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Do startups provide employment opportunities for disadvantaged workers?*

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Abstract: This paper analyzes whether startups offer job opportunities to workers potentially facing labor market problems. It compares the hiring patterns of startups and incumbents in the period 2003 to 2014 using administrative linked employer-employee data for Germany that allow to take the complete employment biographies of newly hired workers into account. The results indicate that young plants are more likely than incumbents to hire older and foreign-applicants as well as workers who have instable employment biographies, come from unemployment or outside the labor force, or were affected by a plant closure. However, an analysis of entry wages reveals that disadvantageous worker characteristics come along with higher wage penalties in startups than in incumbents. Therefore, even if startups provide employment opportunities for certain groups of disadvantaged workers, the quality of these jobs in terms of initial remuneration seems to be low.

Zusammenfassung: Die Studie analysiert, ob neu gegründete Betriebe Beschäftigungsmöglichkeiten für solche Arbeitnehmer bieten, die zu den Problemgruppen des Arbeitsmarktes zählen. Unter Verwendung administrativer, verbundener Arbeitgeber-Arbeitnehmer-Daten für Deutschland, die eine Berücksichtigung der gesamten Erwerbsbiografien von neu eingestellten Arbeitnehmern ermöglichen, vergleicht sie die Einstellungsmuster von neu gegründeten und etablierten Betrieben im Zeitraum 2003-2014. Es zeigt sich, dass junge Betriebe tatsächlich mit einer höheren Wahrscheinlichkeit als etablierte Betriebe ältere und ausländische Arbeitnehmer sowie solche mit instabilen Erwerbsbiografien einstellen. Gleiches gilt für Bewerber, die aus Arbeitslosigkeit oder von außerhalb des Arbeitsmarktes kommen oder die Opfer einer Betriebsschließung wurden. Allerdings deutet eine Analyse der Einstiegslöhne darauf hin, dass die Merkmale dieser benachteiligten Arbeitnehmer in neu gegründeten Betrieben mit höheren Lohnabschlägen einhergehen als in etablierten Betrieben. Auch wenn Neugründungen damit Beschäftigungsmöglichkeiten für bestimmte Gruppen benachteiligter Arbeitnehmer bieten, scheint die Qualität dieser Jobs – gemessen an der anfänglichen Entlohnung – gering zu sein.

Keywords: startups, young firms, employment, wages, linked employer-employee data

JEL Classification: J31, J63, L26, M51

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1. INTRODUCTION

In political debates, startups are often regarded as important drivers of structural change and technological progress and they are ascribed a crucial role for job creation, thereby helping to reduce unemployment. It is thus not surprising that a broad literature has dealt with newly founded firms, their performance and their contribution to job creation and destruction.[1] What is surprising, however, is that there is not much empirical evidence on the actual hiring behavior of newly founded firms. This research deficit is particularly grave because the relevance of startups and their direct contribution to overcoming employment problems will be larger if they disproportionally hire workers who are currently not employed, who have difficulties finding jobs in mature firms or who lost their jobs in the course of reallocation and structural change (e.g., due to plant closures). Even if the jobs in startups are less stable than those in incumbent firms, they may still help to preserve workers' labor market attachment, prevent human capital depreciations coming along with longer periods of unemployment, and make it easier for work seekers to re-enter the labor market. In contrast, if startups just poach workers from incumbent firms, they mainly contribute to labor market turnover. In this case, it is questionable whether their direct contribution to overcoming employment problems of certain groups of workers is substantial enough to warrant the strong political attention and support startups currently receive.

Against this background, the primary objective of this paper is to analyze empirically whether startups are more likely than incumbent firms to provide employment opportunities for so-called "disadvantaged" workers facing serious labor market problems – in particular older workers, foreigners, low-qualified individuals, persons with unstable employment biographies, in (long-term) unemployment or outside the labor force, as well as first-time entrants into the labor market and workers who have become victims of plant closures. Startups may offer such workers a riskier and probably lower-paying alternative when being shut out of jobs at mature firms (an alternative that is still better than being unemployed), but in their critical early phase, these newly founded firms could also be reluctant to recruit individuals with obvious deficiencies. If startups are found to be more likely to provide employment opportunities for disadvantaged workers, this implies that they are not only beneficial for an economy by fostering growth and competition, but also that the jobs created

[1] Surveys of the literature on newly founded firms are provided by Geroski (1995), Wagner (2006) or Santarelli and Vivarelli (2007).

by them are valuable from a socio-political point of view.[2] We add to the literature not only by focusing on workers with labor market problems but also by making use of more detailed information about workers' employment biographies than previous studies as we have access to high-quality linked employer-employee data for (West) Germany reaching back to 1975.

Beyond the analysis of job opportunities for disadvantaged workers, we additionally address the quality of these jobs by investigating whether the above-mentioned worker characteristics come along with wage penalties and whether these penalties are higher in young or incumbent firms. If they are lower in young firms, for instance because startups are not willing or able to discriminate against certain types of workers or assess these workers' human capital differently than incumbent firms, startups provide an additional pecuniary benefit for disadvantaged workers. In contrast, it could also be argued that it is incumbents that have less scope for discrimination than startups due to wage setting institutions like collective agreements and works councils. To the best of our knowledge, we are the first to analyze wage differentials between startups and incumbents specifically for disadvantaged groups of workers.

2. EMPLOYMENT, HIRING BEHAVIOR, AND WAGES IN STARTUPS

Many studies have shown that young firms' contribution to gross and net job creation is substantial (see, e.g., Haltiwanger, Jarmin, and Miranda 2013 for the US; Fuchs and Weyh 2010 for Germany). At the same time, young firms also contribute disproportionately to job destruction, in particular because of their high exit rates (e.g., Fackler, Schnabel, and Wagner 2013). Using data for Germany, Fritsch and Weyh (2006) demonstrate that the total number of jobs in a startup cohort first increases but then falls below its initial level after a couple of years, mainly because many of these startups exit the market.[3] Some authors therefore question whether

[2] Our analysis focuses on whether startups themselves directly contribute to overcoming employment problems by hiring disadvantaged workers. We are aware that even if startups are poaching workers with more desirable characteristics from established firms, this might lead to a redeployment process in which these vacant positions in incumbents could be filled with disadvantaged individuals. Analyzing these dynamics in detail is however beyond the scope of our study.

[3] In addition to these direct employment effects, indirect effects might emerge from the increased competitive pressure exerted by startups, which induces incumbents to react, thereby fostering economic growth. Fritsch and Noseleit (2013), for example, find for Germany that this indirect employment effect of startups is substantial, too.

startups really play an important role for sustainable job creation (e.g., Santarelli and Vivarelli 2007; Shane 2009).

Despite this growing and controversial literature on the overall employment effects of startups, there is not much empirical evidence on the actual hiring behavior of newly founded firms, as observed by Fairlie and Miranda (2017, p. 3): "Job creation is one of the most important aspects of entrepreneurship, but we know relatively little about the hiring patterns and decisions of startups."[4] Although there are some studies addressing various aspects of young firms' hiring behavior, the extant literature is quite small and the relevance of startups for disadvantaged workers has not been its main research question.

Using data for Sweden, Nyström (2012) shows that immigrants and labor market entrants are more likely and women are less likely to be hired by new firms. Also for Sweden, Nyström and Elvung (2015) analyze wage penalties in startups for voluntary versus involuntary job switchers. They report that employees who have to switch jobs because of firm closures are more likely to end up in startups. As a byproduct of investigating employment stability in newly founded firms, a study for Germany by Schnabel, Kohaut, and Brixy. (2011) also provides some evidence on the characteristics of individuals joining these firms. The authors find, *inter alia*, that individuals who had more jobs or a larger number of unemployment spells are more likely to join newly founded firms, whereas the opposite is true for workers with longer employment experience. In a study for Denmark, Coad, Nielsen, and Timmermans (2017) look at the effects of solo entrepreneurs' decision to hire their very first employee on their sales and profits, but they also report that "more marginalized" workers (such as older or previously unemployed individuals) have a higher probability of becoming a new firm's first employee. Finally, focusing on workers' age, Ouimet and Zarutskie (2014) show for the US that young firms disproportionally hire young workers.[5]

Our paper contributes to this small literature, replicating some of the prior results and questioning others, but it goes beyond previous studies, which have reported

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[4] Fairlie and Miranda (2017) study under which circumstances newly founded firms start hiring employees, but they do not address the question which types of workers are hired.

