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Abstract

The present contribution addresses the question whether and how qualitative aspects of employment—like weekly hours of work, wages or qualification—differ between new and established firms. Although a wide strand of literature in entrepreneurship research analyses the employment effects of start-ups vs. incumbent firms, our knowledge about differences in these qualitative aspects of employment is rather poor. Labour market research, on the other hand, has been thoroughly accounting for the consequences of technological and organisational change on the characteristics and turnover of jobs, but it rarely has been attempting to consider the relevance of firm entry. Based on the Establishment History Panel, a plant-level dataset constructed from employment information and comprising nearly the entire German economy, we find significant differences between new and incumbent firms with respect to employment quality. Surprisingly, the difference regarding the share of high-qualified labour is—though highly significant—not as high as commonly expected.

Keywords: Start-ups, Employment, Quality of Employment, Germany, Establishment History Panel, Qualification, Wages, Part-Time, Marginal Employment.

JEL Classification: J24, J31, J82, M13

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1 Background and objectives

It has become a commonplace in research on firm dynamics and entrepreneurship that start-ups contribute to economic development and progress in various aspects. Not only are they believed to enhance technological change by introducing new products, novel processes or organisational innovations (e. g. Acs and Audretsch, 2005; Lynskey, 2004), but there is also a wide strand of literature discussing and analyzing their effects on the development of employment in sectoral and/or regional perspective (Fritsch and Müller, 2004; Fritsch and Schindele, 2008; Santarelli and Vivarelli, 2007) as well as their internal growth (Koch and Strotmann, 2006; Otto and Fornahl, 2008; Stam, Gibcus, Telussa, and Garnsey, 2008).

Although most of the contributions concerned with employment creation and development in new firms do account for *quantitative aspects* of new employment relationships—like how many new jobs are created in start-ups and what are their effects over time—they widely disregard aspects concerning the *quality* of these jobs—for instance what kind of employment relationships are most likely to be created in new firms or whether start-ups rely on other, e. g. more flexible, forms of employment than incumbents do.

Contrariwise, a huge body of research—particularly in labour economics— is studying the structure and the evolution of the composition of the workforce, such as the dynamics and determinants of job flows of different types of employees (e. g. Bauer and Bender, 2004; Card and DiNardo, 2002; Caroli and van Reenen, 2001; Tsou and Liu, 2008). However, the majority of these studies widely disregard any aspect of new firm start-up.

Only more recently, some scholars began to deal with this missing link between industrial dynamics and labour economics (Mamede, 2008) and analyse questions regarding the structure, the dynamics, and the impacts of job quality in new firms. For instance, Brixy, Kohaut, and Schnabel (2007) compare the development of wages in new firms vs. incumbent firms on the basis of German employer-employee data. They find that newly founded firms tend to pay lower wages than incumbent firms, but that wage differentials decline in the course of the first few years of the new firms' development. Likewise, Kölling, Schnabel, and Wagner (2002) analyse the nexus between wages and firm age in Germany. The authors state that "older firms pay on average higher wages for workers with the same broadly defined degree of formal qualification. This firm age differential vanishes after controlling for further worker characteristics and other firm characteristics besides age; if anything, younger firms pay more ceteris paribus" (Kölling, Schnabel, and Wagner, 2002, p. ii). On the basis of a similar dataset, Brixy, Kohaut, and Schnabel (2008) analyse the persistence of employment relationships in new firms. The main finding of that study is that an "individual's employment stability was higher in incumbent than in newly founded firms while their risk of becoming un-

employed was lower" (Brixy, Kohaut, and Schnabel, 2008, p. 21). In contrast, Böheim, Stiglbauer, and Winter-Ebmer (2008) find—on the basis of employer-employee data from Austrian workers and firms—that new jobs in new firms last considerably longer than new jobs in incumbent firms.

Summing up, the few existing empirical studies suggest interrelations between firm status (new firm vs. incumbent firm) and qualitative aspects of the employment relationships inside the firms. However, evidence in this respect is rather scarce, it is frequently based on small samples and only few aspects of employment quality have been investigated so far. The disregard of the outlined aspects in existing research can be partly attributed to the lack of adequate and representative micro-level data including both information on firm status or age and on employment (Mamede, 2008).

Yet, the availability and the accessibility of firm-level and even individual-level data has improved considerably during the last few years regarding contents, coverage and scope, not least in Germany. The present paper builds upon the outlined initial evidence and analyses various aspects of the quality of employment in new firms, particularly in comparison to established firms. The pivotal question of the paper at hand is if and to what extent new firms differ from established firms regarding qualitative aspects of employment relationships. For the examination of this question we resort to establishment level data provided by the Federal Employment Agency of Germany. This data is based on information on individual employment relationships and covers almost the complete German economy.

The remainder of the contribution is structured as follows: In the next section, we outline some conceptional and theoretical backgrounds, namely on different aspects of job quality as well as on the (missing) links between labour market studies and research on start-ups and entry. Our data are introduced in section 3, whereas section 4 presents the empirical results. Section 5 concludes and outlines some pathways for further research.

2 New firms and the quality of employment

In order to understand the potential differences between start-ups and incumbents regarding employment quality, we need to find an answer to the following three questions: (1) Why do firms in general resort to different forms of employment?, (2) under which circumstances might they resort to them?, and (3) which particular what is the role of new business start-ups in this context? Answering these questions implies linking the fields of labour market and entrepreneurship research,[1] which constitutes the surplus of the present paper.

