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Upgrading of educational qualifications and the effects of social origin in terms of wages: Descriptive insights and a decomposition analysis for Germany

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ABSTRACT

The article examines whether formal educational upgrading after labour market entry attenuates or reinforces the association between social origin and wages in Germany. We use NEPS-SC6-ADIAB data for descriptive and decomposition analyses. The results show that the group of upgraders shows a steeper wage growth compared to non-upgraders. However, although upgrading patterns are somewhat socially selective, differences in upgrading do neither compensate nor reinforce wage gaps between individuals of different social classes of origin over the career trajectory. Instead, initial educational attainment at labour market entry is a strong mediator of the social class wage gap.

1. Introduction

Lifelong learning is considered as a solution to many challenges of our time, such as the shortage of skilled labour in some industries, or the changing need for qualifications due to structural and technical change (e.g. Council of the European Union, 2009). At an individual level, lifelong learning can provide avenues for career progression and the related improvement in someone's economic well-being (Desjardins, 2019). From a perspective on social stratification and mobility, a decisive question is whether it also interferes with the association between social origins and destinations. If either the participation in or the labour market rewards of lifelong learning are unequally distributed, it may affect the level of social mobility within a given society. Depending on which social groups benefit from lifelong learning, these influences may either reinforce existing inequalities or have a compensatory effect. While such questions have been asked in much earlier works already (Müller, 1977), surprisingly few recent studies have followed up on it (e.g. Bukodi & Goldthorpe, 2018, chapter 9, Virdia & Schindler, 2019).

To add more evidence to this research gap, we want to focus on social inequalities in labour market success by social origin and pay attention to the role of formal educational upgrading activities after labour market entry. The term 'formal educational upgrading', hereafter also referred to as 'upgrading', refers to obtaining additional, formal higher-level school-leaving or vocational degrees on top of the initial formal educational degree. Hence, we combine a perspective on *inter*generational social mobility with a perspective on *intra*generational mobility. Previous research shows that social origin is strongly linked with labour market success (Grätz & Pollak, 2016; Müller & Shavit, 1998), with educational attainment being the most important mediator, explaining much of these inequalities (Hillmert, 2011; Kratz et al., 2022). Further education adds a dynamic aspect to this issue as it can change the initial distribution of education and its related labour market effects. We therefore want to find out whether socially selective patterns of acquiring additional educational credentials after labour market entry have a compensating or reinforcing influence on the strength of the association between social origin and labour market outcomes.

While previous studies have mostly considered occupation-based labour market outcomes, such as social class or status (e.g. Virdia & Schindler, 2019), we will provide additional evidence considering wage trajectories. Germany constitutes an interesting test case in this regard. While occupational changes are rather uncommon in this country (Manzoni et al. 2014) – and therefore, the scope for effects on changes in inequalities related to occupational measures is limited – it can be expected that considering wage as an alternative outcome opens new insights into aspects of labour market inequalities in Germany that have not been considered yet. Hence, in this paper, we seek to answer the question of whether formal educational upgrading after labour market entry attenuates or reinforces the strength of the association

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between social origin and wages in Germany, using data on employees covered by the German social security system.

2. Formal educational upgrading in the German context

This article focuses on formal educational upgrading as a form of further education within the wider context of lifelong learning. In contrast to non-formal and informal ways of skill acquisition, formal further education results in a formally recognized degree or certificate (Kruppe & Trepesch, 2017).

Germany provides a distinctive context for examining the influences of formal educational upgrading on labour market outcomes; the key features underpinning this distinctiveness are outlined in this section. Germany's stratified education and training system conveys occupation-specific skills at large parts of the upper secondary level and parts of the tertiary level (e.g. Leuze, 2007) and is often described as vocationally oriented in international comparison (Kerckhoff, 2001). Relatedly, much of the professional skill production process takes place before labour market entry. Access to labour market positions heavily relies on level and type of formal qualifications (Elbers et al. 2021), creating a tight link between formal education and labour market returns. Furthermore, seniority pay is comparatively widespread (Zwick, 2009), particularly in the public sector (OECD, 2005), leading to wage increases over the course of a career, even without any further education measures.