[5] Beyond that, some studies have investigated the relationship between the composition of the initial workforce (e.g., in terms of gender, age or qualification) and firm performance in terms of survival or growth (e.g., Weber and Zulehner 2010, 2014; Geroski, Mata, and Portugal 2010; Koch, Späth, and Strotmann 2013). Other studies have analyzed the role of founders or the importance of the initial human capital of founders and employees for the success of startups (e.g., Brüderl, Preisendörfer, and Ziegler 2007; Dahl and Reichstein 2007; Rocha, van Praag, Folta, and Carneiro 2016). However, these studies do not address the hiring patterns of young firms in detail nor compare them to incumbent firms.

results for selected worker characteristics in isolation. We will put special emphasis on various groups of workers facing labor market problems, employing a battery of disadvantaged workers' characteristics. In doing so, we are able to use a more comprehensive data set and more detailed information about workers' employment biographies than previous studies as we have access to high-quality linked employer-employee data reaching back to 1975. In addition, we address the quality of these jobs by investigating whether these adverse worker characteristics come along with wage penalties and whether these penalties are higher in young or incumbent firms.

Although some studies have already analyzed wage differentials between startups and incumbents, extant studies do not provide a clear picture on whether workers (and in particular disadvantaged workers) are better or worse off when joining startups compared to incumbent firms. The majority of extant studies find that new firms tend to pay lower wages (see, e.g., Brixy, Kohaut, and Schnabel 2007 for Germany; Nyström and Elvung 2014 for Sweden). In a detailed analysis of Danish registry data, Burton, Dahl, and Sorenson (2017) observe both firm age and firm size effects when controlling for employee characteristics. They find that typically startups pay less than mature employers, but the largest startups even pay a wage premium. In contrast, using US data, Brown and Medoff (2003) report no significant wage differences, and Ouimet and Zarutskie (2014) even detect a wage premium in startups for young workers and for new hires. Similarly, based on linked employer-employee data for Germany, Schmieder (2013) finds that new establishments pay significantly higher starting wages than establishments that are older than 20 years. Our study contributes to this literature and will confirm that startups pay lower wages. It goes beyond extant studies by analyzing wage differentials between startups and incumbents specifically for disadvantaged groups of workers and by showing how workers' characteristics and establishment age interact in wage determination.

3. THEORETICAL CONSIDERATIONS AND EXTANT EMPIRICAL EVIDENCE

In our analysis, we focus on the employment opportunities in startups compared to incumbent firms with specific respect to several groups of disadvantaged workers who are usually most affected by unemployment and who may have serious problems of (re-)entering the labor market.[6] In particular, we look at eight

[6] See, e.g., Möller and Walwei (2017) for a recent overview of the German labor market.

employment-inhibiting characteristics of individuals and investigate whether workers with these characteristics are more or less likely to be employed by startups. The first three characteristics are *age above 50 years*, *foreign nationality*, and *low qualification,* since the respective groups of persons experience above-average unemployment rates in Germany (Bundesagentur für Arbeit 2016). Related, we also look at workers with *unstable employment biographies* who have received unemployment benefits during a relatively high proportion of their working life, which may be a negative signal to potential employers. Additionally, we take account of the origin or previous labor market state of individuals hired, specifically focusing on whether they come from *unemployment* or from *outside the labor force*, which may reduce their employment prospects because of the loss of human capital associated with employment gaps. We further consider *first-time entrants* to the labor market whose lack of work experience may make it more difficult to find a job. Finally, although they do not possess disadvantageous characteristics *per se,* we also include workers who have become *victims of plant closure* of their last employers since they are often found to experience severe and long-lasting consequences of job loss (see, e.g., Fackler and Hank 2016).

Although there is no elaborate theory of individuals' decision to join startups rather than incumbent firms and of startups' hiring decisions, we can build on some arguments and insights from labor economics, industrial organization and entrepreneurship research to derive testable hypotheses on the employment of disadvantaged workers in startups. Taking first the perspective of the employer, startups are confronted with several fundamental problems that make it difficult to attract employees. First, newly founded firms usually do not have much experience in recruiting employees and may thus be at a disadvantage compared to older and larger firms which have expert personnel departments and can also rely on their name and reputation to attract talented workers (Nyström and Elvung 2015). Second, startups and young firms have a higher risk of failure than incumbents (Fackler et al. 2013), which implies that they should have to compensate workers for the higher risk of job loss. This makes it costlier to attract employees, ceteris paribus. Third, startups typically operate at such a small scale of output that they incur an inherent cost disadvantage and they also face tighter financial constraints than older firms so that they must pursue a strategy of compensating factor differentials, which includes paying lower wages (Audretsch, van Leeuwen, Menkveld, and Thurik 2001; Michelacci and Quadrini 2005). For these reasons, startups may find it difficult to poach employees from other firms but may have to rely more on attracting individuals who are currently unemployed or outside the labor force (Schnabel et al. 2011; Coad et al. 2017).

This reasoning also applies to individuals who enter the labor market for the first time, but since labor market entrants do not possess working experience, newly founded firms that are lacking established work routines and are more reliant on their employees' expertise may hesitate to hire them. In contrast, experienced workers can be recruited among workers who recently lost their jobs in plant closures. Since it is difficult to attract first-class prime age workers, newly founded firms might also have to recruit among "marginalized" workers (Coad et al. 2017), i.e., groups with labor market problems such as older workers, individuals with non-German nationality, low-qualified workers, and workers with instable employment biographies. However, as the first hiring decision(s) can be crucial for the success and survival of startups (Koch et al. 2013; Rocha et al. 2016), newly founded firms may be reluctant to recruit individuals with obvious deficiencies such as low-qualified workers or workers with perforated employment histories, at least in their critical early phase.

From the perspective of the employee, the decision to take up a job in a newly founded firm (rather than joining an incumbent firm or being unemployed) is based on a comparison of the monetary and non-monetary returns with the risks and mobility costs from working there. Employees will join only if their expected discounted lifetime utility is higher in startups, which probably will not be the case for many workers. For instance, labor market entrants coming from the educational system may hesitate to join startups that exhibit a high risk of failure because the first job can be an important determinant of future success in the labor market (Schnabel et al. 2011). A similar reasoning may apply to individuals who are currently out of the labor force and re-enter the labor market.

On the other hand, employees who are unemployed, outside the labor force or who have had instable employment biographies may risk working in a startup, even if this means lower wages and higher employment instability compared to mature firms. One important reason could be that in Germany any job that lasts at least 12 months entitles individuals to draw unemployment benefits (again). Similarly, older (unemployed) employees who only need a bridge into the pension system may be satisfied with a job in a startup even if it cannot be expected to last particularly long. It could also be argued that employees who lost their jobs (e.g. due to plant closures) may have less favorable unobservable characteristics and thus sort themselves into smaller or more unstable firms (Nyström and Elvung 2015). Startups could also be promising employers for foreign workers: if these workers are discriminated against by incumbent firms (as shown by Kaas and Manger 2012), they may be better off with startups that can probably afford less to discriminate, e.g., because of lower profits or a lack of monopsony power.

Similar considerations may pertain to other groups of workers whose unfavorable characteristics are associated with wage penalties. If these penalties are lower in newly founded firms, for instance because startups are not willing or able to discriminate against certain types of workers or differently assess the human capital of these workers than incumbent firms do, then startups are relatively more attractive employers for disadvantaged workers. However, it could also be argued that workers with disadvantageous characteristics are better protected against wage discrimination when choosing to work in incumbent firms. These firms are more likely to have professionalized personnel departments and more elaborate personnel regulations, and they are more often covered by collective agreements and works councils that make discrimination more difficult. At the same time, individuals with problematic characteristics and unemployed workers may not really have a choice but to join startups due to limited outside options (Coad et al. 2017), i.e. because they are not offered any decent jobs by mature firms and because their unemployment benefits are about to run out. In this case, startups could exploit the precarious situation of these workers by offering them even worse working conditions.