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[1]This issue has also been intensely discussed in a recent conceptual article by Ricardo Mamede, who presents a series of potentials and open questions regarding the links between industry dynamics and labour mobility, although his approach is focusing rather on different aspects of *job mobility* (and, thus, stability and sustainability) than explicitly on

The scientific literature from the field of labour economics has for long been studying the interrelations between characteristics of firms, industries, regions and the demand for different types of jobs, i.e. employment quality. In the context of the present study two main lines of research have to be mentioned in this respect, namely one that is concerned with comparing standard and non-standard employment and another that analyses the nexus between technological and/or organisational and different aspects of employment. We will build upon these two research strands when we develop our arguments.

The most fundamental line of research consists of studies that are concerned with employment quality in general and that focus mainly on the differences between two types of employment relationships: standard and non-standard. Contrary to standard employment, which is mainly conceived as being a full-time job with adequate income, long-term permanence and integration into the social security system (see, for example, Economics Council of Canada, 1990; Vosko, Zukewich, and Cranford, 2003), non-standard employment is commonly defined as "any pattern of work that does not follow the traditional male norm of full-time, permanent employment with a single employer", hence considering "agency labour, part-time work, casual work, temporary contracts, self-employment, homeworking, and zero-hours contracts" (cf. Heery and Noon, 2001, p. 13) as the main forms of this type of employment.[2]

Non-standard employment forms have experienced a considerable rise in the industrialized countries since the 1970s (cf., f.i. Carrol, 1999; Felstead and Jewson, 1999). Since national systems of social security rely strongly on standard employment, this rise has always caused concern, especially among scholars who are dealing with social security systems and only few studies do not find such a rise of non-standard employment (e.g. Auer and Cazes, 2003; Winkelmann and Zimmermann, 1998). One line of explanation for the significance and for the development of non-standard employment in modern economies is the overall evolution of the socio-economic structure: in the course of increasing levels of globalisation, technological progress, tertiarisation and many associated processes, the requirements for human capital have become more demanding; at the same time, however, we can also observe growing levels of standardisation of professions, mainly in the service sector. Other approaches stress the role of labour supply stating that not only employers, but also employees may benefit by having non-standard employment relationships due to improved work/life balance possibilities (cf. Carroll, 1999; Mangan, 2000).

Generally spoken, firms that face higher risks can be expected to exhibit

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the quality of jobs (Mamede, 2008).

[2]In this context, many studies point out the role of *precarious* employment (for example Tucker, 2002)—an aspect which will not be tracked in the paper at hand.

greater needs for flexibility. Basically, start-ups can be considered to experience a higher risk of failure than incumbents—even though they may be less affected by processes linked to globalisation, as their initial customer relations are frequently in close spatial proximity to their location. The most commonly known drawbacks for a successful development of a new firm are linked to the discovery and acquisition of resources, mainly knowledge, capital or personnel (e.g. Shane, 2003; Persson, 2004; Stam, Gibcus, Telussa, and Garnsey, 2008). Therefore, both the original endowment of resources as well as the combination of these resources and the ability to dynamically develop its capabilities (Teece and Pisano, 1994) are crucial factors for the survival and the development of a new firm and start-ups differ from incumbents in this respect.

Additionally, many start-ups begin and remain small. The *liability of smallness* concept refers to the fact that many new firms fail to grow to the minimum efficient size in their respective industry necessary to be successful (cf. Aldrich and Auster, 1986; Stinchcombe, 1965). Furthermore, at the time of market entry, i.e. before the market selection process takes place, all kinds of start-ups are present in the market, "good" ones that will survive and "bad" ones that will be filtered out. Thus, when we examine start-ups in comparison to incumbents, we need to bear in mind that start-ups are in many respects less "experienced" than incumbents (which can be seen as former start-ups that managed to survive). In this context, the idea of the *liability of newness* relates to the fact that younger firms face higher hazard rates than older ones (cf. Freeman, Carrol, and Hannan, 1983; Stinchcombe, 1965), because their relationships with other firms (intermediate suppliers and purchasers) and regional institutions are still not entirely evolved or because they face competitional disadvantages compared to incumbents since they cannot assess well their own productivity until they in fact entered the market (Melitz, 2003).

The greater need for flexibility in start-ups—in the functional, numerical and financial sense (cf. Valverde, Tregaskis, and Brewster, 2000)—implies some consequences for the kind of labour they demand. Thus, we expect entering establishments to represent higher levels of qualification than incumbents, as they are in need for higher-qualified employees that are able to cope with rapidly changing working conditions and that even can undertake their colleagues' tasks that may vary substantially from their own ones *(functional flexibility)*. This is also supported by the second line of research mentioned above which focuses on the relations between technological and/or organisational change and employment (for recent overviews, see Giuri, Torrisi, and Zinovyeva, 2008; Mamede, 2008). Studies related to this field find evidence for a skill-biased technological and/or organisational change.

Bauer and Bender (2004), for example, use German employer-employee data for addressing the question how the introduction of information and

communication technologies and processes of firm-internal restructuring impact on job flows and find, for example, that net employment growth across firms is negatively correlated with the introduction of high-performance workplace practices and that unskilled and low-skilled employees suffer from organisational and technological change whereas high-skilled workers are largely unaffected. In a similar vein, Bresnahan, Brynjolfsson, and Hitt (2002) analyse how a combination of related innovation processes—namely the introduction of information technology, new work organisation, and new products and services—affects labour demand. They do not only find that these processes are strongly correlated among each other, but they also confirm that "information technology is a source of increased demand for skilled labour and rising wage inequality" (p. 371). Last but not least, using a French establishment-level dataset Askenazy and Moreno Galbis (2007) find out that employee groups with medium and low skills are negatively affected by innovative workplace practices, whereas managers turnover was positively affected. In contrast, "ICT adoption has led to higher turnover for employees and manual workers, whose relative productivity is likely to have been deteriorated by the introduction of these new technologies." (Askenazy and Moreno Galbis, 2007, p. 40).

