r, E_{rct} is the employment of industry r in county c at time t, and E_{ct} is the total employment (across industries) for county c at time t. Again, we measure *input* using the same German input-output table. We obtain the following measures for donor and recipient benefits:

$$Buy_{it}^{Don} = max\{Buy_{int} - Buy_{ict}, 0\}_{n \in C_b(t)}, \tag{34}$$

$$Buy_{it}^{Rec} = \sum_{j \in BG(t)} max_{j \in BG(t)} \{Buy_{jct} - Buy_{jnt}, 0\} \frac{E_{jnt}}{E_{ict}}, \tag{35}$$

$$Sup_{it}^{Don} = max\{Sup_{int} - Sup_{ict}, 0\}_{n \in C_b(t)}, \tag{36}$$

$$Sup_{it}^{Rec} = \sum_{j \in BG(t)} max_{j \in BG(t)} \{Sup_{jct} - Sup_{jnt}, 0\} \frac{E_{jnt}}{E_{ict}}. \tag{37}$$

A.6 Variable definitions

Table A1: Description of variables. The table defines the main numerical variables used in the paper. All other variables are defined in the respective captions of the tables using them.

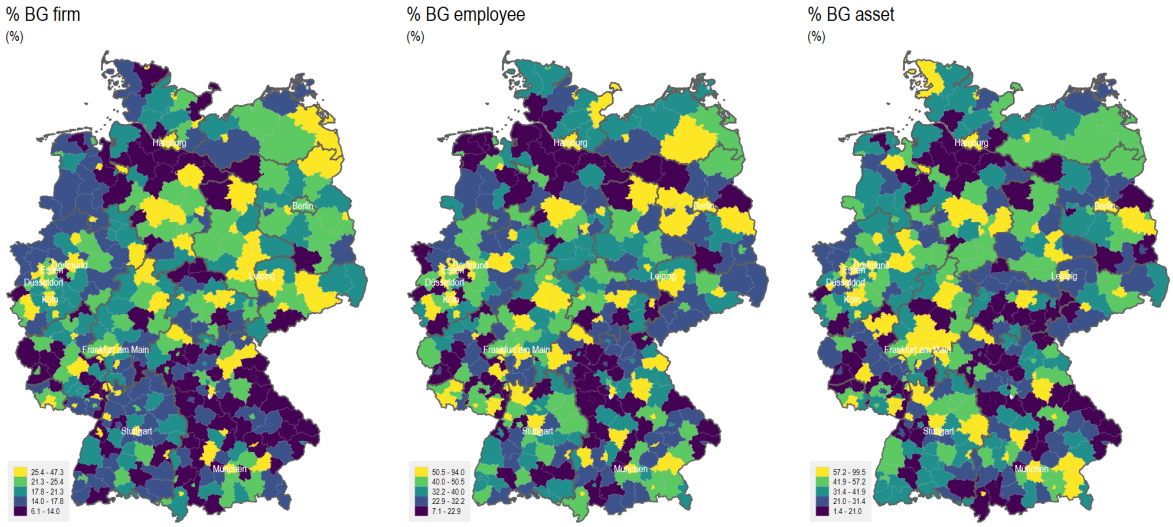
Table A1: Description of variables (continued).

Variable	Definition
Panel A: Firm-level variables	
Employment growth	Employment growth rate from t-1 to t as defined in Section 2.2.1 and Appendix A.1
Int. emp. growth	Internal employment growth rate from t-1 to t as defined in Appendix A.1
Ext. emp. growth	External employment growth rate from t-1 to t as defined in Appendix A.1
Exit	Dummy. Equals one if a BG firm is no longer affiliated to a BG and, consequently, the BG loses its presence in the BG firm's county of residence and remains absent for the rest of the sample period. Equals zero otherwise.
Cost	A firm's expected labor cost in a county given its job profile, calculated as the job-weighted average of county-level average wages across 12 Blossfeld job categories. See Section 2.2.2.
Short	A firm's expected labor shortage in a county given its average industry job profile, calculated as the job-weighted average of county-level unexpected labor demand rise across 12 Blossfeld job categories. See Section 2.2.2.
Fit	A firm's expected labor fit in a county given its average industry job profile, calculated as the Manhattan distance between the job profile demanded by the industry and the job profile supplied by a county across 12 Blossfeld job categories. See Section 2.2.2.
Agg	The level of spatial agglomeration for an industry in a county, proxied by the number of employees hired by establishments operating in a given industry and domiciled in a given county, in logarithm. See Section 2.2.2.
$Cost^{Don}$	Donor benefits with respect to labor cost. The maximum cut in labor cost a BG firm could achieve if it hires employees in another county where the BG is present. See Section 3.1.
$Short^{Don}$	Donor benefits with respect to labor supply. The maximum relief of labor shortage a BG firm could achieve if it hires employees in another county where the BG is present. See Section 3.1.
Fit^{Don}	Donor benefits with respect to labor fit. The maximum improvement of labor fit a BG firm could achieve if it hires employees in another county where the BG is present. See Section 3.1.
Agg^{Don}	Donor benefits with respect to agglomeration. The largest extent to get closer to competitors a BG firm could achieve if it employees in another county where the BG is present. See Section 3.1.
$Cost^{Rec}$	Recipient benefits with respect to labor cost. The maximum labor cost cut a BG firm could contribute by allowing affiliated firms to relocate their employees towards it. See Section 3.2.
$Short^{Rec}$	Recipient benefits with respect to labor supply. The maximum labor shortage relief a BG firm could contribute by allowing affiliated firms to relocate their employees towards it. See Section 3.2.
Fit^{Rec}	Recipient benefits with respect to labor fit. The maximum labor fit improvement a BG firm could contribute by allowing affiliated firms to relocate their employees towards it. See Section 3.2.
Agg^{Rec}	Recipient benefits with respect to agglomeration economics. The largest extent to get closer to competitors a BG firm could contribute by allowing affiliated firms to relocate their employees towards it. See Section 3.2.
Size	Total assets in logarithm.
Age	Firm age.
Relative size	Firm asset divided by BG asset.
Small firm	Dummy. Equals one if a firm has fewer than 10 employees, and zero otherwise.
Education	A firm's weighted average of employee education ranks (4 categories). See Appendix A.2.2.

Table A1: Description of variables (continued).

Variable	Definition
Qualification	A firm's weighted average of employee qualification ranks (3 categories). See Appendix A.2.1.
Enabling share	Fraction of occupations of enabling functions. See Section 3.5.
mc	Managerial capabilities. See Section 3.5.
con	Concentration level of managerial capabilities. See Section 3.5.
imb	Imbalance of managerial capabilities across BG member firms. See Section 3.5.
Panel B: BG-level variables	
Entry	Dummy. Equals one if a BG gains its presence in a county for the first time in the sample period. Equals zero otherwise.
Entry count	Number of counties a BG enters.
Entry LW	Equals the fraction of workers added by entering counties.
Exit	Dummy. Equals one if a BG loses its presence in a county. Equals zero otherwise.
Exit count	Number of counties a BG exits from.
Exit LW	Equals the fraction of workers lost by exiting from counties.
Cost	Labor-weighted average of the firm-level version.
Short	Labor-weighted average of the firm-level version.
Fit	Labor-weighted average of the firm-level version.
Agg	Labor-weighted average of the firm-level version.
$Cost^{BG}$	Labor-weighted average of donor benefits with respect to labor costs.
$Short^{BG}$	Labor-weighted average of donor benefits with respect to labor shortage.
Fit^{BG}	Labor-weighted average of donor benefits with respect to labor fit.
Agg^{BG}	Labor-weighted average of donor benefits with respect to agglomeration economics.
Size	Total assets of all firms with a BG in logarithm.
Age	Labor-weighted average of the firm-level version.
Education	Labor-weighted average of the firm-level version.
Qualification	Labor-weighted average of the firm-level version.
Enabling share	Labor-weighted average of the firm-level version.

B Figures



(a) **(b)** **(c)**

Figure 1: Geographical distribution of BG firms across Germany. This figure plots the distribution of business group firms across 400 German counties from 2005 to 2017. Each variable plotted is calculated at the county-year level, averaged across all sample years, sorted into quintiles and marked with different colors. The range of each quintiles is given in the legend of each panel. Figure 1a plots the number of BG firms as a percentage of all firms. Figure 1b plots the total number of employees of BG firms as a percentage of the total number of employees of all firms. Figure 1c plots the total amount of asset owned by BG firms as a percentage of the total assets of all firms.

C Tables

Table 1: Summary statistics. This table provides descriptive statistics for all variables used in our main analyses. All variables are defined in Table A1.

Table 1: Summary statistics (continued).