Finally, individuals may be attracted to jobs in new firms if they have a preference for the specific job attributes provided by the entrepreneurial work setting in startups such as higher work autonomy, flatter organizational hierarchy, and less bureaucracy than in established firms (Roach and Sauermann 2015). Related, for all groups of (disadvantaged) workers joining startups may be enticing if they speculate that they are now first in line and thus in a good position for a career within the newly founded firm (if it does not fail).

These theoretical considerations imply the positive or negative relationships between our eight main variables of interest and the probability of employment of disadvantaged workers in startups shown in Table 1. Although the perspectives of newly founded firms and of workers do not always coincide, in most cases relatively clear predictions concerning the employment in newly founded firms are possible. When investigating these relationships in reduced-form estimations, however, we should keep in mind that our empirical findings are the result of an interaction of supply and demand and that we will not be able to clearly distinguish between the decisions of individuals and of startup firms.

(Table 1 about here)

As mentioned above, there exists only a sparse empirical literature of not more than five studies that provide multivariate analyses on which employees are working for

startups.[7] Mainly taking the employer's perspective, Ouimet and Zarutskie (2014) show for the U.S. that young firms disproportionately employ and hire young workers, arguing that this may be due to the skills and risk tolerance of these workers. In contrast, using Danish data and focusing on the first employee hired by solo entrepreneurs, Coad et al. (2017) find that the probability of being recruited in a new firm increases with age (albeit at a decreasing rate). They also show that workers coming from unemployment or outside the labor force are more likely to be hired by a startup, while the opposite is found for persons who were enrolled in education before recruitment. With Swedish data, Nyström (2012) finds that the likelihood of being hired by a newly founded firm is lower for women but higher for immigrants and for first-time entrants to the labor market, where the latter result stands in contrast to the findings by Coad et al. (2017). Also for Sweden, Nyström and Elvung (2015) report that employees who have to switch jobs due to firm closures are more likely to end up in startups. Finally, a study for Germany by Schnabel et al. (2011) provides some evidence on the characteristics of individuals joining startups. Although the impact of some socio-demographic characteristics is statistically insignificant or differs between eastern and western Germany, it becomes clear that individuals who had more jobs or more unemployment spells are more likely to join newly founded firms, whereas the opposite is true for workers with longer employment experience.

All in all, the empirical insights from these studies are neither clear-cut nor sufficient to answer our main research question on the role of startups in providing employment opportunities for disadvantaged workers. What is more, there is no empirical evidence at all concerning possible differences in the wage penalties of disadvantaged workers between startups and incumbents.

4. DATA AND DESCRIPTIVE STATISTICS

To analyze hiring patterns and wages in startups, we use extensive administrative data for Germany based on social security notifications provided by the Institute for Employment Research (IAB). We combine two sources, namely the Integrated Employment Biographies (IEB) and the Establishment History Panel (BHP), to create a comprehensive linked employer-employee data set that allows us to

[7] Theoretical analyses which types of employees (with different abilities and assets) may be found in young firms are provided by Dahl and Klepper (2015) and Dinlersoz, Hyatt, and Janicki (2016).

distinguish reliably between startups and incumbents and to observe the complete labor market biographies of all workers entering these establishments.

Detailed daily information on the labor market biographies of all workers in West Germany subject to social security contributions from 1975 to 2014 is collected in the IEB. Since 1992, the data set also includes information on East Germany and since 1999 it comprises marginally employed individuals as well. The IEB contains detailed and very reliable micro-level information on employment, job-search status, benefit receipt, and participation in active labor market policy measures, along with individual characteristics like age, gender, education, and nationality.[8] It should be noted that the data only includes information on hired employees who are subject to social security contributions. This implicates that the founders of firms are not included, and we are therefore not able to analyze relationships between a founder's human capital and the quality of her initial workforce, as is done, e.g., by Rocha et al. (2016). This is, however, a minor shortcoming since our analyses focus on hired employees rather than entrepreneurs.

Information on employers is provided in the BHP, a yearly panel that contains all establishments with at least one employee subject to social security contributions. It includes information on establishment size, industry, location, and workforce composition as of June 30th of a given year (for more information on the BHP, see Schmucker, Seth, Ludsteck, Eberle and Ganzer 2016). As the focus of our analysis lies on young establishments, it is crucial to identify startups as reliably as possible. Since the occurrence of a new establishment identifier in the panel could be due to mere changes of the identification number, we make use of information on worker flows (Hethey-Maier and Schmieder 2013). By observing the fraction of initial employees that have previously worked together in another establishment, it is possible to distinguish between true and spurious entries.[9]

However, since establishments are defined as local production units in the BHP and information at the firm level is not included, we are not able to distinguish clearly between the foundation of new, independent firms and the opening of new branches of multi-plant firms. To assess the importance of this deficit, we had a look at the IAB Establishment Panel, a yearly survey of around 16,000 establishments in

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[8] For more detailed information on the IEB, see Antoni, Ganzer, and vom Berge (2016) who provide a description of the Sample of the Integrated Labour Market Biographies (SIAB), a 2 percent random sample from the IEB.

[9] In the following, we will only define establishments as newly founded if not more than 30 percent of their initial workforce has worked together in the same establishment in the year before, or if their initial workforce consists of no more than 3 persons. This definition is in accordance with the categories "new (small)" and "new (mid & big)" by Hethey-Maier and Schmieder (2013).

Germany that contains information on affiliations to multi-plant firms (see Ellguth, Kohaut, and Möller 2014 for details on this representative data set). Our analysis revealed that in our period of observation around 85 percent of establishments in western Germany are independent legal units that do not belong to a multi-plant firm. With respect to the identification of startups, we also reduce the risk of observing new branches of multi-plant firms by excluding all those establishments that report more than 20 employees in their first year of business, as recommended by Fritsch and Brixy (2004). To evaluate this procedure, we link those establishments from the BHP that we classify as startups and that meet the further sample restrictions described below with the IAB Establishment Panel. This analysis reveals that 93 percent of the establishments that we classify as startups can be categorized as new firms and only 7 percent as branch plant foundations by existing firms**,** which we consider reasonably low.[10]

For our analysis, we draw a 10 percent random sample of those establishments that are newly founded in the period 1999 to 2014[11] and define all those in their first five years of business as *young establishments*. Therefore, our final observation period covers the years 2003 to 2014. *New establishments* are a more narrowly defined subgroup only including plants in their first year. To construct a control group of incumbents, we draw a 5 percent sample of all establishments existing during the same period and only keep those that are 5 years or older. In both samples, we exclude establishments in agriculture, energy and mining, and in the public and non-profit sector. For the remaining establishments, we link information on all employees from the IEB (also referring to June 30th) covering their complete labor market biographies. To ensure that workers' biographies can be traced back over a long time horizon and are not strongly left-censored, we focus on West German establishments and on employees who are not older than 30 years when they are first observed in the IEB.[12] We only include individuals who have been newly hired

[10] Although the IAB Establishment Panel provides some additional information at the firm level, it would not make much sense to use it for the analysis of startups' hiring patterns since the overall number of startups in the IAB Establishment Panel is small and new establishments are typically not included in the survey in their first year of existence.

[11] Since 1999, the data also include marginally employed individuals. Due to the structural break, we only use the data from 1999 onwards.

[12] Since information on East Germany is just available from 1992 onwards, we would only be able to observe the complete employment biographies of very young East German workers. To avoid any bias from pooling this selective sample for East Germany with West German workers of all ages, we exclude all East German establishments. By excluding persons older than 30 when first observed in the IEB, we intend to limit our analyses to those workers whose first appearance in the data coincides with their labor market entry. Relaxing this age restriction somewhat changes the composition of the workforce in our sample but does not change our insights.

by an establishment in the respective year of observation, i.e., those who were not observed there in the previous year.