Hence, since start-ups are more likely to be at the technological forefront regarding, for example, the introduction and utilisation of information and communication techniques, of new workplace practices or—generally spoken—of innovations (Acs and Audretsch, 2005; Lynskey, 2004) they can be supposed to display a higher demand for skilled employees and, subsequently, less need for unskilled workers for routinized jobs.

Additionally, we expect start-ups to have a higher share of part-time and marginal employment than incumbents. The reason therefore is to be able to increase or decrease the number of employees/hours worked in the very short term (*numerical flexibility*), e. g. when confronted with a (positive or negative) demand shock—which is more lokely for young firms. Concerning elderly employees, we expect to find a lower share in start-ups as in Germany dismissal protection of the elderly is very high and start-ups may prefer to hire younger employees. Also, we think of an employee's risk aversion increasing with his/her age which implies that elderly employees would prefer a more stable job in an incumbent firm rather than a (probably) more risky one in a start-up.

Referring to the notion of *financial flexibility*, i. e. the kind of flexibility which is achieved by tying an employee's wage as close as possible to his/her marginal productivity and to the performance of the firm in order to ensure an efficient wage spending, we also suspect entering firms to be in greater need for adaptability than incumbents. However, this interesting question cannot be pursued further, since our data does not contain information about how an individual's wage is actually being set. Thus, we leave it as an issue for future research and confine ourselves to the question whether

younger firms pay lower wages than incumbents, an issue which fostered mixed empirical evidence in the past (cf. also section 1). We expect this to come true since start-ups usually have a budget constraint which is much tighter than that of incumbents.

3 Data: The Establishment History Panel

This paper is based on the "Weakly Anonymous Establishment History Panel" (in German: *Betriebs-Historik-Panel—BHP*) provided by the Research Data Centre of the German Federal Employment Office.[3] The *BHP* is a unique data set containing annual data covering the period 1975–2005. Its original source is individual-level spell data on all employment relationships subject to social security obligation in Germany. This employee-level data derives from the mandatory social security notifications which have to be submitted by employers for any hires and separations as well as—annually— for every existing employment relationship. Via an establishment number, the individual-level data is aggregated on the establishment level by the data provider. Based on the employee-level information, the data includes several variables about qualitative aspects of employment which will be introduced in detail below (for an overview cf. Spengler, 2007).

Being a panel data set, the *BHP* allows for in-depth regional and sectoral accounts of both the evolution of the population of establishments as well as of the development of any single entity over time (although with some limitations—see below). As the data is based on process-generated administrative data, it avoids "typical survey data problems such as memory gaps, refusing to give information or deliberately giving false information" (cf. Spengler, 2007, p. 6). The *BHP* covers all establishments in Germany with employees subject to social security obligation.[4] The number of establishments in the *BHP* amounts to approximately 2.5 million in 1999 and 2005 with sums of 31.1 and 30.5 million employees, respectively.

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[3]The data has been made available to the scientific community in autumn 2006. For the purpose of our research, we had access to the data via on-site use at the Research Data Center of the German Federal Employment Agency at the Institute for Employment Research and via remote data access. As external researchers usually do not get access to the full dataset due to reasons of nondisclosure and restricted computing capacity at the Research Data Center, we had access to a 50% sample of the data stratified by establishment size and the frequency of the establishments' appearance in the several cross-sectional data sets of the *BHP*.

[4]An establishment is defined as a local unit performing economic activity and it must not necessarily be a legally independent unit. However, as nearly 98% of all establishments in Germany are single-site companies, this can be seen as a minor problem. The restriction of the data to employment subject to social security obligation, however, disregards other forms of employment as, for instance, self-employment, home work or public service. In this respect, it is estimated that the *BHP* covers about 75% of the total employment in Germany (of course, with considerable sectoral differences, cf. Fritsch and Brixy, 2002, p. 57).

With some restrictions, the *BHP* can be used for analysing firm demography. Using the consistent ID-numbers, establishments can be traced over time. Thereby, new establishment-IDs can be interpreted as entries. Regarding the identification of new establishments, some deficiences inherent to the data have to be noted:

- Not any allocation of a new ID number to an establishment by the Federal Employment Agency must necessarily represent a start-up. New IDs are also assigned in cases of change of ownership, change of company name or on the occasion of a merger of two existing companies, inter alia. Vice versa, not every new establishment is being assigned a new number (for further information on the allocation of establishment numbers, cf. Bender, Haas, and Klose (2000); Fritsch and Brixy (2002). Whereas we cannot account for the latter case, we are able to mitigate the first problem by separating entities starting with 20 or more employees in the first year of appearance from the group of entrants.[5]

- A particular issue in identifying new establishments is the fact that some establishments (respectively their numbers) have *"discontinuous histories"*, i.e. they are missing in some years between the first and the last year of their appearance in the data. It is unknown whether these perforated establishment numbers refer to one and the same establishment before and after the break or whether they rather have to be considered as newly-founded entities.[6] For the years from 1999 onwards we follow the suggestion made by Fritsch and Brixy (2002) and treat establishments whose history is interrupted for less than three years as one and the same after their re-appearance. Establishment numbers that fail to appear for three years or more, however, are considered as closures with subsequent re-start. This corresponds to establishments that have neither employees liable to social security nor marginal employees for 3 years or more. For the period before 1999, however, we do not account for the discontinuous history problem because we find that a firm that fails to have employees liable to social security in one year is likely to persist with solely marginal employees[7] and that about 60% of all re-starts after 3 or more years of disappearance are spurious.