	N	Mean	SD	P1	P25	P50	P75	P99
Panel A: Firm-level variables								
Employment growth (%)	97,390	1.936	24.224	-83.974	-4.138	1.096	8.418	78.594
Int. emp. growth (%)	97,390	0.042	8.948	-21.818	-0.989	0.000	0.962	23.077
Ext. emp. growth (%)	97,390	1.893	21.781	-68.182	-3.802	0.976	7.947	66.667
Exit (%)	97,390	0.813	8.981	0.000	0.000	0.000	0.000	0.000
Exit LW (%)	97,390	0.141	2.427	0.000	0.000	0.000	0.000	0.000
Cost	97,390	4.776	0.266	4.138	4.608	4.766	4.944	5.418
Short	97,390	0.000	0.019	-0.053	-0.009	0.000	0.009	0.056
Fit	97,390	-0.869	0.233	-1.409	-1.033	-0.879	-0.700	-0.388
Agg	97,390	7.933	1.528	3.932	7.007	7.971	8.941	11.108
$Cost^{Don}$	97,390	0.000	1.000	-0.659	-0.659	-0.659	0.477	3.378
$Short^{Don}$	97,390	0.000	1.000	-0.580	-0.580	-0.580	0.264	4.311
Fit^{Don}	97,390	0.000	1.000	-0.608	-0.608	-0.608	0.332	3.678
Agg^{Don}	97,390	0.000	1.000	-0.615	-0.615	-0.615	0.352	3.352
$Cost^{Rec}$	97,390	0.000	1.000	-0.198	-0.198	-0.198	-0.179	8.149
$Short^{Rec}$	97,390	0.000	1.000	-0.229	-0.229	-0.229	-0.192	7.278
Fit^{Rec}	97,390	0.000	1.000	-0.228	-0.228	-0.228	-0.184	7.288
Agg^{Rec}	97,390	0.000	1.000	-0.233	-0.233	-0.233	-0.186	7.243
Size	97,390	15.936	1.847	11.894	14.879	15.859	16.916	21.126
Age	97,390	25.711	30.159	2.000	9.000	17.000	28.000	146.000
Relative size	97,390	0.363	0.331	0.000	0.055	0.265	0.631	1.000
Small firm	97,390	0.100	0.300	0.000	0.000	0.000	0.000	1.000
Education	97,390	2.057	0.306	1.353	1.882	2.000	2.197	3.000
Qualification	97,390	1.820	0.444	1.000	1.480	1.880	2.090	3.000
Enabling share	97,390	0.222	0.256	0.000	0.046	0.122	0.286	1.000
mc	97,390	0.323	0.323	0.000	0.041	0.200	0.563	1.000
con	97,390	-0.006	0.209	-0.622	-0.082	-0.001	0.067	0.616
imb	97,390	0.153	0.152	0.002	0.047	0.105	0.208	0.712
Industry Tobin's Q	97,390	1.775	0.857	1.122	1.440	1.650	1.952	2.933
County GDP growth	88,852	0.030	0.040	-0.090	0.013	0.032	0.049	0.132
Panel B: BG-level variables								
Entry (%)	35,901	3.565	18.543	0.000	0.000	0.000	0.000	100.000
Entry count	35,901	0.052	0.350	0.000	0.000	0.000	0.000	1.000
Entry LW (%)	35,901	0.789	6.035	0.000	0.000	0.000	0.000	29.374
Exit (%)	35,901	2.072	14.246	0.000	0.000	0.000	0.000	100.000
Exit count	35,901	0.034	0.336	0.000	0.000	0.000	0.000	1.000
Exit LW (%)	35,901	0.520	5.114	0.000	0.000	0.000	0.000	17.568
Cost	35,901	0.000	1.000	-1.933	-0.657	-0.133	0.509	3.074
Short	35,901	0.000	1.000	-2.993	-0.452	-0.006	0.459	3.121
Fit	35,901	0.000	1.000	-2.454	-0.722	0.028	0.685	2.166
Agg	35,901	0.000	1.000	-0.541	-0.443	-0.312	0.013	3.852
$Cost^{BG}$	35,901	0.000	1.000	-0.609	-0.609	-0.551	0.252	3.784
$Short^{BG}$	35,901	0.000	1.000	-0.576	-0.576	-0.521	0.203	4.204
Fit^{BG}	35,901	0.000	1.000	-0.610	-0.610	-0.579	0.246	3.710
Agg^{BG}	35,901	0.000	1.000	-0.390	-0.390	-0.390	-0.111	4.734
Size	35,901	17.258	1.731	13.531	16.207	17.062	18.174	22.343
Age	35,901	30.065	30.711	2.093	12.500	20.674	36.369	137.579
Education	35,901	2.023	0.244	1.424	1.888	2.000	2.134	2.734
Qualification	35,901	1.786	0.355	1.032	1.536	1.813	2.021	2.714
Enabling share	35,901	0.195	0.194	0.000	0.066	0.134	0.246	0.930

Table 2: Firm growth and benefits from reallocation. This table reports panel regressions of firm-level employment growth against donor benefits, recipient benefits, control variables, and fixed effects. Employment growth is calculated as the net rate of hiring and separation. All independent variables are lagged by one year. $Cost^{Don}$, $Short^{Don}$, Fit^{Don} and Agg^{Don} measure the potential for a BG firm to reduce labor cost, relieve labor shortage, improve labor fit, and exploit agglomeration economies by hiring its employees in another county where the BG is present. $Cost^{Rec}$, $Short^{Rec}$, Fit^{Rec} and Agg^{Rec} measure the potential for a BG firm to contribute to reducing labor cost, relieving labor shortage, improving labor fit, and exploiting agglomeration economies by allowing affiliated firms to relocate their employees towards it. All eight relocation benefit variables are normalized to zero mean and unit standard deviation.. All other variables are defined in Table A1 in the Appendix. Standard errors are clustered at the firm-level and t-statistics are presented in parentheses below the coefficients. *, **, *** indicate significance at the 10%, 5%, and 1% level, respectively.

Table 2: Firm growth and opportunities for reallocation (continued).

Dep. var.	Employment growth(%)				
	(1)	(2)	(3)	(4)	(5)
$Cost_{t-1}^{Don}$	-0.247*		-0.630***	-0.593***	-0.633***
	(-1.90)		(-4.79)	(-4.38)	(-4.69)
$Short_{t-1}^{Don}$	-0.213*		-0.319***	-0.282**	-0.376***
	(-1.92)		(-2.88)	(-2.40)	(-3.23)
Fit_{t-1}^{Don}	-0.003		-0.075	-0.278*	-0.316**
	(-0.02)		(-0.62)	(-1.95)	(-2.21)
$Cost_{t-1}^{Rec}$		-0.022	0.127	0.157	0.158
		(-0.16)	(0.91)	(1.12)	(1.14)
$Short_{t-1}^{Rec}$		0.458***	0.526***	0.535***	0.361***
		(3.41)	(3.89)	(3.96)	(2.71)
Fit_{t-1}^{Rec}		0.367**	0.465***	0.470***	0.333**
		(2.22)	(2.78)	(2.81)	(1.98)
Agg_{t-1}^{Don}	-0.379***		-0.493***	-0.555***	-0.743***
	(-3.02)		(-3.86)	(-4.08)	(-5.39)
Agg_{t-1}^{Rec}		0.792***	0.883***	0.892***	0.647***
		(4.94)	(5.45)	(5.49)	(3.98)
$Size_{t-1}$	-0.642***	-0.809***	-0.665***	-0.634***	-1.101***
	(-8.45)	(-10.91)	(-8.74)	(-8.32)	(-13.88)
Age_{t-1}	-0.035***	-0.036***	-0.035***	-0.035***	-0.026***
	(-8.20)	(-8.29)	(-8.13)	(-8.24)	(-6.41)
$Relative\ size_{t-1}$	0.350	1.959***	0.915***	0.778**	4.338***
	(1.02)	(5.99)	(2.64)	(2.24)	(10.38)
$Small\ firm_{t-1}$	-10.661***	-11.587***	-11.904***	-12.007***	-16.099***
	(-21.33)	(-22.11)	(-22.61)	(-22.75)	(-27.77)
$Cost_{t-1}$				0.210	0.844
				(0.16)	(0.64)
$Short_{t-1}$				8.771	12.162
				(0.93)	(1.29)
Fit_{t-1}				-2.709**	-3.297**
				(-2.02)	(-2.46)
Agg_{t-1}				-0.419***	-0.444***
				(-2.63)	(-2.81)
$Education_{t-1}$					7.702***
					(13.71)
$Qualification_{t-1}$					1.318***
					(3.44)
$Enabling\ share_{t-1}$					7.125***
					(11.00)
mc_{t-1}					-6.711***
					(-16.99)
Industry × year FE	Yes	Yes	Yes	Yes	Yes
County × year FE	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.030	0.032	0.033	0.033	0.051
N	97,389	97,389	97,389	97,389	97,389

Table 3: Operational mobility. This table reports panel regressions of firm-level employment growth against donor benefits, recipient benefits, control variables, and fixed effects, replicating Table 2, column 5 for three sets of subsamples. The sample is split at the median of three variables: $Tangibility$, $Capital\,intensity$, and *Remotabilty* each measured on the industry level. $Tangibility$ is measured by the ratio of tangible assets to total value added. *Capital intensity* is measured by the ratio of tangible assets to employment size. *Remotabilty* is measured by the ratio of gross software investment to tangible assets. The data is taken from Bontadini et al., 2023. *Employment growth* is calculated as the net rate of hiring and separation. All independent variables are lagged by one year. $Cost^{Don}$, $Short^{Don}$, Fit^{Don} and Agg^{Don} measure the potential for a BG firm to reduce labor cost, relieve labor shortage, improve labor fit, and exploit agglomeration economies by hiring its employees in another county where the BG is present. $Cost^{Rec}$, $Short^{Rec}$, Fit^{Rec} and Agg^{Rec} measure the potential for a BG firm to contribute to reducing labor cost, relieving labor shortage, improving labor fit, and exploiting agglomeration economies by allowing affiliated firms to relocate their employees towards it. All eight relocation benefit variables are normalized to zero mean and unit standard deviation. All other variables are defined in Table A1 in the Appendix. Standard errors are clustered at the firm-level and t-statistics are presented in parentheses below the coefficients. *, **, *** indicate significance at the 10%, 5%, and 1% level, respectively.

Table 3: Operational mobility (continued).

Dep. var.:	Tangibility		Capital intensity		Remote work	
Employment growth (%)	High (1)	Low (2)	High (3)	Low (4)	Difficult (5)	Easy (6)
$Cost_{t-1}^{Don}$	-0.435**	-0.810***	-0.495**	-0.794***	-0.412*	-0.794***
	(-2.01)	(-4.37)	(-2.54)	(-4.05)	(-1.95)	(-4.25)
$Short_{t-1}^{Don}$	-0.136	-0.613***	-0.262*	-0.482**	-0.018	-0.640***
	(-0.86)	(-3.32)	(-1.71)	(-2.52)	(-0.11)	(-3.55)
Fit_{t-1}^{Don}	-0.116	-0.478**	-0.165	-0.423**	-0.239	-0.474**
	(-0.52)	(-2.42)	(-0.82)	(-2.00)	(-1.10)	(-2.33)
$Cost_{t-1}^{Rec}$	0.411	0.143	0.345	0.136	0.379	0.156
	(1.32)	(0.91)	(1.29)	(0.83)	(1.28)	(0.99)
$Short_{t-1}^{Rec}$	0.160	0.474***	0.140	0.558***	0.161	0.494***
	(0.62)	(2.92)	(0.65)	(3.07)	(0.64)	(3.03)
Fit_{t-1}^{Rec}	0.281	0.393*	0.225	0.503**	0.262	0.463**
	(0.94)	(1.84)	(0.88)	(2.19)	(0.90)	(2.11)
Agg_{t-1}^{Don}	-1.060***	-0.498**	-0.773***	-0.728***	-1.160***	-0.452**
	(-5.35)	(-2.44)	(-3.98)	(-3.62)	(-5.78)	(-2.21)
Agg_{t-1}^{Rec}	0.783**	0.597***	0.631**	0.630***	0.784**	0.559***
	(2.35)	(3.20)	(2.26)	(3.13)	(2.36)	(2.99)
$Size_{t-1}$	-1.318***	-0.916***	-1.254***	-1.004***	-1.246***	-0.984***
	(-11.94)	(-7.69)	(-11.37)	(-8.70)	(-11.40)	(-8.35)
Age_{t-1}	-0.022***	-0.033***	-0.022***	-0.033***	-0.021***	-0.032***
	(-4.00)	(-6.77)	(-4.53)	(-6.02)	(-3.98)	(-6.39)
$Relative\ size_{t-1}$	4.839***	4.207***	4.605***	4.221***	4.825***	4.232***
	(8.06)	(6.84)	(7.78)	(6.99)	(8.17)	(6.87)
$Small\ firm_{t-1}$	-16.890***	-15.816***	-16.098***	-16.131***	-17.009***	-15.586***
	(-18.10)	(-21.13)	(-18.86)	(-20.47)	(-18.05)	(-20.90)
$Cost_{t-1}$	3.497*	-0.997	3.781*	-1.911	1.567	0.430
	(1.84)	(-0.47)	(1.94)	(-0.96)	(0.81)	(0.21)
$Short_{t-1}$	-6.138	19.624	13.815	10.842	-5.489	13.180
	(-0.47)	(1.23)	(1.03)	(0.70)	(-0.42)	(0.83)
Fit_{t-1}	-0.787	-3.871**	-0.213	-3.898*	-1.569	-4.082**
	(-0.38)	(-2.04)	(-0.11)	(-1.91)	(-0.78)	(-2.05)
Agg_{t-1}	-0.432**	-0.606**	-0.195	-1.157***	-0.580***	-0.421
	(-2.02)	(-2.34)	(-1.00)	(-4.00)	(-2.78)	(-1.60)
$Education_{t-1}$	8.926***	6.986***	7.709***	7.830***	8.777***	6.896***
	(10.69)	(8.89)	(9.13)	(10.33)	(10.55)	(8.78)
$Qualification_{t-1}$	0.973*	1.534***	1.132**	1.472***	0.812	1.740***
	(1.72)	(2.81)	(2.06)	(2.66)	(1.46)	(3.15)
$Enabling\ share_{t-1}$	6.793***	7.008***	6.364***	7.543***	6.899***	6.910***
	(6.45)	(8.28)	(6.58)	(8.53)	(6.59)	(8.19)
mc_{t-1}	-6.439***	-7.189***	-6.534***	-6.824***	-6.486***	-7.075***
	(-11.23)	(-12.45)	(-11.53)	(-11.99)	(-11.41)	(-12.30)
Industry × year FE	Yes	Yes	Yes	Yes	Yes	Yes
County × year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.050	0.051	0.047	0.057	0.048	0.051
N	48,470	48,316	48,332	48,444	48,231	48,574