(Table 2 about here)

A descriptive overview over the establishments in our final sample is given in Table 2. On average, young (and especially new) establishments are smaller than incumbents and operate more often in the tertiary and less often in the secondary sector than established plants. With respect to workforce composition, differences are not so pronounced.

To gain first insights into the characteristics of newly hired employees in young, new and incumbent plants, Table 3 lists various individual-level variables. Workers entering startups are more often older than 30 years than those hired by incumbents, indicating that young firms may indeed opt for more experienced workers or that older people face problems finding a job at an incumbent plant. We also see that the shares of foreigners, female hires and of medium-qualified employees are higher in startups than in incumbents.[13]

(Table 3 about here)

Comparing previous labor market status before recruitment in the current establishment reveals that workers entering startups are slightly more often coming from unemployment or from outside the labor force, suggesting that startups might offer an opportunity to re-enter employment for those workers with limited opportunities on the labor market.[14] As expected, only few first-time entrants find their way into young and especially new plants, which is also consistent with the fact that incumbents employ more apprentices. On average, individuals entering startups spent a larger part of their working lives receiving unemployment benefits

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[13] All employees who neither have *Abitur*, a German A-level equivalent, nor completed vocational training, are defined as low-qualified. High-qualified workers are those holding a university degree. Note that the education variable is imputed according to Fitzenberger, Osikominu, and Völter (2005), see also Schmucker et al. (2016).

[14] We define direct job-to-job transitions as recruitment if individuals have left their previous job not more than 90 days before entering their current employer, i.e. workers with rather short periods of frictional non-employment are not regarded as hires from unemployment or from outside the labor force. Workers are categorized as being recruited from unemployment if they have left their previous job more than 90 days ago and in the meantime were registered as job seeker, received benefit payments, or participated in labor market programs. They are defined as coming from outside the labor force if they were not observed at all in the data for more than 90 days. As the IEB contains only workers subject to social security, “from outside the labor force” can also mean that these workers were previously self-employed or – very unlikely – civil servants.

and had a slightly larger number of previous employers, pointing towards perforated and less stable employment biographies.

The last two variables in Table 3 refer only to individuals with previous working experience (as observed in our data). On average, the share of workers coming from an establishment that closed in the same year in which the worker left is twice as high among those entering young rather than incumbent plants.[15] Workers entering the subgroup of new plants have been affected even more often by a closure of their previous establishment. Moreover, individuals who are hired by a startup more often come from a young firm than those hired by incumbents, pointing towards a certain labor market segmentation.

5. Econometric analysis

Descriptive evidence suggests that on average unfavorable worker characteristics are more often found among new hires in startups than among workers entering incumbents. In the following, we will investigate in a multivariate framework whether startups are still more likely to hire certain groups of disadvantaged workers when conditioning on a large set of control variables. Furthermore, the wages in young and incumbent establishments are analyzed more closely to test whether startups provide additional benefits to disadvantaged workers in terms of lower wage penalties.

5.1 Employment opportunities in startups

We estimate the probability of being hired by a startup as opposed to an incumbent establishment using a linear probability model.[16] In our first specification, the binary dependent variable indicates whether the establishment is young, i.e., in its first 5 years of business, or incumbent, i.e., older than 5 years (columns 1 and 2 in Table 4). Secondly, we test whether results are similar when we consider only new

[15] To identify workers who lost their jobs due to plant closures, we first identified closures in the BHP making use of worker flow information by Hethey-Maier and Schmieder (2013) – similar to the identification of startups – in order to distinguish between “true” closures and ID changes. In a second step, we identified those workers who left closing plants in the same year in which they closed down.

[16] Linear probability models, i.e., ordinary least squares estimations with binary dependent variables, produce consistent and unbiased estimates of partial effects (see, e.g., Wooldridge 2010, p. 562). As a robustness check, we also estimate a probit model. Average marginal effects show the same level of significance and their magnitude is very similar to the coefficients obtained in the linear probability model.

establishments in their first year of business and compare them to the control group of incumbents (columns 3 and 4). Each specification is estimated for two samples. The first includes all hires (columns 1 and 3), allowing us to analyze the hiring behavior of startups and incumbents more generally and to investigate whether startups are more or less likely to hire labor market entrants. The second and more restrictive sample (columns 2 and 4) is limited to persons with previous labor market experience, which enables us to include information on the previous employer as additional explanatory variables.[17]

(Table 4 about here)

Table 4 presents the results of these estimations. The lower panel of this table indicates that most of our control variables have statistically significant relationships with the probability to be hired in a young or new plant rather than an incumbent plant. Mainly focusing on the potentially employment-inhibiting characteristics of disadvantaged workers, we see from the results in Table 4 that the probability to be hired by a young plant is 0.94 percentage points higher for the oldest group of workers aged above 50 (compared to the middle-aged reference group) in the sample for all hires (column 1). This effect is comparably small and not in all samples statistically significant. In contrast to older workers, young workers are less likely to be hired by a startup than the middle-aged reference group.[18] Compared to workers with German nationality, foreigners are considerably more likely to be hired by a young plant. The coefficient of 0.0509 in the sample of all hires (column 1) indicates that the probability of being hired by a young plant is ceteris paribus 5.09 percentage points higher for foreigners than for workers with German nationality. In the other three estimations, the corresponding coefficient estimates are slightly smaller but still positive and highly significant. In terms of qualification, both low- and high-qualified workers are less likely to enter startups than the reference group of medium-qualified workers, but for the disadvantaged group of low-qualified workers, the estimated coefficients lose statistical significance in the more restrictive sample. Included as an indicator for instable or perforated employment biographies, the time of benefit receipt (relative to a person's complete working life) also has a positive impact on the likelihood of being hired by a startup in all estimations.

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[17] Additional to our main variables of interest, we include attributes of the new job as control variables, namely indicators for vocational training, part-time work, and marginal employment. Moreover, dummies for industry, year, and labor market region are included. Labor market regions are classified according to Kropp and Schwengler (2011), who used workers' commuting patterns to define labor market regions.

[18] The relationship with worker age is broadly in line with previous results by Coad et al. (2017) for Denmark but in contrast with findings by Ouimet and Zarutskie (2014) for the U.S.

Employees coming from unemployment or from outside the labor force are more likely to be recruited by young rather than incumbent establishments compared to workers coming directly from another employer.[19] The size of these effects is between one and two percentage points and thus not particularly large. When looking at new plants only in their founding year, however, the positive effect for workers hired from unemployment vanishes or even becomes negative (columns 3 and 4). In both specifications, first-time entrants to the labor market are significantly less likely to be hired by startups than workers with previous labor market experience. A rather large effect is found for workers affected by a closure of their previous workplace (this information is only available in the restricted sample): the estimated coefficients indicate a 12.29 (15.20) percentage points higher likelihood of entering a young (new) establishment.

As startups are typically small, it could be argued that the employee sorting patterns found may occur on establishment size rather than age (see also Burton et al. 2017). However, comparing small startups with small incumbents may be misleading: For startups, being small is not *per se* a negative attribute as they may have good prospects for future growth. For incumbent plants, a small number of employees indicates that they have hardly grown over time (e.g., because they are not very successful and possess further unfavorable characteristics not observable in our data). Consequently, small incumbent plants might be in an even more unfavorable position in the labor market than startups because they are lacking credible growth prospects, so that incumbent plants of the same size do not constitute an adequate comparison group for startups.

(Table 5 about here)

Despite this reservation, we also estimate our regressions for plants with maximum 20 employees to make startups and incumbents better comparable with respect to size. The results, which are presented in Table 5, indicate that even conditional on being a small plant, establishment age still plays an important role for employee sorting. Across all explanatory variables (including controls), hiring patterns are largely in line with our main results presented above. Specifically, young plants still have a higher probability than incumbents to hire foreigners, workers with instable employment biographies and individuals from outside the labor force. For foreigners and workers with instable employment biographies, the effects are even stronger than in our main specification in Table 4. Young plants are still more likely to hire employees affected by a closure of their last workplace and less likely to hire first-

[19] We allow for a maximum gap of three months of non-employment. Results remain robust when reducing this gap to one month.

time entrants to the labor market, and their hiring behavior towards other groups of employees, such as females and young workers, remains in line with the main results. That said, the results on older, low-qualified and unemployed workers are not robust in that they flip signs. Focusing on new versus incumbent plants, most hiring patterns are also quite similar to those presented in Table 4. These insights also hold if we further restrict the sample to plants with not more than 10 employees (results are available on request). Taken together, we may conclude that even in a subsample of small plants, young plants are more likely than incumbents to provide employment opportunities for various groups of disadvantaged workers.