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[5]Clearly, these entrants do not represent "real" entries and should rather be considered as "pseudo-entrants".

[6]While there is a broad consensus in the literature in that the longer a period of an establishment's non-appearance in the data lasts, the less probable it is that it is still the same establishment after the break, there exists—to the best of our knowledge—no empirically justified cutoff value which discriminates between establishments whose history is merely interrupted and closings with adjacent re-founding.

[7]This is the case in about 80% of the "paused" observations .

- Due to the cross-sectional structure of the *BHP*, the number of entrants might be underestimated as establishments entering *and* exiting the market between July 1st and June 29th of the following year are not covered by the "snapshot" data. This reporting date may also cause an overestimation of both the numbers of establishments and employees due to higher seasonal employment in summer. As the qualification structure and other characteristics of the employees might be biased in this respect, this may also impact on the analysis of qualitative aspects of employment.

- Last but not least, we have to account for the fact that the data contains information on marginal employment only since 1999 implying a considerable structural break in the data. Thus, we do not know whether an establishment appearing for the first time in 1999 and consisting exclusively of marginal employees is actually a start-up or—which is clearly more probable—if it represents a business whose starting date reaches back to an earlier year. To handle this problem, we restrict our definition of entrants to units with at least one employee subject to social security obligation. Firms that enter the data set in 1999 or later and that exclusively consist of marginal employees are not counted as start-ups until they have at least one employee *liable to social security*, the years before being discarded.[8] (Likewise, we define as exit if a firm fails to have at least one employee *liable to social security* for more than 2 years, discarding thus the possibly remaining observations where the firm consists solely of marginal employees.)

Finally, as the present contribution intends to analyse the differences between new firms and established firms, it has to be discussed what exactly is the difference between an incumbent establishment and a new establishment and, accordingly, when a young firm converts into an incumbent. Previous studies comparing these two groups of firms (cf. Böheim, Stiglbauer, and Winter-Ebmer, 2008; Brixy, Kohaut, and Schnabel, 2007) treat all establishments appearing for the first time in the data as start-ups, whereas all other units are defined to be "incumbents", which we find rather unsatisfactory, as after one year[9] of existence neither a single firm nor a cohort of entrants has gained any stability in its evolution. In the present paper, we define all firms as incumbents which exist for at least five years. Establishments in the first four years after their foundation, on the other hand, are treated

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[8]The easiest way to resolve this problem would be to exclude any marginal employment from our data. However, as marginal employment constitutes a crucial aspect of employment quality, this is not a viable solution.

[9]As the *BHP* is a cross-sectional dataset containing annual snapshots of the population of establishments by June 30th every year, establishments appearing in the data for the first time might be aged far less than one year as they could have contracted their first employee only on the day before the reporting date.

as start-ups. We are aware of the fact that the five-year limit is somewhat arbitrary, but it seems feasible as it is a rather stylized fact that the first few years are the most critical period in the development of new firms. Between 30 and 40% of entrants fail within five years (cf. Geroski, 1995), and failure rates decline significantly thereafter. Also on the level of the single firm, it is acknowledged that most units have managed to stabilise their business when having survived that five-year period.

Every establishment is assigned an industry code following the German Industry Classification (Wirtschaftszweigsystematik - WZ). A problem with regard to sectoral analysis is that there have been two major modifications of the classification within the period covered by the data: Whereas for the years from 1975 until 2002 an industry classification is used which dates back to 1973 (WZ73), another one is employed from 1999 until 2003 (WZ93) and yet another from 2003 until 2005 (WZ03). As transcoding (which anyway could only be done for the last two classifications, WZ93 and WZ03) always suffers from inaccuracies we choose the longest available time period that provides both a consistent industry classification and data on marginal employment, i. e. the period 1999-2003.

With regard to the qualitative aspects of employment, the *BHP* contains a number of variables describing attributes of employees at the establishment level. These can be differentiated into variables concerning (1) general characteristics of employees—like age, sex, and nationality (2) the working hours, (3) the qualification and (4) information on wages (for an overview, cf. Spengler, 2007). All information on the characteristics of employees derives from the mandatory social security notifications of employers. With regard to most attributes, the employers' reports can be seen as reliable and complete and the main shortcoming is the fact that only employment subject to social security obligation is covered by the data. Employees' age, sex and nationality are fully covered by the data and do not represent major problems.

Concerning working hours, it is distinguished between three categories of workload: full-time employment, part-time employment with a weekly workload of more than 18 but less hours that would be required to make a full-time job, and part-time employment with less than 18 hours per week. Although these declarations can be regarded as reliable, a problem is that the exact number of weekly working hours remains unknown. This is particularly critical in connection with the information on wages: these are available as average daily wages (pre tax). As we do not have the exact working hours, it is not possible to deduce information on hourly wages except for full-time employees. We also subsume the information on marginal employment under the category of working hours, although this is not completely correct: marginal employment is any kind of employment not liable to social security, i. e. that fails to attain a certain wage threshold for a given period of time. The number of hours worked is not important in this

context, but typically the marginally occupied are part-time employees. A shortcoming in our data is constituted by the fact that this wage threshold is the outcome of a political process and can vary over years. For the years 1999–2001 the minimum income limit for compulsory social insurance was 322€ per month,[10] but in 2002 and 2003 it changed to 325€ and 400€, respectively, the former rise being of minor importance, of course. The rise of the threshold in 2003, however, should be borne in mind when interpreting the results. Marginal employment is covered by the data since 1999.