Table 4: Occupation characteristics. This table reports panel regressions of firm-level growth of various occupations against donor benefits, recipient benefits, control variables, and fixed effects. Internal employment growth is calculated as the net rate of hiring and separations from or to affiliated firms. External employment growth is calculated as the net rate of hiring and separation from or to the outside labor market. All independent variables are lagged by one year. $Cost^{Don}$, $Short^{Don}$, Fit^{Don} and Agg^{Don} measure the potential for a BG firm to reduce labor cost, relieve labor shortage, improve labor fit, and exploit agglomeration economies by hiring its employees in another county where the BG is present. $Cost^{Rec}$, $Short^{Rec}$, Fit^{Rec} and Agg^{Rec} measure the potential for a BG firm to contribute to reducing labor cost, relieving labor shortage, improving labor fit, and exploiting agglomeration economies by allowing affiliated firms to relocate their employees towards it. All eight relocation benefit variables are normalized to zero mean and unit standard deviation. All other variables are defined in Table A1 in the Appendix. Standard errors are clustered at the firm-level and t-statistics are presented in parentheses below the coefficients. *, **, *** indicate significance at the 10%, 5%, and 1% level, respectively.

Table 4: Occupation characteristics (continued).

Dep. var.	Employment growth attributable to occupations characterized by ... (%)										
	Education			Qualification			Task complexity			Managerial	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
$Cost_{t-1}^{Don}$	-0.070	-0.066	-0.208**	-0.113	-0.050	-0.180**	-0.082	-0.022	-0.240**	-0.294**	-0.058*
	(-0.90)	(-0.85)	(-2.17)	(-1.49)	(-0.68)	(-2.02)	(-0.92)	(-0.36)	(-2.26)	(-2.18)	(-1.75)
$Short_{t-1}^{Don}$	0.056	-0.390***	-0.247***	-0.183**	-0.123	-0.275***	0.032	-0.145**	-0.469***	-0.634***	0.041
	(0.60)	(-4.29)	(-2.89)	(-1.99)	(-1.46)	(-3.27)	(0.32)	(-1.97)	(-4.40)	(-4.50)	(1.30)
Fit_{t-1}^{Don}	0.037	-0.149*	-0.336***	0.057	-0.276***	-0.229**	-0.050	-0.045	-0.352***	-0.385***	-0.029
	(0.56)	(-1.94)	(-3.54)	(0.84)	(-3.80)	(-2.54)	(-0.62)	(-0.85)	(-3.33)	(-2.90)	(-0.89)
$Cost_{t-1}^{Rec}$	0.480***	-0.409***	0.089	0.180**	-0.124	0.104	-0.279***	0.446***	-0.008	0.223	-0.033
	(5.78)	(-4.03)	(0.77)	(2.29)	(-1.39)	(1.00)	(-3.00)	(5.85)	(-0.07)	(1.51)	(-0.74)
$Short_{t-1}^{Rec}$	0.177**	0.339***	0.175	0.168**	0.246***	0.277**	0.217**	0.068	0.407***	0.563***	0.106**
	(2.27)	(3.53)	(1.34)	(2.38)	(2.81)	(2.32)	(2.40)	(0.96)	(3.15)	(3.85)	(2.00)
Fit_{t-1}^{Rec}	-0.012	0.194**	0.246**	0.169**	0.079	0.180	0.335***	-0.216***	0.309**	0.312*	0.091*
	(-0.16)	(2.07)	(1.99)	(2.25)	(0.91)	(1.58)	(3.57)	(-3.23)	(2.42)	(1.91)	(1.94)
Agg_{t-1}^{Don}	-0.228***	-0.094	0.059	-0.250***	0.044	-0.057	-0.206***	-0.117**	0.061	-0.305***	0.020
	(-3.27)	(-1.38)	(0.82)	(-3.59)	(0.75)	(-0.79)	(-2.62)	(-2.24)	(0.75)	(-2.63)	(0.98)
Agg_{t-1}^{Rec}	0.196**	0.107	0.441***	0.143*	0.240***	0.361***	0.248**	0.065	0.431***	0.689***	0.067
	(2.41)	(1.13)	(3.52)	(1.82)	(2.99)	(3.13)	(2.55)	(0.90)	(3.44)	(4.40)	(1.40)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry × year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County × year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.156	0.222	0.111	0.267	0.270	0.173	0.174	0.336	0.228	0.046	0.005
N	88,030	88,030	88,030	88,030	88,030	88,030	88,030	88,030	88,030	88,030	88,030

Table 5: Movements of jobs and movements of employees. This table reports panel regressions of firm-level internal and external employment growth against donor benefits, recipient benefits, control variables, and fixed effects. Internal employment growth is calculated as the net rate of hiring and separation from/to affiliated firms. External employment growth is calculated as the net rate of hiring and separation from/to the outside labor market. All independent variables are lagged by one year. $Cost^{Don}$, $Short^{Don}$, Fit^{Don} and Agg^{Don} measure the potential for a BG firm to reduce labor cost, relieve labor shortage, improve labor fit, and exploit agglomeration economies by hiring its employees in another county where the BG is present. $Cost^{Rec}$, $Short^{Rec}$, Fit^{Rec} and Agg^{Rec} measure the potential for a BG firm to contribute to reducing labor cost, relieving labor shortage, improving labor fit, and exploiting agglomeration economies by allowing affiliated firms to relocate their employees towards it. All eight relocation benefit variables are normalized to zero mean and unit standard deviation. All other variables are defined in Table A1 in the Appendix. Standard errors are clustered at the firm-level and t-statistics are presented in parentheses below the coefficients. *, **, *** indicate significance at the 10%, 5%, and 1% level, respectively.

Table 5: Movements of jobs and movements of employees (continued).

	Dependent variable						% Ext.
	Internal employment growth(%)			External employment growth(%)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$Cost_{t-1}^{Don}$	-0.116***	-0.088**	-0.112**	-0.514***	-0.504***	-0.521***	82.4%
	(-2.72)	(-1.98)	(-2.48)	(-4.29)	(-4.08)	(-4.23)	
$Short_{t-1}^{Don}$	-0.115***	-0.114***	-0.145***	-0.205**	-0.167	-0.231**	61.5%
	(-3.09)	(-2.96)	(-3.74)	(-2.01)	(-1.55)	(-2.16)	
Fit_{t-1}^{Don}	0.045	-0.015	-0.031	-0.120	-0.263**	-0.285**	90.1%
	(1.11)	(-0.31)	(-0.66)	(-1.07)	(-2.03)	(-2.17)	
$Cost_{t-1}^{Rec}$	-0.060	-0.054	-0.053	0.186	0.210*	0.210*	133.6%
	(-1.05)	(-0.94)	(-0.93)	(1.48)	(1.66)	(1.68)	
$Short_{t-1}^{Rec}$	0.126**	0.126**	0.090	0.400***	0.409***	0.271**	75.0%
	(2.14)	(2.14)	(1.53)	(3.32)	(3.40)	(2.28)	
Fit_{t-1}^{Rec}	0.121*	0.124*	0.099	0.344**	0.346**	0.234	70.2%
	(1.77)	(1.80)	(1.44)	(2.36)	(2.38)	(1.59)	
Agg_{t-1}^{Don}	-0.083*	-0.085*	-0.134***	-0.410***	-0.470***	-0.608***	81.9%
	(-1.96)	(-1.89)	(-2.96)	(-3.49)	(-3.74)	(-4.79)	
Agg_{t-1}^{Rec}	0.166***	0.167***	0.118*	0.717***	0.726***	0.529***	81.8%
	(2.66)	(2.67)	(1.89)	(4.96)	(5.00)	(3.64)	
$Size_{t-1}$	-0.022	-0.018	-0.092***	-0.642***	-0.617***	-1.009***	91.7%
	(-0.89)	(-0.69)	(-3.46)	(-9.28)	(-8.88)	(-13.95)	
Age_{t-1}	-0.005***	-0.005***	-0.003**	-0.031***	-0.031***	-0.023***	89.5%
	(-3.99)	(-4.01)	(-2.36)	(-7.88)	(-7.98)	(-6.42)	
$Relative\ size_{t-1}$	-0.338***	-0.360***	0.622***	1.254***	1.138***	3.716***	85.7%
	(-2.93)	(-3.11)	(4.66)	(3.93)	(3.55)	(9.62)	
$Small\ firm_{t-1}$	-1.474***	-1.494***	-2.329***	-10.429***	-10.514***	-13.770***	85.5%
	(-7.10)	(-7.18)	(-10.45)	(-22.01)	(-22.13)	(-26.37)	
$Cost_{t-1}$		-0.854*	-0.675		1.064	1.520	180.0%
		(-1.87)	(-1.48)		(0.88)	(1.26)	
$Short_{t-1}$		2.217	3.104		6.554	9.059	74.5%
		(0.68)	(0.95)		(0.76)	(1.06)	
Fit_{t-1}		-0.865*	-1.001**		-1.844	-2.295*	69.6%
		(-1.94)	(-2.26)		(-1.50)	(-1.87)	
Agg_{t-1}		-0.045	-0.052		-0.374**	-0.392***	88.3%
		(-0.87)	(-1.00)		(-2.52)	(-2.67)	
$Education_{t-1}$			1.230***			6.472***	84.0%
			(6.00)			(12.61)	
$Qualification_{t-1}$			0.125			1.194***	90.6%
			(0.88)			(3.39)	
$Enabling\ share_{t-1}$			1.359***			5.766***	80.9%
			(5.44)			(9.86)	
mc_{t-1}			-1.883***			-4.828***	71.9%
Industry × year FE	Yes	Yes	Yes	Yes	Yes	Yes	
County × year FE	Yes	Yes	Yes	Yes	Yes	Yes	
Adj. R^2	-0.001	-0.001	0.003	0.040	0.040	0.054	
N	97,389	97,389	97,389	97,389	97,389	97,389	

Table 6: Hiring and separation. This table replicates in Panel A firm-level regressions from Table 2 (column 5) but replaces the dependent variables with measures of hiring and separation. All variables are defined in Table A1 in the Appendix. Standard errors are clustered at the firm-level and t-statistics are presented in parentheses below the coefficients. *, **, *** indicate significance at the 10%, 5%, and 1% level, respectively.