To test whether the results remain robust when looking at different sectors and workers, we re-estimate the regression for several subgroups. The coefficients of our main variables of interest are presented in Table 6. The estimates of the basic regression correspond to specification 2 in Table 4, i.e., young vs. incumbent plants for workers with previous labor market experience. Firstly, establishments in the secondary and tertiary sector are investigated separately to test whether the results are driven by only one segment of the economy (columns 2 and 3). Secondly, we distinguish between male and female hires (columns 4 and 5). Estimates are to a large extent robust among the different subgroups. Startups are more likely to hire workers with foreign nationality (except for females), with relatively more time in benefit receipt, previous non-employment, or closure of the prior workplace. Only the effect for older workers is mostly insignificant and the coefficient for low qualification varies in sign and significance.

(Table 6 about here)

Coming back to our theoretical considerations on employment in startups outlined above, most of the expected relationships sketched in Table 1 are confirmed by the regression analyses. Indeed, workers with foreign nationality or instable employment biographies have a higher probability of entering a newly founded firm, as startups might find it difficult to attract other applicants and disadvantaged workers will have problems finding a job with a less risky employer. That startups are more likely to hire foreigners confirms findings for Sweden by Nyström (2012), and that instable employment biographies come along with an increased probability to be hired by a startup corresponds with previous results for Germany by Schnabel et al. (2011). Moreover, young firms seem to be less able to poach workers from other employers and hence recruit individuals from outside the labor force or from unemployment**,** which is generally in line with results for Denmark by Coad et al.

(2017).[20] The finding that the latter effect vanishes for new firms in their very first year, putting the respective finding by Coad et al. (2017) into question, can potentially be explained if very new firms regard the quality and expertise of their initial employees hired in the critical early stage as too crucial to rely on workers whose current spell of unemployment can be seen as a negative signal. The conjecture that startups, which are lacking established work routines and are therefore more reliant on their employees' expertise, might value work experience more than incumbents is corroborated by the finding that they are less likely to hire labor market entrants. This is in accordance with findings for Denmark by Coad et al. (2017) but stands in contrast to insights for Sweden by Nyström (2012). The very strong effect of previous employer's closure on individuals' probability of being hired by a startup, which confirms results for Sweden by Nyström and Elvung (2015), suggests that young firms might indeed help to overcome the negative consequences of reallocation and structural change.

5.2 WAGES IN STARTUPS

To investigate whether unfavorable worker characteristics are more or less strongly penalized in startups than in incumbents, we estimate Mincer-type regressions on the entry wages of new hires. Since our data set lacks information on working hours, we restrict our analysis to regular full-time employees, thereby excluding part-time and marginal employees as well as apprentices.[21] As the dependent variable, we use the logarithm of daily wages deflated by the consumer price index (in 2010 prices). To exclude implausibly low wages, we delete observations in the lowest percentile of the wage distribution. Since in the IEB data set wages are reported only up to the contribution limit to social security, we impute higher wages in order

[20] Workers classified as hired from outside the labor force in our analyses may also have been previously self-employed, which we cannot observe in our data and which could affect the way in which our result has to be interpreted. However, it also appears quite sensible that previously self-employed workers are more likely to enter startups than workers coming from dependent employment, since preferences for entrepreneurial job characteristics are found to be strongly pronounced among both, individuals founding their own business and workers joining a startup (Roach and Sauermann 2015).

[21] Moreover, we focus on hires with previous work experience. This is done because work experience is included as a control variable in the wage regressions and since first time entrants to the labor market are characterized by zero work experience, we cannot separately identify a wage effect for this group of workers by including a dummy variable. As we do not want to mix up job-to-job transitions and first-time labor market entrants in the reference category in our regression analyses, we decided to exclude the latter.

to obtain unbiased estimates in the line of Gartner (2005).[22] Regressions are run separately for men (columns 1 and 2 in Table 7) and women (columns 3 and 4).

In a first basic specification, we test whether the worker characteristics of interest are associated with wage penalties in general (columns 1 and 3). In a second specification, we interact these characteristics with a dummy indicating whether workers were hired by a startup or by an incumbent to test whether wage penalties are stronger in young or incumbent plants (columns 2 and 4). Additionally, the usual controls for work experience, establishment size, occupational groups according to the categorization by Blossfeld (1987), industry, labor market region, and year are included.

(Table 7 about here)

Table 7 presents the results for the Mincer wage regressions. The control variables in all regressions are statistically significant and show the expected signs. Coming to our main variables of interest, it can be seen that for men the estimated coefficient for entering a young establishment as opposed to an incumbent is significantly negative. Ceteris paribus, wages in startups are 3.44 percent lower than in incumbents in the basic specification (column 1).[23] As expected, old age, foreign nationality, low qualification, having spent a large fraction of one's working life in benefit receipt, as well as recruitment from unemployment or from outside the labor force are all associated with significantly lower wages.

In the second specification (column 2), interaction terms between these characteristics and the startup indicator allow for a more detailed analysis of wage penalties. Our results suggest that the negative relation between unfavorable worker characteristics and wages is even more pronounced for those workers hired by startups. Being older than 50 years is associated with 6.99 percent lower wages in incumbents and beyond that, older workers hired by startups face an additional wage penalty of 2.31 percent. The difference in wage penalties between startups and incumbents is even larger for foreign employees, amounting to 8.69 percent. The wage penalty for foreigners is therefore more than five times higher in startups than in incumbents. Being low-qualified, having spent a relatively large fraction of

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[22] When estimating the regression using only non-censored wages below the social security contribution threshold, our insights remain unchanged; results are available on request.

[23] These results are in line with previous studies finding significantly lower wages in newly founded firms. For Germany, Brixy et al. (2007) estimate a stronger effect of 8 percent; however, they can only compare mean wages between establishments and control for the average workforce composition. Nyström and Elvung (2014) for Sweden focus on labor market entrants and find a wage penalty of approximately 2.9 percent for entering a startup after matching on worker characteristics.

time in benefit receipt, and coming from unemployment or from outside the labor market also comes along with higher wage penalties in startups than in incumbent plants. For workers coming from outside the labor force, the wage penalty in startups is almost three times higher than in incumbents whereas the differences for the other groups are comparably small. Additional regressions conducted as robustness checks but not reported show that these insights still hold when focusing on new establishments in their first year of business (rather than young establishments in their first five years) and comparing them to incumbents.

Estimating the model for women, the basic specification (column 3) suggests that wages in startups are on average slightly higher than in incumbents, though the difference is hardly significant. As was the case for men, disadvantaged groups of female workers earn lower wages than their counterparts with more favorable attributes. Only the estimate for foreign nationality is statistically insignificant. In the second specification (column 4), the inclusion of interaction terms shows that also female workers who are foreign, low-qualified, or coming from outside the labor force are penalized more strongly in startups but overall the differences between startups and incumbents are less pronounced than for men. The interaction term is only positive for older female workers above 50 and it is statistically insignificant for women who are recruited from unemployment or who received unemployment benefits for a large fraction of their working life. Again, our robustness check of focusing on new establishments renders the same insights.