Information on the qualification of employees has to be handled with some caution: In the data, three basic levels of qualification are distinguished: high, medium and low qualification. Highly qualified employees are persons with at least a university degree; employees with medium qualification are those having finished A-levels and/or having obtained a professional degree; last but not least, employees with low qualification are those having finished only basic school, i. e. that neither attained A-levels nor received a professional degree. Furthermore, the data provides information about the number of employees whose qualification is unknown, either because it is impossible to declare or because the respective employer is unwilling to do so. The share of employees with unknown qualifications is not extraordinarily high across the complete sample. However, a major problem is that this share increases the younger an establishment is. There are two main reasons for this shortcoming: first, the declaration on qualification is not a mandatory information in the employers' notifications, and, second, particularly for newly contracted employees this information seems to be rather difficult to obtain. Fitzenberger, Osikominu, and Völter (2005) introduce three different methodologies to impute missing information on qualifications based on a number of assumptions.[11] However, their approaches require access to the individual-level data, which we do not have. Nevertheless, their results show that after imputing the education variable using one of the proposed procedures about 26% of the spells with originally missing education can be converted into spells with low qualification, 48% into medium qualification and 2% into high qualification. About 24% of the spells with originally missing observations remain missing (Fitzenberger, Osikominu, and Völter, 2005, pp. 39–40). To deal with the fact that start-ups have higher shares of employees with unknown qualification we include it as a covariate in our regressions; furthermore, since our data also provides information about employees without formal qualification (i. e. unskilled workers), we use them as an approximate check of the results for the group of low-qualified employees.

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[10]To be precise, in East Germany the year 1999 was cut into two parts: from January 1 to March 31, the limit amounted to 271€month, subsequently rising to 322€month for the remainder of that year.

[11]Actually, these imputation procedures also apply to *inconsistent* information on education reported in subsequent spells. Thereby, inconsistent means reports of education at time t that are lower than at $t-1$.

Last but not least, although information on employees' wages is rather reliable (with the shortcoming of not being thoroughly combinable with information on working hours), a problem is that there is an upper cut-off limit and that wages above that limit are not taken into account when aggregating the individual-level spell data on the establishment level. Also, the cut-off limit need not be stable over time: whereas, f. i., in the period 1999–2002 only minor changes took place (in West and East Germany it rose from 4364 (3681)€/month in 1999 to 4500 (3750) in 2002, respectively), a more pronounced increase can be observed in 2003, when it amounted to 5100 (4250)€/month. This (changing) extent of right-censoring of the wage distribution could be controlled for as suggested by Gartner (2005), but this requires access to the individual-level data which we do not have.

Despite these shortcomings, the *BHP* is a capacious dataset allowing for in-depth analyses of various aspects of employment in both incumbents as well as in new establishments and every other dataset in Germany is far from covering a comparable number of aspects regarding employment in an equal sectoral, regional and temporal depth and reliability.

4   Empirical results

For the following analyses, we had access to a 50% random sample stratified by establishment size and the frequency of the establishments' appearance in the single cross-sectional data sets of the *BHP*. Special attention during stratification was paid to not severely reduce the number of panel cases. We restrict the sample to the years 1999 to 2003 (however, not totally disregarding information from the years before) because this is the longest available period of time for which we have both a consistent industry classification and information about marginal employment (see also above). The sample distribution over years can be seen in table 1. One observation is striking when looking at the table: the share of young firms varies considerably between sectors: it is low in sectors depending heavily on physical capital and being in a mature status—like manufacturing, mining and energy—as well as in sectors with a dominance of public bodies, e. g. public administration itself, but also in the education and the health sectors.

Table 2 presents descriptive statistics of the quality measures for our sample. Regarding the hours worked, it can be seen from the table that young firms in West Germany have a lower share of full-time employees than incumbents (about 62% vs. 73%); consequently the part-time share in young firms is higher than in incumbents. Considering the share of employees working more than 18 hours a week but not full-time, there are no huge differences between incumbents and entrants, neither in West nor in East Germany, albeit the difference in the East is somewhat more pronounced (14 vs. 8 percentage points). The share of employees working less than 18 hours