Dep. var.	Hire(%)			Separation(%)		
	(1)	(2)	(3)	(4)	(5)	(6)
$Cost_{t-1}^{Don}$	-0.360***	-0.392***	-0.467***	0.270**	0.201	0.166
	(-2.86)	(-3.00)	(-3.58)	(2.20)	(1.58)	(1.30)
$Short_{t-1}^{Don}$	0.049	0.056	-0.023	0.368***	0.337***	0.353***
	(0.54)	(0.59)	(-0.25)	(3.97)	(3.48)	(3.67)
Fit_{t-1}^{Don}	0.084	-0.017	-0.058	0.159	0.261*	0.258*
	(0.70)	(-0.12)	(-0.42)	(1.30)	(1.85)	(1.84)
$Cost_{t-1}^{Rec}$	-0.457***	-0.459***	-0.453***	-0.584***	-0.616***	-0.611***
	(-3.61)	(-3.62)	(-3.59)	(-4.95)	(-5.22)	(-5.22)
$Short_{t-1}^{Rec}$	0.020	0.019	-0.050	-0.506***	-0.517***	-0.411***
	(0.17)	(0.16)	(-0.42)	(-4.70)	(-4.80)	(-3.83)
Fit_{t-1}^{Rec}	0.318**	0.317**	0.277*	-0.148	-0.153	-0.055
	(2.10)	(2.09)	(1.83)	(-1.03)	(-1.06)	(-0.38)
Agg_{t-1}^{Don}	0.132	0.252*	0.132	0.624***	0.807***	0.875***
	(1.07)	(1.90)	(0.98)	(4.98)	(5.98)	(6.55)
Agg_{t-1}^{Rec}	0.413***	0.426***	0.332**	-0.470***	-0.466***	-0.315**
	(2.79)	(2.88)	(2.25)	(-3.26)	(-3.23)	(-2.15)
$Size_{t-1}$	-1.970***	-1.978***	-2.072***	-1.306***	-1.344***	-0.972***
	(-26.18)	(-26.22)	(-26.98)	(-18.11)	(-18.58)	(-13.31)
Age_{t-1}	-0.049***	-0.049***	-0.046***	-0.014***	-0.014***	-0.020***
	(-10.06)	(-10.06)	(-9.58)	(-4.31)	(-4.29)	(-5.74)
$Relative\ size_{t-1}$	2.950***	2.965***	5.154***	2.035***	2.188***	0.816**
	(8.78)	(8.78)	(12.98)	(5.88)	(6.28)	(2.06)
$Small\ firm_{t-1}$	-4.563***	-4.570***	-6.183***	7.341***	7.438***	9.915***
	(-12.07)	(-12.06)	(-15.68)	(14.36)	(14.53)	(18.03)
$Cost_{t-1}$		1.740	2.288*		1.530	1.444
		(1.32)	(1.74)		(1.17)	(1.12)
$Short_{t-1}$		-1.615	0.181		-10.386	-11.981
		(-0.21)	(0.02)		(-1.37)	(-1.59)
Fit_{t-1}		-2.423*	-2.799**		0.286	0.497
		(-1.78)	(-2.05)		(0.21)	(0.38)
Agg_{t-1}		0.379**	0.368**		0.799***	0.813***
		(2.32)	(2.25)		(5.03)	(5.11)
$Education_{t-1}$			2.541***			-5.162***
			(4.63)			(-9.78)
$Qualification_{t-1}$			-1.438***			-2.756***
			(-3.85)			(-7.67)
$Enabling\ share_{t-1}$			3.594***			-3.531***
			(6.18)			(-6.03)
mc_{t-1}			-4.290***			2.422***
			(-11.57)			(6.58)
Industry × year FE	Yes	Yes	Yes	Yes	Yes	Yes
County × year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.167	0.168	0.172	0.147	0.148	0.162
N	97,389	97,389	97,389	97,389	97,389	97,389

Table 7: Managerial capabilities. This table reports panel regressions of firm-level employment growth against donor benefits, recipient benefits, control variables, and fixed effects, replicating Table 2, column 5 for three sets of subsamples. The sample is split at the median of three variables: *mc*, *con*, and *imb*. *mc* is the employment share of the focal firm for enabling functions relative to the whole group. *con* is the difference between a focal firm's *mc* and its employment share in its group. *imb* is employment-weighted average of the absolute values of *con*. *Employment growth* is calculated as the net rate of hiring and separation. All independent variables are lagged by one year. $Cost^{Don}$, $Short^{Don}$, Fit^{Don} and Agg^{Don} measure the potential for a BG firm to reduce labor cost, relieve labor shortage, improve labor fit, and exploit agglomeration economies by hiring its employees in another county where the BG is present. $Cost^{Rec}$, $Short^{Rec}$, Fit^{Rec} and Agg^{Rec} measure the potential for a BG firm to contribute to reducing labor cost, relieving labor shortage, improving labor fit, and exploiting agglomeration economies by allowing affiliated firms to relocate their employees towards it. All eight relocation benefit variables are normalized to zero mean and unit standard deviation. All other variables are defined in Table A1 in the Appendix. Standard errors are clustered at the firm-level and t-statistics are presented in parentheses below the coefficients. *, **, *** indicate significance at the 10%, 5%, and 1% level, respectively.

Table 7: Managerial capabilities (continued).

Dep. var.:	Employment growth (%)					
Subsample:	*mc*		*con*		*imb*	
	Low (1)	High (2)	Low (3)	High (4)	Low (5)	High (6)
$Cost_{t-1}^{Don}$	-0.916***	-0.368**	-0.615***	-0.702***	-0.541***	-0.692***
	(-4.29)	(-2.08)	(-3.01)	(-3.65)	(-3.00)	(-3.21)
$Short_{t-1}^{Don}$	-0.311*	-0.178	-0.244	-0.518***	-0.688***	-0.070
	(-1.71)	(-1.16)	(-1.45)	(-2.97)	(-4.14)	(-0.38)
Fit_{t-1}^{Don}	-0.678***	0.056	-0.162	-0.561***	-0.796***	0.086
	(-3.04)	(0.30)	(-0.81)	(-2.64)	(-4.08)	(0.40)
$Cost_{t-1}^{Rec}$	0.140	6.015**	0.639	0.174	0.274*	-0.105
	(0.90)	(1.98)	(1.26)	(1.07)	(1.67)	(-0.28)
$Short_{t-1}^{Rec}$	0.356**	0.381	0.801*	0.224	0.384**	0.365
	(2.47)	(0.23)	(1.76)	(1.59)	(2.29)	(1.37)
Fit_{t-1}^{Rec}	0.192	0.671	0.164	0.376**	0.339*	0.416
	(1.06)	(0.34)	(0.41)	(1.96)	(1.69)	(1.27)
Agg_{t-1}^{Don}	-1.101***	-0.464**	-0.727***	-0.691***	-0.950***	-0.442**
	(-5.35)	(-2.45)	(-3.99)	(-3.29)	(-4.93)	(-2.15)
Agg_{t-1}^{Rec}	0.500***	1.226	0.830**	0.686***	0.676***	0.625**
	(2.88)	(1.02)	(2.16)	(3.79)	(3.41)	(2.11)
Size_{t-1}	-1.498***	-0.778***	-0.870***	-1.302***	-1.123***	-1.059***
	(-11.98)	(-8.04)	(-7.96)	(-11.16)	(-9.84)	(-9.62)
Age_{t-1}	-0.048***	-0.020***	-0.032***	-0.023***	-0.024***	-0.030***
	(-7.20)	(-4.44)	(-4.21)	(-4.91)	(-4.46)	(-5.64)
$Relative\ size_{t-1}$	5.820***	2.444***	3.325***	5.497***	5.899***	3.493***
	(8.30)	(4.68)	(5.76)	(8.43)	(8.96)	(6.25)
$Small\ firm_{t-1}$	-17.783***	-18.481***	-17.224***	-16.862***	-17.282***	-15.703***
	(-22.78)	(-17.76)	(-15.80)	(-23.81)	(-20.59)	(-19.49)
$Cost_{t-1}$	0.916	1.164	2.816	-0.785	1.747	0.123
	(0.44)	(0.71)	(1.52)	(-0.40)	(0.92)	(0.07)
$Short_{t-1}$	5.885	20.771*	-12.157	42.911***	7.865	16.176
	(0.40)	(1.66)	(-0.92)	(2.93)	(0.55)	(1.15)
Fit_{t-1}	-6.365***	-1.704	-1.441	-3.437*	-7.760***	-0.073
	(-2.72)	(-1.06)	(-0.76)	(-1.77)	(-3.94)	(-0.04)
Agg_{t-1}	-1.263***	0.165	-0.711***	-0.265	-0.378*	-0.539**
	(-4.63)	(0.88)	(-3.31)	(-1.10)	(-1.67)	(-2.41)
$Education_{t-1}$	8.577***	5.357***	9.111***	6.507***	8.125***	7.288***
	(10.69)	(7.12)	(11.57)	(7.91)	(9.67)	(9.68)
$Qualification_{t-1}$	1.452***	1.175**	1.644***	1.024*	0.943	1.410***
	(2.66)	(2.23)	(3.19)	(1.72)	(1.59)	(2.77)
$Enabling\ share_{t-1}$	9.287***	9.708***	-3.786**	10.582***	6.677***	7.791***
	(9.26)	(11.34)	(-2.47)	(12.30)	(7.04)	(8.76)
mc_{t-1}	-30.425***	-2.309***	-5.996***	-7.253***	-9.368***	-5.459***
	(-11.58)	(-4.16)	(-9.12)	(-11.61)	(-14.76)	(-10.52)
Industry × year FE	Yes	Yes	Yes	Yes	Yes	Yes
County × year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.063	0.049	0.043	0.056	0.055	0.046
N	48,333	48,378	48,406	48,347	48,372	48,386

Table 8: Firm-level analysis of exits. This table reports panel regressions of firm-level exiting decision variables against donor benefits, recipient benefits, control variables, and fixed effects. *Exit* equals one if a firm is no longer affiliated and, consequently, the BG loses its presence in a county. *Labor-weighted exit* is calculated as the fraction of BG employees lost after exiting a county. All independent variables are lagged by one year. $Cost^{Don}$, $Short^{Don}$, Fit^{Don} and Agg^{Don} measure the potential for a BG firm to reduce labor cost, relieve labor shortage, improve labor fit, and exploit agglomeration economies by hiring its employees in another county where the BG is present. $Cost^{Rec}$, $Short^{Rec}$, Fit^{Rec} and Agg^{Rec} measure the potential for a BG firm to contribute to reducing labor cost, relieving labor shortage, improving labor fit, and exploiting agglomeration economies by allowing affiliated firms to relocate their employees towards it. All eight variables relocation benefit are normalized to zero mean and unit standard deviation. All other variables are defined in Table A1 in the Appendix. Standard errors are clustered at the firm-level and t-statistics are presented in parentheses below the coefficients. *, **, *** indicate significance at the 10%, 5%, and 1% level, respectively.