Our results thus do not suggest that the employment opportunities which startups provide to disadvantaged workers come along with additional benefits in terms of lower wage penalties associated with unfavorable worker characteristics. Instead, wage penalties seem even more pronounced in startups for all groups of disadvantaged employees among men, and for most of these groups among women.[24] Our findings are hence in line with the conjecture that incumbents, which are more likely to have elaborate personnel regulations and wage setting institutions such as works councils and collective bargaining agreements, have less scope for paying lower wages to disadvantaged groups of new hires. It is, however, unclear whether the higher wage penalties in startups reflect these firms' ability to discriminate more against these groups of workers. It could also be the case that

[24] Focusing on entry wages, we are not able to control for worker fixed effects, so that we cannot fully rule out that particular groups of disadvantaged workers who enter startups or incumbents, respectively, still differ to some extent in unobserved characteristics (e.g., foreigners in their command of the German language, which also might affect their chance of being hired by an incumbent plant). That said, as our wage regressions include very detailed information about workers' employment biographies and other characteristics, we believe that this potential bias is not large.

wage setting institutions like collective agreements or works councils lead to a compression of the wage structure, i.e., disadvantaged workers might receive wages above their value of marginal product in incumbent establishments, whereas wages for these groups of workers in startups reflect their true productivity.

6. CONCLUSIONS

Although startups currently receive strong political attention and their contribution to economic growth and job creation has been analyzed by a wide range of studies, much less is known about their hiring behavior and the quality of employment created by these young firms. To shed some light on these aspects, we have investigated whether startups are more likely than incumbents to provide employment opportunities for disadvantaged workers or for persons who lost their previous job in the course of structural change, thereby helping these individuals to stay attached to the labor market and prevent human capital depreciations. Moreover, we have analyzed whether wage penalties associated with unfavorable worker characteristics are more or less pronounced in startups than in incumbents.

Our results based on a large linked employer-employee data set for Germany suggest that startups are indeed more likely to hire several groups of disadvantaged workers than incumbent firms. We find that non-German applicants and workers with instable employment biographies have a higher likelihood of being hired by a young establishment. The same applies to workers recruited from unemployment or outside the labor force and to workers who were affected by a plant closure. These findings potentially reflect that startups – due to their lack of reputation and their perceived riskiness – find it difficult to attract other applicants and that disadvantaged workers may have problems finding jobs with less risky employers. Focusing on the monetary quality of employment in startups, our analysis of entry wages in young and incumbent establishments indicates that the wage penalties associated with disadvantageous worker characteristics are more pronounced in young establishments, probably due to a lack of elaborate wage setting institutions. Hence, startups seem to be either able to discriminate more against certain groups of workers or to pay wages that are more closely related to worker productivity. To some extent, the finding that startups are able to pay lower wages to disadvantaged groups of workers could also explain why young plants are more likely than incumbents to hire them.

When interpreting our main finding that startups are more likely than incumbents to provide employment opportunities to disadvantaged workers, one should keep in mind that it does not allow us to draw positive conclusions on the question whether startups and their subsidization can be regarded as beneficial for these groups of workers. Firstly, in terms of entry wages we find job conditions for disadvantaged workers to be even worse in startups than in incumbents. Secondly, supporting job creation in incumbent establishments might – at least indirectly – have the same consequences as the subsidization of startups: If established plants themselves are perceived as more attractive employers and thus are able to fill the newly created positions with the most desired workers poached from other firms, this might trigger a redeployment process which ultimately results in the least attractive employers hiring from the groups of disadvantaged workers. Thus, while facilitating the foundation and growth of startups might be beneficial for the entire economy by fostering competition and growth, the skepticism towards the advantages of startup subsidization in terms of job creation uttered in some studies (e.g., Santarelli and Vivarelli 2007; Shane 2009) cannot be curbed by our analysis. Finally, whereas the empirical analysis in this paper has focused on workers' entry wages, it would be of further interest to investigate whether entering startups rather than incumbents turns out to be beneficial in the long run. Future research should therefore analyze wage trajectories and subsequent career paths of workers hired by startups**,** thereby taking establishment survival and employees' voluntary and involuntary separations into account.

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TABLES

Table 1: Selected worker characteristics and their expected relationship with the probability of joining newly founded firms

Worker characteristics	Relationship with employment in startups	
	Firm perspective	Worker perspective
Older worker (age above 50 years)	+	+
Foreign nationality	+	+
Low-qualified	+/-	+
Instable employment biography	+/-	+
Recruited from unemployment	+	+
Recruited from out of the labor force	+	+/-
First-time entrant to the labor market	+/-	-
Last establishment: closure	+	+

Table 2: Selected establishment characteristics of young, new, and incumbent plants (means)

	Young Plants	New Plants	Incumbent Plants
Number of Employees	5.29 (15.20)	2.85 (2.84)	31.17 (281.96)
Secondary Sector (%)	19.28 (39.45)	18.54 (38.86)	30.54 (46.06)
Tertiary Sector (%)	80.72 (39.45)	81.46 (38.86)	69.46 (46.06)
Share of Women (%)	49.37 (39.01)	48.31 (42.66)	50.01 (32.58)
Share of Full-Time Workers (%)	48.21 (38.10)	51.97 (41.91)	50.90 (31.51)
Share of Marginally Employed Workers (%)	29.10 (30.96)	22.54 (29.41)	29.57 (29.82)
Number of Observations	*221,736*	*94,704*	*294,770*

Notes: The sample includes only West German establishments in the years 2003-2014, excluding agriculture, energy & mining, and the public and non-profit sector. Standard deviations are reported in parentheses. Source: BHP, own calculations.

Table 3: Selected individual characteristics of workers entering young, new, and incumbent plants (means)

	Young Plants	New Plants	Incumbent Plants
Age: Up to 30 years (%)	46.69 (49.89)	40.84 (49.15)	54.27 (49.82)
Age: 31-50 years (%)	44.13 (49.65)	47.97 (49.96)	37.98 (48.53)
Age: Above 50 years (%)	9.18 (28.88)	11.18 (31.52)	7.75 (26.74)
Foreign Nationality (%)	13.81 (34.50)	14.57 (35.28)	10.20 (30.26)
Women (%)	47.77 (49.95)	49.89 (50.00)	44.40 (49.69)
Low-Qualified (%)	21.05 (40.77)	19.01 (39.23)	24.65 (43.09)
Medium-Qualified (%)	69.95 (45.85)	72.62 (44.59)	63.29 (48.20)
High-Qualified (%)	9.00 (28.62)	8.38 (27.70)	12.06 (32.57)
Years since first appearance in the data	14.48 (10.52)	15.87 (10.64)	12.81 (10.71)
…thereof time of benefit receipt (%)	8.83 (14.23)	8.61 (13.54)	6.82 (13.20)
Origin: Job-to-Job Transition (%)	56.55 (49.57)	58.72 (49.23)	57.43 (49.45)
Origin: From Unemployment (%)	21.73 (41.24)	20.59 (40.43)	17.04 (37.60)
Origin: From Outside the Labor Force (%)	17.24 (37.77)	17.71 (38.17)	15.90 (36.56)
Origin: First-Time Entrant (%)	4.48 (20.68)	2.99 (17.02)	9.63 (29.50)
Number of Previous Employers	6.43 (4.76)	6.65 (4.64)	5.55 (4.52)
Apprenticeship / Vocational Training (%)	3.80 (19.11)	2.97 (16.96)	8.09 (27.27)
Part-Time (%)	40.87 (49.16)	41.71 (49.31)	34.58 (47.56)
Marginally Employed (%)	28.38 (45.08)	25.54 (43.61)	24.49 (43.01)
Number of Observations	*570,752*	*201,150*	*1,442,996*
Last Establishment: Closure (%)	15.00 (35.71)	21.98 (41.41)	7.58 (26.47)
Last Establishment: Young (%)	31.47 (46.44)	33.57 (47.22)	22.63 (41.84)
Number of Observations	*508,379*	*184,282*	*1,192,590*

Notes: The sample includes only West German establishments in the years 2003-2014, excluding agriculture, energy & mining, and the public and non-profit sector. Only individuals newly entering an establishment, excluding those older than 30 when first appearing in the IEB. Standard deviations are reported in parentheses. Source: IEB, BHP; own calculations.