	1999	2000	2001	2002	2003
A&B: Agric., Forestry, Fishing	34,477	34,341	33,817	33,249	31,766
% young firms	*28.0*	*27.2*	*26.8*	*26.3*	*23.9*
C: Mining and Quarrying	1,962	1,915	1,883	1,800	1,725
% young firms	*16.9*	*15.8*	*15.3*	*14.6*	*13.9*
D: Manufacturing	121,250	120,199	118,209	114,874	109,209
% young firms	*22.0*	*21.9*	*21.5*	*20.9*	*18.8*
E: Elecricity, Gas, Water	2,250	2,269	2,304	2,253	2,102
% young firms	*22.3*	*26.0*	*27.8*	*26.6*	*22.5*
F: Construction	117,485	117,232	113,319	108,892	102,059
% young firms	*33.3*	*33.2*	*32.2*	*31.3*	*28.5*
G: Trade	235,628	233,216	229,040	223,128	209,842
% young firms	*32.7*	*32.1*	*31.7*	*31.1*	*28.4*
H: Hotels and Restaurants	75,518	75,789	75,266	73,944	66,814
% young firms	*44.1*	*44.0*	*43.6*	*43.0*	*39.7*
I: Transp., Storage, Comm.	52,803	53,402	53,128	51,773	47,941
% young firms	*41.5*	*40.7*	*37.1*	*35.9*	*31.9*
J: Financial Intermediation	24,631	25,025	25,051	24,845	23,751
% young firms	*30.9*	*32.1*	*32.7*	*33.4*	*31.0*
K: Real Esatet, Bus. Serv.	163,521	170,133	173,101	171,261	148,270
% young firms	*47.5*	*47.6*	*47.6*	*46.3*	*38.9*
L: Public Admin.	17,105	16,914	16,902	16,373	15,634
% young firms	*10.8*	*10.4*	*9.6*	*8.9*	*6.7*
M: Education	24,731	25,064	25,289	25,430	24,859
% young firms	*22.0*	*21.2*	*20.5*	*19.8*	*17.9*
N: Health and Social Work	98,184	99,390	10,0467	10,1272	99,182
% young firms	*25.2*	*24.3*	*23.7*	*23.6*	*21.4*
O: Other Services	74,122	75,296	75,817	75,288	68,525
% young firms	*33.5*	*33.3*	*33.1*	*32.6*	*27.6*
P&Q: Priv. Househ., Extraterr. Org.	18,338	18,943	18,924	16,209	12,993
% young firms	*59.6*	*60.3*	*60.3*	*55.3*	*47.3*
A-Q: All Sectors	1,062,005	1,069,128	1,062,517	1,040,591	964,672
% young firms	*34.0*	*33.9*	*33.4*	*32.6*	*28.6*

Table 1: Distribution of incumbents and start-ups over industries and years, Germany. Source: Establishment History Panel, authors' calculations.

a week, however, is considerably higher in start-ups than in incumbents (29% vs. 16% in the West and 14% vs. 8% in the East). The same is true for marginal employment (24% vs. 13% in the West and 14% vs. 8% in the East). In the former German Democratic Republic (GDR) there is virtually no difference between incumbents and young firms.

Concerning the qualification structure in incumbents and start-ups, we find firstly that young firms have a considerably lower share of a medium-qualified workforce than incumbents (45% vs. 59% in West Germany); in East Germany the difference is somewhat less pronounced (63% vs. 68%), which may be an outcome of the lower share of employees with unknown qualification that in young firms amounts to 24%, merely, instead of 36% in West Germany. Second, young firms have a slightly lower share of low-qualified employees than incumbents (14% vs. 18% and 8% vs. 10% in West and East, respectively) and, third, the difference between the share of employees without formal qualification (which may be seen as a proxy

for the share of low-qualified employees) is very small. Furthermore, there is only a minor difference between young and incumbent firms regarding the share of high-qualified employees (3 and 6 percentage points in West and East, respectively). Surprisingly, young firms seem to have less high-qualified employees than incumbents. In this context, the above mentioned high share of unknown qualifications in young firms has to be taken into account.

The results for the third group of aspects of the quality of employment show that young firms seem to pay lower wages, where the wage differential is more pronounced in the West than in the East of Germany. Furthermore, there is no clear tendency regarding the share of female employees: whereas in West Germany young firms employ more women than incumbents do, the converse holds for East Germany. (The differences, however, can be considered as minor.)

The share of employees aged 50 years or more is lower in young firms (17% vs. 23% in West Germany and 18% vs. 24% in East Germany). With respect to the percentage of immigrants, there is only a slight difference between entrants and incumbents, in West Germany as well as in the eastern part of the country. These findings, however, are descriptive by nature and do not account for the possible influences of further unobserved variables like firm size, sectoral affiliation or effects related to the business cycle. In the following, we will thus control for these additional influences by performing multivariate analyses including further variables. Our estimation approach is shown in the following:

$$y = X\beta + Z\gamma + \epsilon$$

where the dependent variable y represents the different measures of the quality of employment outlined above. On the right-hand side of the equation the first regressor matrix, X, contains variables that are included in each of the estimations, in detail: the size of establishment i at time t measured in total employment ($size_{it}$), a dummy variable ind_{ji} taking on value 1 if an establishment i belongs to industry j and 0 otherwise (measured at the level of 1-digit industry codes), time-fixed effects (t_{mt}) and, finally, two dummy variables indicating whether a particular business enters the equation either as an entrant with up to 20 employees ($entry_{1it}$) or as an entrant with more than 20 employees in the first year ($entry_{2it}$), respectively. Dependant on the explained variable, which is one out of the many specific aspects of employment quality, we control for one or more of the remaining employment quality variables, which are represented by the columns of Z. F. i. when explaining the median wage per establishment it is sensible to control for the qualification structure of the firms in the sample, as an individual's wage increases with his/her qualification.

Since the dependent variables mostly refer to percentages which are cen-

sored at a lower limit of 0 and an upper limit of 100, tobit estimation would be the appropriate estimation framework. However, performing tobit regressions resulted in deeply biased results since the residuals from the model were heteroskedastic and not normally distributed, a case in which the coefficients from the tobit model cannot be consistently estimated anymore. Thus, we resort to simple OLS regressions (with bootstrapped standard errors) whose coefficients neither are completely unbiased since this method is not designed for liimited dependent variables but show far more reliable results.[12] Regression results can be seen in table 3.