Table 8: Firm-level analysis of exits (continued).

Dep. var.	Exit(%)			Exit LW(%)		
	(1)	(2)	(3)	(4)	(5)	(6)
$Cost_{t-1}^{Don}$	0.159***	0.135***	0.129**	0.029**	0.024*	0.027**
	(3.17)	(2.68)	(2.57)	(2.29)	(1.83)	(2.09)
$Short_{t-1}^{Don}$	0.173***	0.191***	0.185***	0.017	0.017	0.020
	(3.37)	(3.69)	(3.56)	(1.33)	(1.29)	(1.50)
Fit_{t-1}^{Don}	0.193***	0.225***	0.219***	0.025*	0.040**	0.041***
	(3.60)	(3.93)	(3.82)	(1.88)	(2.54)	(2.63)
$Cost_{t-1}^{Rec}$	-0.141**	-0.151***	-0.150***	-0.038***	-0.040***	-0.040***
	(-2.56)	(-2.74)	(-2.73)	(-4.76)	(-5.06)	(-5.06)
$Short_{t-1}^{Rec}$	0.114**	0.112**	0.108*	-0.016**	-0.017**	-0.014*
	(1.99)	(1.96)	(1.88)	(-2.03)	(-2.07)	(-1.81)
Fit_{t-1}^{Rec}	0.162**	0.162**	0.160**	-0.014**	-0.014**	-0.013**
	(2.39)	(2.39)	(2.36)	(-2.42)	(-2.47)	(-2.34)
Agg_{t-1}^{Don}	0.443***	0.469***	0.461***	0.057***	0.060***	0.064***
	(8.08)	(8.49)	(8.32)	(4.04)	(3.96)	(4.18)
Agg_{t-1}^{Rec}	-0.075	-0.078	-0.082	-0.016***	-0.016***	-0.014***
	(-1.35)	(-1.39)	(-1.47)	(-3.30)	(-3.43)	(-2.86)
Size_{t-1}	0.044*	0.035	0.028	0.010	0.008	0.011*
	(1.83)	(1.45)	(1.17)	(1.57)	(1.25)	(1.66)
Age_{t-1}	-0.003**	-0.003***	-0.002**	0.000	0.000	0.000
	(-2.56)	(-2.58)	(-2.19)	(-1.11)	(-1.11)	(-1.41)
$Relative\ size_{t-1}$	-0.932***	-0.890***	-0.668***	-0.075**	-0.066*	-0.142***
	(-8.43)	(-8.07)	(-5.34)	(-2.12)	(-1.85)	(-3.42)
$Small\ firm_{t-1}$	-0.074	-0.049	-0.131	-0.042**	-0.035*	0.021
	(-0.78)	(-0.51)	(-1.22)	(-2.23)	(-1.93)	(1.07)
$Cost_{t-1}$		0.380	0.384		0.099	0.084
		(0.84)	(0.85)		(0.74)	(0.63)
$Short_{t-1}$		-9.732***	-9.562***		-1.083	-1.165
		(-2.81)	(-2.76)		(-1.09)	(-1.17)
Fit_{t-1}		0.337	0.328		0.208*	0.216*
		(0.87)	(0.85)		(1.84)	(1.90)
Agg_{t-1}		0.143***	0.139***		0.022	0.023
		(2.74)	(2.67)		(1.52)	(1.55)
$Education_{t-1}$			0.004			0.004
			(0.02)			(0.11)
$Qualification_{t-1}$			0.277***			-0.008
			(2.59)			(-0.31)
$Enabling\ share_{t-1}$			-0.280*			-0.123***
			(-1.77)			(-3.05)
mc_{t-1}			-0.405***			0.153***
			(-4.09)			(3.90)
Industry × year FE	Yes	Yes	Yes	Yes	Yes	Yes
County × year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.030	0.030	0.030	0.013	0.013	0.013
N	97,389	97,389	97,389	97,389	97,389	97,389

Table 9: Group-level analysis. This table reports panel regressions of BG-level entry and exit decision variables against BG-level relocation benefits, control variables and fixed effects. *Entry dummy* (*Exit dummy*) equals one if a BG enters (leaves) a county. *Entry count* (*Exit count*) is the number of counties a BG enters (leaves). *Entry LW* (*Exit LW*) is the fraction of BG employees gained (lost) by entering (leaving) counties. All independent variables are lagged by one year. $Cost^{BG}$, $Short^{BG}$, Fit^{BG} and Agg^{BG} measure the potential for a BG to reduce labor cost, relieve labor shortage, improve labor fit, and exploit agglomeration economies by relocating employees across counties where the BG is present. All four relocation benefit variables are normalized to zero mean and unit standard deviation. All other variables are defined in Table A1 in the Appendix. Standard errors are clustered at the firm-level and t-statistics are presented in parentheses below the coefficients. *, **, *** indicate significance at the 10%, 5%, and 1% level, respectively.

Table 9: Group-level analysis (continued).

Dep. var.	Exit			Entry		
	Dummy(%) (1)	Count (2)	LW(%) (3)	Dummy(%) (4)	Count (5)	LW(%) (6)
$Cost_{t-1}^{BG}$	-2.517***	-0.044***	-0.610***	1.795***	0.041***	0.429***
	(-5.57)	(-4.46)	(-3.34)	(4.77)	(4.67)	(2.89)
$Short_{t-1}^{BG}$	-1.314***	-0.022***	-0.331***	0.575***	0.017***	0.219***
	(-6.49)	(-4.60)	(-4.62)	(3.83)	(2.88)	(3.80)
Fit_{t-1}^{BG}	-2.165***	-0.035***	-0.934***	2.225***	0.046***	0.559***
	(-4.23)	(-3.26)	(-4.17)	(4.85)	(4.46)	(3.10)
Agg_{t-1}^{BG}	-0.843*	-0.016	-0.444***	1.444***	0.042***	0.443*
	(-1.76)	(-1.47)	(-2.60)	(2.95)	(3.29)	(1.93)
$Size_{t-1}$	-0.409	-0.022*	-0.698***	0.953***	0.030***	0.240*
	(-1.30)	(-1.88)	(-4.65)	(3.28)	(2.99)	(1.71)
Age_{t-1}	-0.029	0.000	0.005	-0.019	-0.001	-0.006
	(-1.46)	(0.21)	(0.59)	(-1.25)	(-1.23)	(-0.78)
$Cost_{t-1}$	0.041**	0.001***	0.023***	-1.618***	-0.042***	-0.441
	(2.12)	(2.62)	(2.81)	(-2.89)	(-2.77)	(-1.55)
$Short_{t-1}$	11.325**	0.065	3.487**	-0.039	-0.001	-0.007
	(2.31)	(0.78)	(2.07)	(-0.66)	(-0.78)	(-0.29)
Fit_{t-1}	-0.312	0.023	0.438	0.759	0.013	0.086
	(-0.11)	(0.26)	(0.32)	(1.46)	(1.03)	(0.35)
Agg_{t-1}	0.001	0.000	0.002	-0.075	-0.005	-0.138
	(0.05)	(-0.49)	(0.28)	(-0.13)	(-0.44)	(-0.41)
$Education_{t-1}$	-0.738	0.095*	2.267***	-1.082	-0.071*	-1.398*
	(-0.43)	(1.74)	(2.84)	(-0.67)	(-1.86)	(-1.76)
$Qualification_{t-1}$	-0.543	0.004	0.393	-0.334	0.020	-0.446
	(-0.48)	(0.19)	(0.74)	(-0.33)	(0.82)	(-0.88)
$Enabling\ share_{t-1}$	-0.084	0.055	1.985*	-2.999**	-0.087**	-1.018
	(-0.05)	(1.45)	(1.94)	(-2.20)	(-2.54)	(-1.51)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
BG FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.163	0.174	0.114	0.148	0.116	0.119
N	35,901	35,901	35,901	35,901	35,901	35,901

Table 10: Extended local labor markets. This table replicates in Panel A firm-level regressions from Table 2 (column 5), Table 5 (columns 3 and 6), and Table 8 (columns 3 and 6) and in Panel B BG-level regressions from Table 9 (columns 1 to 6) using a different definition of local labor markets. For each firm in county c, the definition of the local labor market includes all firms and employees located in county c and all those located in counties that share at least one border with county c. The local labor market characteristics for each focal county c (labor cost, shortage, fit, and agglomeration) are calculated as the worker-weighted average of the respective county-level variables across the focal county and its adjacent counties. All other variables are defined as above. Standard errors are clustered at the firm-level and t-statistics are presented in parentheses below the coefficients. *, **, *** indicate significance at the 10%, 5%, and 1% level, respectively.

Panel A: Firm-level regressions

Dep. var.:	Employment growth				Exit	
	Total (%) (1)	Internal (%) (2)	External (%) (3)	% Ext. (4)	Dummy (%) (5)	LW (%) (6)
$Cost_{t-1}^{Don}$	-0.592***	-0.079*	-0.513***	86.6%	0.094*	0.020
	(-4.39)	(-1.78)	(-4.12)		(1.84)	(1.58)
$Short_{t-1}^{Don}$	-0.344***	-0.186***	-0.158	45.8%	0.214***	0.020
	(-3.04)	(-4.91)	(-1.52)		(4.18)	(1.57)
Fit_{t-1}^{Don}	-0.513***	-0.102**	-0.411***	80.1%	0.390***	0.058***
	(-3.82)	(-2.26)	(-3.35)		(7.39)	(4.23)
$Cost_{t-1}^{Rec}$	-0.128	-0.093	-0.034	26.9%	-0.072	-0.031***
	(-0.83)	(-1.52)	(-0.25)		(-1.19)	(-4.23)
$Short_{t-1}^{Rec}$	0.275**	0.037	0.238**	86.6%	-0.010	-0.020***
	(2.05)	(0.70)	(2.04)		(-0.19)	(-3.08)
Fit_{t-1}^{Rec}	0.691***	0.180***	0.511***	73.9%	0.210***	-0.013**
	(4.41)	(3.00)	(3.60)		(3.20)	(-2.48)
Agg_{t-1}^{Don}	-0.847***	-0.099**	-0.748***	88.3%	0.304***	0.048***
	(-6.11)	(-2.15)	(-5.81)		(5.95)	(3.45)
Agg_{t-1}^{Rec}	0.563***	0.111*	0.452***	80.3%	-0.083	-0.014**
	(3.78)	(1.79)	(3.36)		(-1.55)	(-2.49)
Industry × year FE	Yes	Yes	Yes		Yes	Yes
County × year FE	Yes	Yes	Yes		Yes	Yes
Adj. R^2	0.051	0.004	0.055		0.031	0.013
N	97,389	97,389	97,389		97,389	97,389

Table 10: Extended local labor markets (continued).