Table 4: Probability of being hired by a startup (young / new establishment) as opposed to an incumbent

	YOUNG VS. INCUMBENT PLANTS						NEW VS. INCUMBENT PLANTS					
	All Hires			Hires with Lab. Market Experience			All Hires			Hires with Lab. Market Experience		
	(1)			(2)			(3)			(4)		
Age: Up to 30 years (d)	-0.0300	(0.0035)	***	-0.0228	(0.0029)	***	-0.0375	(0.0016)	***	-0.0311	(0.0015)	***
Age: 31-50 years (d)	Reference						Reference					
Age: Above 50 years(d)	0.0094	(0.0027)	***	0.0036	(0.0023)		0.0226	(0.0015)	***	0.0169	(0.0014)	***
Foreign Nationality (d)	0.0509	(0.0047)	***	0.0368	(0.0044)	***	0.0383	(0.0027)	***	0.0318	(0.0027)	***
Low-Qualified (d)	-0.0160	(0.0036)	***	-0.0026	(0.0037)		-0.0077	(0.0017)	***	-0.0005	(0.0019)	
Medium-Qualified (d)	Reference						Reference					
High-Qualified (d)	-0.0301	(0.0058)	***	-0.0197	(0.0055)	***	-0.0198	(0.0026)	***	-0.0085	(0.0024)	***
Rel. Time of Benefit Receipt	0.0762	(0.0076)	***	0.1078	(0.0094)	***	0.0398	(0.0038)	***	0.0614	(0.0048)	***
Origin: Job-to-Job Transition (d)	Reference						Reference					
Origin: From Unemployment (d)	0.0136	(0.0028)	***	0.0144	(0.0025)	***	-0.0021	(0.0013)	*	-0.0012	(0.0012)	
Origin: From Outside the Lab. Force (d)	0.0145	(0.0026)	***	0.0231	(0.0022)	***	0.0135	(0.0012)	***	0.0219	(0.0013)	***
Origin: First-Time Entrant (d)	-0.0544	(0.0042)	***				-0.0293	(0.0021)	***			
Last Establishment: Closure (d)				0.1229	(0.0042)	***				0.1520	(0.0026)	***
Female (d)	-0.0063	(0.0032)	**	-0.0077	(0.0031)	**	0.0017	(0.0015)		0.0011	(0.0015)	
Vocational Training (d)	-0.0863	(0.0057)	***	-0.0878	(0.0054)	***	-0.0546	(0.0029)	***	-0.0571	(0.0027)	***
Part-Time (d)	0.0112	(0.0066)	*	0.0120	(0.0062)	*	0.0239	(0.0037)	***	0.0237	(0.0035)	***
Marginally Employed (d)	-0.0197	(0.0063)	***	-0.0203	(0.0059)	***	-0.0527	(0.0039)	***	-0.0542	(0.0037)	***
Number of Previous Employers	0.0032	(0.0004)	***	0.0023	(0.0003)	***	0.0017	(0.0002)	***	0.0009	(0.0001)	***
Last Establishment: Young (d)				0.0522	(0.0022)	***				0.0313	(0.0012)	***
Last Establishment: Industry (2-Digit) (d)					Included	***					Included	***
Industry (2-Digit) (d)		Included	***		Included	***		Included	***		Included	***
Labor Market Region (d)		Included	***		Included	**		Included	***		Included	***
Year (d)		Included	***		Included	***		Included	***		Included	***
Constant	0.1637	(0.0221)	***	0.1328	(0.0200)	***	0.0796	(0.0091)	***	0.0533	(0.0097)	***
Number of Observations		2,013,748			1,700,969			1,644,146			1,376,872	
R^2		0.0948			0.1026			0.0767			0.0981	

*Notes: OLS regressions. The binary dependent variable indicates whether an individual is newly hired in a young/new (1) or incumbent (0) establishment. Further sample restrictions as in Table 3. Standard errors (reported in parentheses) are clustered by establishment. (d) denotes a dummy variable. */**/*** indicates statistical significance at the10/5/1% level, respectively. Source: IEB, BHP, own calculations.*

Table 5: Probability of being hired by a startup (young/new establishment) for establishments with max. 20 employees

	YOUNG VS. INCUMBENT PLANTS						NEW VS. INCUMBENT PLANTS					
	All Hires			Hires with Lab. Market Experience			All Hires			Hires with Lab. Market Experience		
	(1)			(2)			(3)			(4)		
Age: Up to 30 years (d)	-0.0085	(0.0018)	***	-0.0033	(0.0018)	*	-0.0460	(0.0019)	***	-0.0336	(0.0019)	***
Age: 31-50 years (d)	Reference						Reference					
Age: Above 50 years(d)	-0.0124	(0.0022)	***	-0.0177	(0.0022)	***	0.0209	(0.0024)	***	0.0098	(0.0023)	***
Foreign Nationality (d)	0.1081	(0.0030)	***	0.0884	(0.0030)	***	0.1125	(0.0034)	***	0.0955	(0.0035)	***
Low-Qualified (d)	0.0190	(0.0020)	***	0.0339	(0.0021)	***	0.0246	(0.0021)	***	0.0372	(0.0023)	***
Medium-Qualified (d)	Reference						Reference					
High-Qualified (d)	0.0008	(0.0033)		0.0041	(0.0032)		-0.0143	(0.0033)	***	-0.0059	(0.0032)	*
Rel. Time of Benefit Receipt	0.1033	(0.0054)	***	0.1308	(0.0067)	***	0.0920	(0.0059)	***	0.1271	(0.0074)	***
Origin: Job-to-Job Transition (d)	Reference						Reference					
Origin: From Unemployment (d)	-0.0083	(0.0017)	***	-0.0032	(0.0017)	*	-0.0388	(0.0019)	***	-0.0279	(0.0019)	***
Origin: From Outside the Lab. Force (d)	0.0095	(0.0017)	***	0.0236	(0.0018)	***	-0.0040	(0.0019)	**	0.0180	(0.0020)	***
Origin: First-Time Entrant (d)	-0.0954	(0.0030)	***				-0.1034	(0.0028)	***			
Last Establishment: Closure (d)				0.1212	(0.0021)	***				0.2039	(0.0025)	***
Female (d)	-0.0242	(0.0022)	***	-0.0233	(0.0022)	***	-0.0265	(0.0021)	***	-0.0246	(0.0021)	***
Vocational Training (d)	-0.1893	(0.0035)	***	-0.1757	(0.0042)	***	-0.1907	(0.0030)	***	-0.1857	(0.0037)	***
Part-Time (d)	0.0485	(0.0027)	***	0.0422	(0.0027)	***	0.0612	(0.0028)	***	0.0540	(0.0028)	***
Marginally Employed (d)	-0.0787	(0.0028)	***	-0.0800	(0.0028)	***	-0.1500	(0.0029)	***	-0.1487	(0.0029)	***
Number of Previous Employers	0.0046	(0.0002)	***	0.0038	(0.0002)	***	0.0036	(0.0002)	***	0.0029	(0.0002)	***
Last Establishment: Young (d)				0.0533	(0.0015)	***				0.0508	(0.0017)	***
Last Establishment: Industry (2-Digit) (d)					Included	***					Included	***
Industry (2-Digit) (d)		Included	***		Included	***		Included	***		Included	***
Labor Market Region (d)		Included	***		Included	***		Included	***		Included	***
Year (d)		Included	***		Included	***		Included	***		Included	***
Constant	0.3571	(0.0143)	***	0.3017	(0.0165)	***	0.2615	(0.0108)	***	0.1750	(0.0136)	***
Number of Observations		868,303			749,374			609,804			524,964	
R^2		0.0612			0.0613			0.0830			0.0966	

*Notes: OLS regressions. The binary dependent variable indicates whether an individual is newly hired in a young/new (1) or incumbent (0) establishment. Further sample restrictions as in Table 3. Standard errors (reported in parentheses) are clustered by establishment. (d) denotes a dummy variable. */**/*** indicates statistical significance at the10/5/1% level, respectively. Source: IEB, BHP, own calculations.*

Table 6: Probability of being hired by a startup (young / new establishment) as opposed to an incumbent, estimates for different sectors and subgroups of workers