As regards the volume of work, entrants have a share of part-time employees that is significantly larger than in incumbent firms. It lies about 3 percentage points above the share encountered in incumbent firms. Also, the share of employees working in little part-time, i. e. those working less than 18 hours a week, is significantly higher in entrants and its impact amounts to about 3.5 percentage points. On the other hand, young firms employ significantly less people that work more than 18 hours per week but less than full-time. The size of this difference, however, is only little (0.3 percentage points). Regarding marginal employment we find that—after controlling for groups of employees that are likely to be found in marginal employment relations (such as part-time, low-qualified and female employees or employees with unknown qualification)—that young firms have a *lower* share than incumbents, which stands in contrast to one of our previously stated hypotheses.

Referring to qualifications, entrants are also significantly different from incumbents: their share of low-qualified labour lies about 1.5 percentage points below that in incumbents, their share of mid-qualified employees is 0.5 percentage points higher and—as commonly is expected—they have a significantly larger share of high-qualified employees. Surprisingly, it is only about 1.1 percentage points higher than in incumbents which may cast some doubt on the suggestion commonly made that start-ups are much more innovative than incumbents.

With respect to wages, start-ups pay less than incumbents—about 7€ per day pre-tax. Eventually, entrants employ about 6 percentage points less employees aged more than 50 years than incumbents and also less women but more people with immigrant background.

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[12]We also did consider semi-parametric Tobit estimation. However since our data is far too capacious to perform any of these memory-intensive techniques (ICLAD, SCLS or related) in a reasonable amount of time, we were not able to further pursuit this approach. An attempt was made to fit a fractional logit model, as first introduced by Papke and Wooldridge (1996). However, it failed due to the high number of observations at the extreme values 0 and 1 (transformed percentage values), case in which even the fractional logit model does not seem to function properly (although this should be the case according to Papke and Wooldridge).

		West		East	
		incum-bents	young firms	incum-bents	young firms
(a) Volume of work / Working hours					
Share of ... (%)					
full-time employees	n	2,864,780	1,353,718	585,189	357,996
	mean	72.7	62.3	77.6	77.6
	sd	27.0	35.1	27.0	30.5
part-time employees	n	2,864,780	1,353,718	585,189	357,996
	mean	27.3	37.7	22.4	22.4
	sd	27.0	35.1	27.0	30.5
part-time employees $\leq$ 18h	n	2,864,780	1,353,718	585,189	357,996
	mean	15.5	28.6	8.3	13.9
	sd	22.1	32.6	16.5	24.2
part-time employees $>$ 18h	n	2,864,780	1,353,718	585,189	357,996
	mean	11.9	9.2	14.1	8.6
	sd	15.6	18.2	21.9	20.2
marginal employees	n	2,864,780	1,353,718	585,189	357,996
	mean	13.0	24.4	8.1	13.9
	sd	19.7	28.1	15.8	23.5
(b) Qualifications					
Share of ... (%)					
employees with low qualification	n	2,864,780	1,353,718	585,189	357,996
	mean	18.0	13.7	9.9	7.9
	sd	19.3	23.4	16.4	16.8
employees with medium qualification	n	2,864,780	1,353,718	585,189	357,996
	mean	59.3	45.2	67.9	62.6
	sd	26.0	36.0	28.8	36.5
employees with high qualification	n	2,864,780	1,353,718	585,189	357,996
	mean	7.6	4.6	10.6	5.1
	sd	13.2	13.4	18.4	14.3
employees with unknown qualification	n	2,864,780	1,353,718	585,189	357,996
	mean	14.9	35.8	11.3	24.0
	sd	26.4	39.5	24.6	35.8
employees without formal qualification	n	2,864,780	1,353,718	585,189	357,996
	mean	16.0	15.8	8.8	11.4
	sd	21.7	27.0	17.8	23.7
(c) Other aspects of employment quality					
Share of ... (%)					
employees aged 50 years or more	n	2,864,780	1,353,718	585,189	357,996
	mean	22.5	17.0	24.3	18.3
	sd	14.4	21.0	16.1	21.1
female employees	n	2,864,780	1,353,718	585,189	357,996
	mean	46.6	51.4	50.6	47.5
	sd	29.5	34.3	30.6	36.2
foreign-born employees	n	2,864,780	1,353,718	585,189	357,996
	mean	8.1	9.9	0.5	1.4
	sd	12.2	19.8	3.0	9.0
median wage[a]	n	2,505,402	1,019,588	539,932	317,504
	mean	65.5	56.3	50.5	45.6
	sd	27.5	31.0	22.1	20.0

[a]Pre-tax daily wages of full-time employees, in €.