Panel B: BG-level regressions

Dep. var.	Exit			Entry		
	Dummy(%)	Count	LW(%)	Dummy(%)	Count	LW(%)
	(1)	(2)	(3)	(4)	(5)	(6)
	Dummy (%)	Count	LW (%)	Dummy (%)	Count	LW (%)
$Cost_{t-1}^{BG}$	-2.918***	-0.052***	-0.823***	2.375***	0.048***	0.505**
	(-5.01)	(-4.36)	(-3.49)	(5.04)	(4.94)	(2.52)
$Short_{t-1}^{BG}$	-1.145***	-0.016***	-0.258***	0.248	0.012*	0.117**
	(-5.68)	(-3.50)	(-3.69)	(1.64)	(1.91)	(2.13)
Fit_{t-1}^{BG}	-1.147**	-0.022*	-0.621**	2.124***	0.042***	0.511**
	(-1.97)	(-1.83)	(-2.43)	(4.24)	(3.06)	(2.33)
Agg_{t-1}^{BG}	-3.310***	-0.059***	-1.309***	3.046***	0.081***	1.190***
	(-5.75)	(-4.56)	(-5.71)	(5.49)	(5.14)	(5.86)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
BG FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.165	0.175	0.116	0.151	0.119	0.122
N	35,901	35,901	35,901	35,901	35,901	35,901

Table 11: Standalone firms as a counterfactual. This table replicates the firm-level regressions from Table 2 (column 5) using matched BG and standalone firms. We match each BG firm to a comparable standalone firm. The matching is done in two steps. In the first step, all BG and standalone firm observations are assigned to cells constructed by crossing county codes (400), 2-digit NACE Rev. 2 industry codes (84), number of establishments (4 categories: 1, 2-5, 6-10 and above 10) and calendar years (12). In the second step, the Euclidean distance is calculated based on the logarithmic employment size and firm age within each cell, for each BG firm and its matched standalone firm. Both variables are scaled by the respective sample standard deviation of the BG firms. For each BG firm, we select the standalone firm with the smallest Euclidean distance as its counterfactual. For matching diagnostics, see OA3. Column (1) and (2) are regression results based on the subsamples of the matched BG firms and the matched standalone firms respectively. Column (3) - (5) nest (1) and (2) into one regression model in a SUR setting. Column (5) reports the difference between the coefficients in column (3) and (4). Standard errors are clustered at the firm-level and t-statistics are presented in parentheses below the coefficients. *, **, *** indicate significance at the 10%, 5%, and 1% level, respectively.

Table 11: Extended local labor markets (continued).

	Sample split		SUR		
	Matched BG firms	Matched standalone firms	Matched BG firms	Matched standalone firms	(3)-(4)
	(1)	(2)	(3)	(4)	(5)
$Cost_{t-1}^{Don}$	-0.514***	0.082	-0.514***	0.082	-0.596***
	(-3.22)	(0.64)	(-3.22)	(0.64)	(-2.92)
$Short_{t-1}^{Don}$	-0.355**	-0.031	-0.355**	-0.031	-0.324*
	(-2.46)	(-0.25)	(-2.46)	(-0.25)	(-1.70)
Fit_{t-1}^{Don}	-0.546***	-0.140	-0.546***	-0.140	-0.406*
	(-3.04)	(-0.94)	(-3.04)	(-0.94)	(-1.74)
Agg_{t-1}^{Don}	-0.599***	0.024	-0.599***	0.024	-0.624***
	(-3.35)	(0.15)	(-3.35)	(0.15)	(-2.61)
$Cost_{t-1}^{Rec}$	0.222	-0.075	0.222	-0.075	0.297
	(1.42)	(-0.54)	(1.42)	(-0.54)	(1.43)
$Short_{t-1}^{Rec}$	0.440***	-0.015	0.440***	-0.015	0.455**
	(2.77)	(-0.11)	(2.77)	(-0.11)	(2.17)
Fit_{t-1}^{Rec}	0.365*	-0.106	0.365*	-0.106	0.471*
	(1.73)	(-0.70)	(1.73)	(-0.70)	(1.81)
Agg_{t-1}^{Rec}	0.909***	0.120	0.909***	0.120	0.788***
	(4.95)	(0.78)	(4.95)	(0.78)	(3.29)
$Size_{t-1}$	-0.929***	-1.201***	-0.929***	-1.201***	0.272*
	(-10.53)	(-10.04)	(-10.53)	(-10.04)	(1.83)
Age_{t-1}	-0.032***	-0.015***	-0.032***	-0.015***	-0.017***
	(-6.07)	(-5.14)	(-6.07)	(-5.14)	(-2.77)
$Small\ firm_{t-1}$	-14.745***	0.999**	-14.745***	0.999**	-15.744***
	(-22.64)	(2.50)	(-22.64)	(2.50)	(-20.57)
$Cost_{t-1}$	-0.054	-1.465	-0.054	-1.465	1.411
	(-0.03)	(-0.91)	(-0.03)	(-0.91)	(0.60)
$Short_{t-1}$	0.594	-12.589	0.594	-12.589	13.184
	(0.05)	(-0.83)	(0.05)	(-0.83)	(0.69)
Fit_{t-1}	-4.577***	0.196	-4.577***	0.196	-4.773**
	(-2.67)	(0.12)	(-2.67)	(0.12)	(-1.99)
Agg_{t-1}	-0.757***	-0.153	-0.757***	-0.153	-0.604*
	(-3.25)	(-0.68)	(-3.25)	(-0.68)	(-1.86)
$Qualification_{t-1}$	11.164***	7.232***	11.164***	7.232***	3.932***
	(17.98)	(9.30)	(17.98)	(9.30)	(3.94)
Industry × year FE	Yes	Yes			
County × year FE	Yes	Yes			
Industry × year × affiliated FE				Yes	
County × year × affiliated FE				Yes	
Adj. R^2	0.044	0.059		0.047	
N	68,065	68,065		134,150	

D Online Appendix

Table OA1: Correlations. This table provides correlation coefficients for all variables used in our main analyses. Panel A provides correlations for the firm-level data set and Panel B for the BG-level data set. All variables are defined in Table A1. *, **, *** indicate significance at the 10%, 5%, and 1% level, respectively.

Panel A: Firm-level variables

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1)	*Employment growth*	1.00											
(2)	*Int. emp. growth*	0.44***	1.00										
(3)	*Ext. emp. growth*	0.93***	0.08***	1.00									
(4)	*Exit*	-0.01	0.01	-0.01**	1.00								
(5)	*Exit LW*	0.00	0.00	0.00	0.64***	1.00							
(6)	*Cost*	0.00	0.02***	-0.01*	0.00	0.00	1.00						
(7)	*Short*	0.00	0.00	0.00	0.00	0.00	-0.01***	1.00					
(8)	*Fit*	-0.02***	0.00	-0.03***	0.00	0.00	0.17***	0.01	1.00				
(9)	*Agg*	0.01**	0.00	0.01***	-0.01***	0.00	0.17***	0.02***	-0.03***	1.00			
(10)	$Cost^{Don}$	-0.02***	-0.01	-0.02***	0.05***	0.02***	0.31***	0.00	0.00	0.18***	1.00		
(11)	$Short^{Don}$	-0.02***	-0.01***	-0.02***	0.05***	0.02***	0.00	0.35***	-0.03***	0.04***	0.42***	1.00	
(12)	Fit^{Don}	-0.02***	0.00	-0.02***	0.07***	0.03***	0.05***	-0.02***	-0.14***	-0.09***	0.38***	0.35***	1.00
(13)	Agg^{Don}	-0.02***	-0.01*	-0.02***	0.07***	0.03***	-0.07***	-0.02***	-0.04***	-0.32***	0.25***	0.36***	0.52***
(14)	$Cost^{Rec}$	-0.06***	-0.03***	-0.05***	0.02***	-0.01***	-0.07***	-0.01***	0.00	0.01***	0.16***	0.26***	0.26***
(15)	$Short^{Rec}$	-0.07***	-0.03***	-0.07***	0.03***	-0.01***	0.03***	-0.12***	0.01**	0.02***	0.23***	0.11***	0.19***
(16)	Fit^{Rec}	-0.07***	-0.03***	-0.07***	0.04***	-0.01***	0.05***	0.00	0.04***	-0.01***	0.23***	0.20***	0.18***
(17)	Agg^{Rec}	-0.08***	-0.03***	-0.07***	0.02***	-0.01***	0.11***	0.00	0.04***	0.12***	0.29***	0.17***	0.13***
(18)	*Size*	-0.01**	0.01***	-0.01***	0.00	0.00	0.23***	0.00	0.14***	-0.02***	0.13***	0.06***	0.07***
(19)	*Age*	-0.06***	-0.01***	-0.06***	-0.01***	0.00	0.07***	-0.01***	0.10***	-0.05***	0.02***	-0.01***	0.00
(20)	*Relative size*	0.00	0.00	0.00	-0.06***	-0.01***	0.09***	0.00	0.05***	-0.04***	-0.21***	-0.23***	-0.20***
(21)	*Small firm*	-0.12***	-0.03***	-0.12***	-0.01***	-0.02***	0.08***	0.00	0.05***	-0.04***	-0.03***	-0.06***	-0.05***
(22)	*Education*	0.02***	0.03***	0.01***	0.00	-0.01	0.37***	0.01***	0.09***	0.04***	0.05***	-0.01***	0.01***
(23)	*Qualification*	0.02***	0.02***	0.02***	0.01***	0.00	0.40***	0.00	0.02***	0.03***	0.02***	-0.05***	-0.01***
(24)	*Enabling share*	-0.03***	0.01**	-0.03***	-0.01***	-0.01***	0.27***	0.00	0.18***	-0.01***	0.07***	-0.02***	0.01***
(25)	*mc*	0.04***	0.01***	0.04***	-0.05***	0.00	0.05***	0.00	0.06***	-0.04***	-0.22***	-0.23***	-0.21***

		(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
(13)	Agg^{Don}	1.00											
(14)	$Cost^{Rec}$	0.29***	1.00										
(15)	$Short^{Rec}$	0.22***	0.50***	1.00									
(16)	Fit^{Rec}	0.22***	0.51***	0.50***	1.00								
(17)	Agg^{Rec}	0.05***	0.28***	0.45***	0.57***	1.00							
(18)	*Size*	0.02***	0.00	0.02***	0.02***	0.03***	1.00						
(19)	*Age*	-0.03***	-0.04***	-0.02***	-0.02***	-0.02***	0.33***	1.00					
(20)	*Relative size*	-0.24***	-0.18***	-0.17***	-0.17***	-0.15***	0.44***	0.25***	1.00				
(21)	*Small firm*	-0.04***	0.09***	0.17***	0.19***	0.22***	0.03***	-0.02***	0.03***	1.00			
(22)	*Education*	-0.01***	0.03***	0.09***	0.11***	0.14***	0.28***	-0.01***	0.09***	0.25***	1.00		
(23)	*Qualification*	-0.05***	-0.01***	0.05***	0.07***	0.10***	0.28***	0.01*	0.12***	0.22***	0.67***	1.00	
(24)	*Enabling share*	-0.01***	0.05***	0.11***	0.13***	0.16***	0.27***	0.06***	0.14***	0.39***	0.43***	0.42***	1.00
(25)	*mc*	-0.24***	-0.19***	-0.20***	-0.20***	-0.20***	0.25***	0.20***	0.61***	-0.16***	0.00	0.06***	0.12***

Table OA1: Correlations (continued).