	YOUNG VS. INCUMBENT PLANTS Hires with Labor Market Experience				
	Basic Regression	Establishments in Secondary Sector	Establishments in Tertiary Sector	Male Hires	Female Hires
	(1)	(2)	(3)	(4)	(5)
Age: Above 50 years (d)	0.0036	-0.0012	0.0039	-0.0005	0.0058 **
	(0.0023)	(0.0030)	(0.0029)	(0.0029)	(0.0027)
Foreign Nationality (d)	0.0368 ***	0.0545 ***	0.0312 ***	0.0602 ***	-0.0061
	(0.0044)	(0.0067)	(0.0053)	(0.0049)	(0.0051)
Low-Qualified (d)	-0.0026	0.0113 ***	-0.0051	0.0147 ***	-0.0167 ***
	(0.0037)	(0.0040)	(0.0044)	(0.0039)	(0.0041)
Relative Time of Benefit Receipt	0.1078 ***	0.1558 ***	0.0974 ***	0.1296 ***	0.0600 ***
	(0.0094)	(0.0109)	(0.0112)	(0.0116)	(0.0099)
Origin: From Unemployment (d)	0.0144 ***	0.0173 ***	0.0131 ***	0.0188 ***	0.0063 **
	(0.0025)	(0.0029)	(0.0031)	(0.0028)	(0.0027)
Origin: From Outside the Labor Force (d)	0.0231 ***	0.0277 ***	0.0212 ***	0.0381 ***	0.0089 ***
	(0.0022)	(0.0033)	(0.0027)	(0.0030)	(0.0023)
Last Establishment: Closure (d)	0.1229 ***	0.1051 ***	0.1280 ***	0.1118 ***	0.1321 ***
	(0.0042)	(0.0051)	(0.0053)	(0.0051)	(0.0041)
Number of Observations	1,700,969	453,590	1,247,379	926,736	774,233
R^2	0.1026	0.1618	0.0687	0.1221	0.0884

*Notes: OLS regressions. The binary dependent variable indicates whether an individual is newly hired in a young (1) or incumbent (0) establishment. All variables listed in Table 4 are included in each regression. Further sample restrictions as in Table 3. Standard errors (reported in parentheses) are clustered by establishment. "Basic Regression" refers to regression (2) in Table 4. (d) denotes a dummy variable. */**/*** indicates statistical significance at the10/5/1% level, respectively. Source: IEB, BHP, own calculations.*

Table 7: Determinants of entry wages

	Men						Women					
	Basic (1)			Interaction (2)			Basic (3)			Interaction (4)		
Young Plant (d)	-0.0344	(0.0067)	***	-0.0255	(0.0089)	***	0.0137	(0.0082)	*	-0.0178	(0.0132)	
Age: Up to 30 years (d)	-0.0634	(0.0032)	***	-0.0796	(0.0041)	***	0.0309	(0.0054)	***	0.0058	(0.0071)	
Age: 31-50 years (d)	Reference						Reference					
Age: Above 50 years (d)	-0.0795	(0.0031)	***	-0.0699	(0.0037)	***	-0.0983	(0.0043)	***	-0.1026	(0.0055)	***
Age: Up to 30 * Young Plant				***0.0501***	***(0.0063)***	*****				***0.0796***	***(0.0101)***	*****
Age: Above 50 * Young Plant				***-0.0231***	***(0.0074)***	*****				***0.0188***	***(0.0091)***	**
Foreign Nationality (d)	-0.0501	(0.0032)	***	-0.0189	(0.0037)	***	-0.0046	(0.0045)		0.0019	(0.0060)	
Foreign Nationality * Young Plant				***-0.0869***	***(0.0060)***	*****				***-0.0218***	***(0.0081)***	*****
Low-Qualified (d)	-0.0906	(0.0047)	***	-0.0842	(0.0066)	***	-0.0831	(0.0055)	***	-0.0742	(0.0069)	***
Medium-Qualified (d)	Reference						Reference					
High-Qualified (d)	0.3355	(0.0050)	***	0.3252	(0.0058)	***	0.2957	(0.0072)	***	0.2922	(0.0089)	***
Low-Qualified * Young Plant				***-0.0176***	***(0.0077)***	**				***-0.0307***	***(0.0085)***	*****
High-Qualified * Young Plant				***0.0394***	***(0.0129)***	*****				***0.0107***	***(0.0120)***	
Rel. Time of Benefit Receipt	-0.2695	(0.0082)	***	-0.2542	(0.0102)	***	-0.2627	(0.0126)	***	-0.2753	(0.0171)	***
Time of Benefit Receipt * Young Plant				***-0.0514***	***(0.0183)***	*****				***0.0317***	***(0.0285)***	
Origin: Job-to-Job Transition (d)	Reference						Reference					
Origin: From Unemployment (d)	-0.1006	(0.0023)	***	-0.0975	(0.0029)	***	-0.0882	(0.0031)	***	-0.0856	(0.0037)	***
Origin: From Outside the Lab. Force (d)	-0.1122	(0.0051)	***	-0.0681	(0.0081)	***	-0.1422	(0.0070)	***	-0.1214	(0.0100)	***
Origin: From Unempl. * Young Plant				***-0.0124***	***(0.0048)***	**				***-0.0092***	***(0.0069)***	
Origin: From Outside * Young Plant				***-0.1304***	***(0.0101)***	*****				***-0.0579***	***(0.0132)***	*****
Number of Previous Employers	-0.0108	(0.0003)	***	-0.0108	(0.0003)	***	-0.0061	(0.0006)	***	-0.0061	(0.0006)	***
Work Experience	0.0440	(0.0012)	***	0.0444	(0.0011)	***	0.0391	(0.0016)	***	0.0390	(0.0015)	***
Work Experience^2	-0.0016	(0.0001)	***	-0.0016	(0.0001)	***	-0.0017	(0.0001)	***	-0.0018	(0.0001)	***
Work Experience^3	0.0000	(0.0000)	***	0.0000	(0.0000)	***	0.0000	(0.0000)	***	0.0000	(0.0000)	***
Establishment Size:1-4 (d)	-0.3855	(0.0161)	***	-0.3827	(0.0160)	***	-0.5103	(0.0293)	***	-0.5085	(0.0293)	***

Establishment Size:5-9 (d)	-0.2956	(0.0153)	***	-0.2960	(0.0152)	***	-0.3768	(0.0280)	***	-0.3781	(0.0279)	***
Establishment Size:10-19 (d)	-0.2438	(0.0150)	***	-0.2447	(0.0149)	***	-0.3077	(0.0278)	***	-0.3091	(0.0276)	***
Establishment Size:20-49 (d)	-0.2004	(0.0149)	***	-0.2013	(0.0148)	***	-0.2360	(0.0275)	***	-0.2371	(0.0273)	***
Establishment Size:50-99 (d)	-0.1872	(0.0154)	***	-0.1876	(0.0152)	***	-0.1869	(0.0278)	***	-0.1879	(0.0277)	***
Establishment Size:100-199 (d)	-0.1730	(0.0161)	***	-0.1730	(0.0159)	***	-0.1580	(0.0287)	***	-0.1586	(0.0286)	***
Establishment Size: 200-499 (d)	-0.1148	(0.0157)	***	-0.1148	(0.0156)	***	-0.1138	(0.0272)	***	-0.1142	(0.0271)	***
Establishment Size: at least 500 (d)		Reference						Reference				
Occupation (Blossfeld) (d)		Included	***		Included	***		Included	***		Included	***
Industry (2-Digit) (d)		Included	***		Included	***		Included	***		Included	***
Labor Market Region (d)		Included	***		Included	***		Included	***		Included	***
Year (d)		Included	***		Included	***		Included	***		Included	***
Constant	4.3000	(0.0247)	***	4.2973	(0.0245)	***	3.9188	(0.0404)	***	3.9293	(0.0395)	***
Number of Observations		686,992			686,992			312,005			312,005	
R^2		0.6018			0.6038			0.4579			0.4591	

*Notes: OLS regressions. Dependent variable is the logarithm of daily wages in 2010 Euros, where those wages above the contribution limit to social security are imputed. Wages in the lowest percentile of the distribution are excluded. Only regular full-time employees with previous work experience. Further sample restrictions as in Table 3. Standard errors (reported in parentheses) are clustered by establishment. (d) denotes a dummy variable. */**/*** indicates statistical significance at the10/5/1% level, respectively. Source: IEB, BHP, own calculations.*