Table 2: Summary statistics of quality measures for incumbents and young firms in Western Germany, period 1999-2003. Source: Establishment History Panel, authors' calculations.

	part-time	little[a] part-time	big[b] part-time	marginal employment
(a) Volume/scope of work				
establishment size	0.0001	-0.0014***	0.0015***	-0.0014***
start-up	3.1647***	3.4859***	-0.3212***	-1.9678***
start-up > 20	-0.6831***	-2.4844***	1.8013***	-4.8686***
low-qualified share	0.0036***	0.0181***	-0.0145***	0.0593***
high-qualified share	0.0114***	-0.0329***	0.0442***	-0.0552***
unknown qualification share	0.0671***	0.0756***	-0.0086***	0.1126***
part-time share	—	—	—	0.3151***
marginal employment share	0.6189***	0.7542***	-0.1353***	—
median wage	—	—	—	—
foreigner share	0.0146***	-0.0155***	0.0300***	-0.0676***
elderly share	0.0892***	0.0553***	0.0340***	0.0495***
women share	0.1891***	0.0471***	0.1420***	0.0379***
Prob > χ^2	0.0000	0.0000	0.0000	0.0000
adjusted R^2	0.3554	0.4809	0.1088	0.3242
obs.	5,198,933	5,198,933	5,198,933	5,198,933

	low	mid	high	no formal
(b) Qualification				
establishment size	0.0032***	-0.0042***	0.0012***	0.0036***
start-up	-1.4963***	0.4671***	1.1486***	1.122***
start-up > 20	3.2023***	-2.8967***	-0.1442***	4.1491***
low-qualified share	—	—	—	0.3627***
high-qualified share	—	—	—	-0.0081***
unknown quali-fication share	-0.2106***	-0.7561***	-0.0393***	0.2007***
part-time share	0.0251***	-0.0043***	-0.0130***	-0.1866***
marginal employment share	0.0639***	-0.0486***	-0.0147***	-0.0330***
median wage	-0.0984***	-0.0461***	0.1448***	-0.1446***
foreigner share	0.1632***	-0.1712***	0.0119***	0.1720***
elderly share	-0.0190***	0.0197***	0.0061***	0.0250***
women share	-0.0301***	0.0298***	-0.0025***	-0.1198***
Prob > χ^2	0.0000	0.0000	0.0000	0.0000
adjusted R^2	0.1571	0.5859	0.1535	0.3418
obs.	4,424,393	4,424,393	4,424,393	4,424,393

	elderly[c]	women	foreigners	median wage[d] (€)
(c) Other quality measures				
establishment size	-0.0018***	-0.0016***	0.0020***	0.0117***
start-up	-6.4632***	-4.6676***	1.5462***	-6.8281***
start-up > 20	-4.2588***	-6.1999***	1.7225***	9.0111***
low qualification	-0.0303***	-0.0649***	0.1138***	-0.1051***
high qualification	0.0191***	-0.0214***	0.0352***	0.4364***
unknown quali-fication share	-0.0126***	-0.0662***	0.0767***	-0.0688***
part-time share	0.0062***	0.3510***	0.0168***	—
marginal employment share	0.1550***	-0.0031***	-0.0692***	—
median wage	0.0070***	-0.3267***	-0.0561***	—
foreigner share	-0.0725***	-0.1968***	—	-0.1020***
elderly share	—	-0.0159***	-0.0300***	0.0018***
women share	-0.0124***	—	-0.0637***	-0.1822***
Prob > χ^2	0.0000	0.0000	0.0000	0.0000
adjusted R^2	0.0485	0.3930	0.1473	0.3031
obs.	4,424,393	4,424,393	4,424,393	4,424,393

[a]Less than 18 hours/week [b]Between 18 and 36 hours/week
[c]Employees aged 50 years or more [d]Pre-tax daily wages of full-time employees, in €
***significant at 1% level.
Reference category: Western Germany, manufacturing, 1999, incumbent.
Regressions with intercepts and dummies for industry, year and West/East Germany.
Bootstrapped standard errors with 50 replications.

Table 3: The quality of employment in start-ups and incumbents, Germany, 1999-2003 (Dependent variable: Share of employment group . . . per establishment) Source: Establishment History Panel, authors' calculations.

5 Summary and conclusions

The principal aim of the paper at hand was to provide empirical evidence on the question whether, how, and to what extent new firms differ from incumbents in terms of qualitative aspects of employment relationships. As—to the best of our knowledge—empirical evidence on this particular subject is still scarce (not least because of a lack of adequate micro-level data), we built upon a framework bringing together existing concepts and previous research from both labour economics and industrial dynamics (Mamede, 2008). Unlike other studies, we had access to a dataset including a representative 50%-share of all establishments in Germany with rich information on various aspects of employment inside these entities *and* allowing for distinguishing start-ups and incumbents.

Mainly three principle faces of employment quality have been assessed: Regarding the volume or scope of work, we find that—after controlling for various covariates like firm size, industry- and time-specific effects, among others—younger firms employ a significantly higher share of part-time employees, which can be seen as a sign that young firms rely more upon atypical and flexible employment firms than incumbents do. On the other hand, we find that young firms have a lower share of low-qualified employees than incumbents, which stands in contrast to the foregoing result. Moreover, and in accordance to what we expected, young firms pay lower wages than incumbents (about 7 €per day pre-tax, holding, among others, the qualification structure inside the firms constant). However, only a slight, albeit still highly significant difference regarding the use of high-qualified labour could be found: the share of high-qualified employees in entrants is merely about 1.1 percentage points higher than in incumbents, which is surprising since there is common belief that start-ups are by far more innovative than incumbents. Furthermore, entrants employ significantly less employees aged more than 50 years and less women, but more people with immigrant background.

This contribution leaves space for future research. Besides the question at what point in time newly-founded firms can be considered as incumbents with regard to our measures of employment quality, one may ask about the impact of a firm's resource structure on its post-entry performance or to what extent the human resource structure of a region or a sector affects the respective start-up activities and further economic development. Particularly from the point of view of labour market politics, it may be of interest to what extent start-ups offer employment opportunities for particular groups of the work force—such as elderly, immigrants or women. This could, simultaneously, generate important implications both for potential firm founders and for entrepreneurship policy.

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