Panel B: BG-level variables

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1)	Entry	1.00											
(2)	Entry count	0.77***	1.00										
(3)	Entry LW	0.68***	0.63***	1.00									
(4)	Exit	0.18***	0.18***	0.12***	1.00								
(5)	Exit count	0.17***	0.21***	0.10***	0.69***	1.00							
(6)	Exit LW	0.11***	0.11***	0.12***	0.70***	0.62***	1.00						
(7)	Labor cost	0.02***	0.02***	0.01	0.03***	0.02***	0.01	1.00					
(8)	Labor shortage	-0.01	-0.01	-0.01	0.00	0.00	0.00	-0.01	1.00				
(9)	Labor fit	0.00	0.00	-0.01	0.00	0.00	0.00	0.18***	0.00	1.00			
(10)	Agglomeration	-0.01	-0.01	0.00	0.00	0.00	0.01	0.14***	0.01**	0.18***	1.00		
(11)	$Cost^{BG}$	0.21***	0.19***	0.12***	0.17***	0.13***	0.09***	0.19***	-0.01	0.01	0.02***	1.00	
(12)	$Short^{BG}$	0.19***	0.18***	0.11***	0.14***	0.12***	0.09***	0.05***	0.19***	-0.01***	-0.04***	0.42***	1.00
(13)	Fit^{BG}	0.19***	0.17***	0.12***	0.16***	0.13***	0.09***	0.10***	-0.01**	-0.07***	-0.06***	0.47***	0.38***
(14)	Agg^{BG}	0.15***	0.14***	0.10***	0.13***	0.11***	0.10***	0.02***	-0.01**	-0.03***	0.02***	0.25***	0.26***
(15)	Size	0.18***	0.17***	0.07***	0.15***	0.13***	0.06***	0.19***	0.00	0.10***	0.01**	0.32***	0.24***
(16)	Age	0.00	0.00	-0.02***	-0.01	-0.01	-0.01**	0.06***	-0.01	0.13***	-0.02***	0.10***	0.06***
(17)	Education	0.02***	0.01**	0.01**	0.03***	0.02***	0.02***	0.46***	0.01**	0.09***	0.12***	0.05***	0.03***
(18)	Qualification	0.01	0.01	0.01	0.02***	0.02***	0.01	0.44***	0.00	0.00	0.06***	0.03***	0.00

		(12)	(13)	(14)	(15)	(16)	(17)	(18)
(13)	Fit^{BG}	1.00						
(14)	Agg^{BG}	0.38***	1.00					
(15)	Size	0.26***	0.15***	1.00				
(16)	Age	0.08***	-0.02***	0.23***	1.00			
(17)	Education	0.03***	0.04***	0.22***	-0.05***	1.00		
(18)	Qualification	0.01**	0.01*	0.21***	-0.05***	0.68***	1.00	

Table OA2: Sample split by industries. This table replicates in Panel A firm-level regressions from Table 2 (column 5) in three subsamples by firms' industry affiliation. All variables are defined in Table A1 in the Appendix. Standard errors are clustered at the firm-level and t-statistics are presented in parentheses below the coefficients. *, **, *** indicate significance at the 10%, 5%, and 1% level, respectively.

Dep. var.:	Non-service		Service
	Manufacturing	Others	
	(1)	(2)	(3)
$Cost_{t-1}^{Don}$	-0.057	1.568	-0.653***
	(-0.23)	(1.44)	(-3.84)
$Short_{t-1}^{Don}$	-0.304	-0.438	-0.326**
	(-1.45)	(-0.62)	(-2.05)
Fit_{t-1}^{Don}	-0.481**	-0.007	-0.108
	(-2.11)	(-0.01)	(-0.55)
$Cost_{t-1}^{Rec}$	0.997	2.752***	0.009
	(1.50)	(3.06)	(0.06)
$Short_{t-1}^{Rec}$	0.526	-0.949	0.528***
	(1.30)	(-1.59)	(3.38)
Fit_{t-1}^{Rec}	-0.167	-0.968	0.601***
	(-0.34)	(-1.01)	(3.12)
Agg_{t-1}^{Don}	-0.242	0.426	-0.785***
	(-0.92)	(0.40)	(-4.42)
Agg_{t-1}^{Rec}	-0.317	0.889	0.699***
	(-0.44)	(0.86)	(4.06)
$Size_{t-1}$	-0.780***	-2.219***	-1.014***
	(-5.19)	(-4.81)	(-12.25)
Age_{t-1}	-0.012**	-0.090***	-0.038***
	(-1.99)	(-3.75)	(-7.83)
$Small\ firm_{t-1}$	-21.984***	-16.732***	-14.247***
	(-7.82)	(-6.62)	(-23.17)
$Cost_{t-1}$	13.305***	-7.065	-0.012
	(3.12)	(-0.69)	(-0.01)
$Short_{t-1}$	-41.948	92.711	14.338
	(-1.21)	(1.50)	(1.06)
Fit_{t-1}	1.893	-8.171	-3.272*
	(0.32)	(-0.71)	(-1.70)
Agg_{t-1}	-0.048	0.628	-1.060***
	(-0.17)	(0.86)	(-4.01)
$Education_{t-1}$	10.690***	19.600***	7.049***
	(6.81)	(5.17)	(11.16)
$Qualification_{t-1}$	-0.324	-1.412	1.841***
	(-0.40)	(-0.82)	(3.84)
$Enabling\ share_{t-1}$	9.850***	7.478**	5.153***
	(4.28)	(2.23)	(7.30)
Industry × year FE	Yes	Yes	Yes
County × year FE	Yes	Yes	Yes
Adj. R^2	0.046	0.036	0.050
N	18,297	3,985	69,292

Table OA3: Matching diagnostics. The table reports statistics of all continuous variables for matched standalone firms, matched BG firms, and unmatched BG firms. In addition, we also compare the matched BG firms to matched standalone firms and to unmatched BG firms. We report differences in means and the Imbens-Wooldridge statistics. We match each BG firm to a comparable standalone firm. The matching is done in two steps. In the first step, all BG and standalone firm observations are assigned to cells constructed by crossing county codes (400), 2-digit NACE Rev. 2 industry codes (84), number of establishments (4 categories: 1, 2-5, 6-10 and above 10) and calendar years (12). In the second step, the Euclidean distance is calculated based on the logarithmic employment size and firm age within each cell, for each BG firm and its matched standalone firm. Both variables are scaled by the respective sample standard deviation of the BG firms. For each BG firm, we select the standalone firm with the smallest Euclidean distance as its counterfactual.

Variable	Log employment size	Log firm age	Log worker age	% female	% highly qualified	% medium-qualified
Panel A: Matched BG firm-years (N = 68,977)						
Mean	4.019	2.885	3.715	0.419	0.195	0.676
Median	4.127	2.833	3.730	0.381	0.110	0.731
St. Dev.	1.384	0.832	0.135	0.269	0.222	0.218
Panel B: Unmatched BG firm-years (N = 27,814)						
Mean	4.566	2.949	3.733	0.437	0.185	0.696
Median	4.554	2.890	3.745	0.414	0.116	0.743
St. Dev.	1.549	0.868	0.125	0.273	0.198	0.197
Panel C: Matched standalone firm-years (N = 68,977)						
Mean	3.906	2.953	3.710	0.421	0.163	0.689
Median	3.989	2.944	3.722	0.383	0.090	0.739
St. Dev.	1.080	0.748	0.125	0.256	0.192	0.200
Panel D: Difference between matched BG and standalone firms						
Diff	0.113	-0.068	0.006	-0.002	0.032	-0.013
IW-stat	0.091	-0.086	0.043	-0.009	0.156	-0.060
Panel E: Difference between matched and unmatched BG firms						
Diff	-0.547	-0.064	-0.017	-0.018	0.010	-0.020
IW-stat	-0.373	-0.075	-0.134	-0.067	0.049	-0.096

Table OA4: Human capital relatedness. This table replicates in Panel A firm-level regressions from Table 2 (column 5), Table 5 (columns 3 and 6), and Table 8 (columns 3 and 6) and in Panel B BG-level regressions from Table 9 (columns 1 to 6) using HCR instead of $Labor\,fit$. All variables are defined in Table A1 in the Appendix. Standard errors are clustered at the firm-level and t-statistics are presented in parentheses below the coefficients. *, **, *** indicate significance at the 10%, 5%, and 1% level, respectively.

Panel A: Firm-level regressions

Dep. var.:	Employment growth				Exit	
	Total (%)	Internal (%)	External (%)	% Ext.	Dummy (%)	LW (%)
	(1)	(2)	(3)	(4)	(5)	(6)
$Cost_{t-1}^{Don}$	-0.629***	-0.113**	-0.517***	82.1%	0.151***	0.029**
	(-4.50)	(-2.41)	(-4.05)		(2.88)	(2.15)
$Short_{t-1}^{Don}$	-0.386***	-0.147***	-0.239**	61.9%	0.199***	0.023*
	(-3.31)	(-3.80)	(-2.23)		(3.83)	(1.67)
HCR_{t-1}^{Don}	-0.207	-0.018	-0.189	91.5%	0.072	0.020
	(-1.42)	(-0.36)	(-1.42)		(1.37)	(1.42)
$Cost_{t-1}^{Rec}$	0.153	-0.066	0.218	143.0%	-0.114*	-0.030***
	(0.91)	(-0.98)	(1.46)		(-1.89)	(-4.07)
$Short_{t-1}^{Rec}$	0.394***	0.098*	0.296**	75.2%	0.126**	-0.015*
	(2.99)	(1.66)	(2.53)		(2.21)	(-1.89)
HCR_{t-1}^{Rec}	0.180	0.081	0.099	54.8%	0.053	-0.024***
	(0.98)	(1.07)	(0.61)		(0.81)	(-3.69)
Agg_{t-1}^{Don}	-0.802***	-0.140***	-0.662***	82.6%	0.538***	0.075***
	(-6.12)	(-3.19)	(-5.47)		(10.16)	(5.14)
Agg_{t-1}^{Rec}	0.730***	0.137**	0.593***	81.3%	-0.028	-0.012**
	(4.67)	(2.31)	(4.22)		(-0.54)	(-2.57)
Industry × year FE	Yes	Yes	Yes		Yes	Yes
County × year FE	Yes	Yes	Yes		Yes	Yes
Adj. R^2	0.050	0.003	0.054		0.031	0.013
N	97,389	97,389	97,389		97,389	97,389

Panel B: BG-level regressions

Dep. var.	Exit			Entry		
	Dummy(%)	Count	LW(%)	Dummy(%)	Count	LW(%)
	(1)	(2)	(3)	(4)	(5)	(6)
$Cost_{t-1}^{BG}$	-2.363***	-0.041***	-0.522***	1.759***	0.042***	0.428***
	(-5.25)	(-4.17)	(-2.79)	(4.67)	(4.58)	(2.86)
$Short_{t-1}^{BG}$	-1.295***	-0.021***	-0.324***	0.558***	0.016***	0.214***
	(-6.39)	(-4.50)	(-4.49)	(3.71)	(2.81)	(3.72)
HCR_{t-1}^{BG}	-2.192***	-0.036***	-1.051***	1.615***	0.025**	0.351**
	(-4.64)	(-3.94)	(-4.95)	(3.99)	(2.44)	(2.24)
Agg_{t-1}^{BG}	-1.026**	-0.018*	-0.515***	1.679***	0.047***	0.505**
	(-2.14)	(-1.78)	(-3.07)	(3.44)	(3.65)	(2.20)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
BG FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.163	0.174	0.114	0.147	0.115	0.118
N	35,901	35,901	35,901	35,901	35,901	35,901

Table OA5: Labor shortage and establishment closures. This table replicates in Panel A firm-level regressions from Table 2 (column 5), Table 5 (columns 3 and 6), and Table 8 (columns 3 and 6) and in Panel B BG-level regressions from Table 9 (columns 1 to 6) using an alternative measure of labor shortage. All variables are defined in Table A1 in the Appendix. Standard errors are clustered at the firm-level and t-statistics are presented in parentheses below the coefficients. *, **, *** indicate significance at the 10%, 5%, and 1% level, respectively.

Panel A: Firm-level regressions

Dep. var.:	Employment growth				Exit	
	Total (%)	Internal (%)	External (%)	% Ext.	Dummy (%)	LW (%)
	(1)	(2)	(3)	(4)	(5)	(6)
$Cost_{t-1}^{Don}$	-0.374***	-0.080*	-0.295**	78.7%	0.157***	0.023*
	(-2.75)	(-1.76)	(-2.38)		(2.99)	(1.79)
$Supply_{t-1}^{Don}$	-0.573***	-0.088*	-0.485***	84.6%	0.144**	0.015
	(-4.16)	(-1.81)	(-3.86)		(2.27)	(0.99)
Fit_{t-1}^{Don}	-0.374***	-0.043	-0.331***	88.6%	0.376***	0.060***
	(-2.78)	(-0.94)	(-2.68)		(6.89)	(4.11)
Agg_{t-1}^{Don}	-0.274**	-0.042	-0.232**	84.8%	0.250***	0.026*
	(-2.36)	(-1.16)	(-2.17)		(4.37)	(1.91)
$Cost_{t-1}^{Rec}$	0.166	-0.062	0.228*	137.6%	-0.136**	-0.042***
	(1.15)	(-1.09)	(1.76)		(-2.34)	(-4.80)
$Supply_{t-1}^{Rec}$	0.677***	0.180***	0.497***	73.4%	0.085	-0.010**
	(4.60)	(2.92)	(3.80)		(1.51)	(-2.21)
Fit_{t-1}^{Rec}	0.432***	0.115*	0.317**	73.3%	0.194***	-0.016***
	(2.69)	(1.76)	(2.26)		(3.05)	(-2.88)
Agg_{t-1}^{Rec}	0.627***	0.110*	0.517***	82.4%	-0.089*	-0.013***
	(3.94)	(1.91)	(3.63)		(-1.68)	(-2.98)
Industry × year FE	Yes	Yes	Yes		Yes	Yes
County × year FE	Yes	Yes	Yes		Yes	Yes
Adj. R^2	0.045	0.001	0.050		0.030	0.013
N	97,389	97,389	97,389		97,389	97,389

Panel B: BG-level regressions

Dep. var.	Exit			Entry		
	Dummy(%)	Count	LW(%)	Dummy(%)	Count	LW(%)
	(1)	(2)	(3)	(4)	(5)	(6)
$Cost_{t-1}^{BG}$	1.807***	0.041***	0.422***	-2.707***	-0.047***	-0.656***
	(4.90)	(4.61)	(2.99)	(-6.03)	(-4.69)	(-3.62)
$Supply_{t-1}^{BG}$	-0.067	-0.002	-0.052	-0.047	0.000	0.056
	(-0.53)	(-0.96)	(-0.54)	(-0.66)	(0.20)	(1.06)
Fit_{t-1}^{BG}	2.205***	0.046***	0.564***	-2.036***	-0.033***	-0.900***
	(4.83)	(4.42)	(3.15)	(-3.99)	(-3.08)	(-4.02)
Agg_{t-1}^{BG}	1.473***	0.042***	0.446**	-0.927*	-0.017	-0.467***
	(3.04)	(3.28)	(1.96)	(-1.95)	(-1.62)	(-2.74)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
BG FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.147	0.113	0.116	0.160	0.171	0.109
N	35,921	35,921	35,921	35,921	35,921	35,921

Table OA6: Buyer fit and supplier fit. This table replicates in Panel A firm-level regressions from Table 2 (column 5), Table 5 (columns 3 and 6), and Table 8 (columns 3 and 6) and in Panel B BG-level regressions from Table 9 (columns 1 to 6) including the additional controls: *Buyer fit* and *Supplier fit*. All variables are defined in Table A1 in the Appendix. Standard errors are clustered at the firm-level and t-statistics are presented in parentheses below the coefficients. *, **, *** indicate significance at the 10%, 5%, and 1% level, respectively.

Panel A: Firm-level regressions

Dep. var.:	Employment growth				Exit	
	Total (%) (1)	Internal (%) (2)	External (%) (3)	% Ext. (4)	Dummy (%) (5)	LW (%) (6)
$Cost_{t-1}^{Don}$	-0.618***	-0.112**	-0.507***	81.9%	0.132**	0.031**
	(-4.45)	(-2.43)	(-3.99)		(2.57)	(2.32)
$Short_{t-1}^{Don}$	-0.363***	-0.150***	-0.212**	58.5%	0.189***	0.023*
	(-3.09)	(-3.87)	(-1.96)		(3.59)	(1.66)
Fit_{t-1}^{Don}	-0.240	-0.025	-0.215	89.7%	0.221***	0.043***
	(-1.64)	(-0.51)	(-1.61)		(3.75)	(2.69)
$Cost_{t-1}^{Rec}$	0.018	-0.087	0.105	581.4%	-0.106*	-0.034***
	(0.12)	(-1.45)	(0.80)		(-1.82)	(-4.39)
$Short_{t-1}^{Rec}$	0.291**	0.070	0.221*	75.9%	0.107*	-0.012
	(2.17)	(1.20)	(1.85)		(1.82)	(-1.45)
Fit_{t-1}^{Rec}	0.202	0.070	0.132	65.5%	0.200***	-0.007
	(1.19)	(0.98)	(0.89)		(2.82)	(-1.29)
Agg_{t-1}^{Don}	-0.607***	-0.124**	-0.483***	79.6%	0.475***	0.067***
	(-4.08)	(-2.48)	(-3.52)		(7.88)	(3.98)
Buy_{t-1}^{Don}	-0.172	-0.054	-0.119	68.9%	0.063	-0.011
	(-1.51)	(-1.34)	(-1.15)		(1.20)	(-1.12)
Sup_{t-1}^{Don}	-0.283*	0.000	-0.283**	100.1%	-0.047	-0.002
	(-1.88)	(0.00)	(-2.00)		(-0.73)	(-0.12)
Agg_{t-1}^{Rec}	0.409**	0.044	0.365**	89.3%	-0.079	-0.009*
	(2.32)	(0.62)	(2.30)		(-1.28)	(-1.65)
Buy_{t-1}^{Rec}	0.326**	0.050	0.276**	84.8%	-0.227***	-0.021***
	(2.19)	(0.77)	(2.13)		(-3.85)	(-3.88)
Sup_{t-1}^{Rec}	0.524***	0.170**	0.355**	67.7%	0.056	-0.006
	(3.22)	(2.44)	(2.36)		(0.91)	(-1.24)
Industry × year FE	Yes	Yes	Yes		Yes	Yes
County × year FE	Yes	Yes	Yes		Yes	Yes
Adj. R^2	0.051	0.004	0.055		0.031	0.013
N	97,189	97,189	97,189		97,189	97,189

Table OA6: Buyer fit and supplier fit (continued).

Panel B: BG-level regressions

Dep. var.	Exit			Entry		
	Dummy(%)	Count	LW(%)	Dummy(%)	Count	LW(%)
	(1)	(2)	(3)	(4)	(5)	(6)
$Cost_{t-1}^{BG}$	-2.462***	-0.042***	-0.575***	1.622***	0.037***	0.375**
	(-5.48)	(-4.35)	(-3.18)	(4.32)	(4.38)	(2.55)
$Short_{t-1}^{BG}$	-1.279***	-0.021***	-0.314***	0.521***	0.015***	0.198***
	(-6.32)	(-4.54)	(-4.42)	(3.49)	(2.66)	(3.45)
Fit_{t-1}^{BG}	-1.913***	-0.032***	-0.851***	1.939***	0.038***	0.459***
	(-3.70)	(-2.99)	(-3.77)	(4.16)	(3.71)	(2.58)
Agg_{t-1}^{BG}	-0.667	-0.014	-0.393**	1.314***	0.037***	0.382*
	(-1.37)	(-1.40)	(-2.30)	(2.71)	(3.03)	(1.69)
Buy_{t-1}^{BG}	-0.158	-0.008	-0.095	0.868***	0.017**	0.161
	(-0.55)	(-1.35)	(-0.91)	(2.65)	(2.32)	(1.33)
Sup_{t-1}^{BG}	-1.176***	-0.014**	-0.464***	0.901***	0.028***	0.446***
	(-3.11)	(-2.26)	(-3.41)	(2.70)	(3.38)	(3.14)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
BG FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.164	0.175	0.115	0.150	0.119	0.121
N	35,901	35,901	35,901	35,900	35,900	35,900