Germany ranks among the least socially mobile countries, with a strong association between social origins and educational attainment (Breen & Jonsson, 2005; OECD, 2025), translating into pronounced inequalities by social origin at labour market entry (Schindler & Bittmann, 2025). In international comparison, Germany displays a low level of intragenerational career mobility, and occupational status hierarchies are highly predetermined by labour market entry (Hillmert, 2016; Manzoni et al., 2014). The strong link between educational credentials and occupations limits the scope for occupational reorientation after labour market entry. If occupational upgrades occur at the individual level, they tend to be related to formal educational upgrading (Virdia & Schindler, 2019). Yet, the German educational system offers various options for upgrading even after entering the labour market, either through part-time training alongside employment or through full-time training during a break in employment. About 20 % of the German workforce upgrade their formal educational qualifications after having entered the labour market (Schindler & Bittmann, 2025).

A first variant of educational upgrading relates to the acquisition of a higher-level qualification within the same occupational domain as the previous degree. In the vocational training sector, for example, there are higher-level vocational degrees that build on previously acquired lower-level ones and provide access to higher-level positions in the same occupational field (e.g. journeyman to master craftsman). A less institutionalised option may comprise the pursuit of higher education studies after having completed vocational training in a related field (e.g. technicians entering engineering). A second variant of upgrading may involve a shift to a higher-level degree in different domains, such as a bank clerk pursuing a degree in medicine, which is usually more time-consuming since prior achievements are not formally recognized. A third variant of upgrading relates to the upgrading of school-leaving qualifications (e.g., acquiring an Abitur after Mittlere Reife), though this occurs mostly before labour market entry (Schindler & Bittmann, 2025).

Hence, the context of our analysis is characterized by a labour market with a high degree of social stratification of the wage distribution among labour market entrants, which, without educational upgrading, can be expected to be rather persistent throughout career progression.

3. State of research

Drawing on cross-national evidence, Kilpi-Jakonen et al. (2015) conclude that adult education plays a negligible role in alleviating social inequalities associated with educational attainment in almost all countries. The few studies that consider the contribution of formal upgrading to the relationship between social origin and labour market returns suggest that it does not reduce social inequality. Virdia and Schindler (2019) demonstrate that educational upgrading in Germany does not reduce social origin-based inequality in occupational status. Other studies indicate that lifelong learning can increase cumulative advantages for persons with privileged social backgrounds (Bukodi et al., 2019; Gloster et al., 2015; Kosyakova & Bills, 2021). As outlined in the introduction, social inequality may be shaped by unequal participation in educational upgrading and the labour-market returns resulting from it. In previous studies, the two aspects are mostly considered separately.

Regarding the former, the existing body of empirical research on the association between social origin and participation in educational upgrading remains limited. Most studies consider upgrading processes before labour market entry and focus on the "at-risk" subpopulation of those who are able to undertake upgrades because they have not reached the highest level of education. They reveal that upgrading rates are higher among individuals from privileged social backgrounds (Glaesser & Cooper, 2011; Schuchart, 2006; Trautwein et al., 2011). Studies focusing on the total population report no or only small compensatory influences of educational upgrading on the level of social inequality in the educational distribution (Schindler, 2015). Studies that do not distinguish between participation in formal further education prior and after labour market entry show equivalent results for the at-risk population (Biewen & Tapalaga, 2017; Dietrich et al., 2019; Jacob, 2004). Among the studies investigating upgrading after labour market entry, Weiss (2019) shows disadvantages in re-enrolment in post-secondary education for disadvantaged social classes in Sweden and the US, but not in Germany. Studies on other countries also indicate advantages for privileged social origins (Bukodi, 2017 for the UK, Kosyakova & Gerber, 2019 for Russia, Hällsten, 2011 for Sweden). A comparative study by Lee and Desjardins (2019) indicates significant results in favour of individuals with advantaged social backgrounds for some of the countries but not for others.

Regarding the returns to educational upgrading, almost all previous studies report positive influences of upgrading on labour market outcomes. In their review article, Kosyakova and Bills (2021) state that upgrading is typically associated with higher wages in many countries. For the German context, Hammen (2011) also finds evidence of this pattern. In a recent descriptive study, Schindler and Bittmann (2025) show a positive association between upgrading and wages. Similarly, Thomas (2013), focusing on individuals who have completed dual training, demonstrates that upgrading is associated with higher wages – the more so the higher the initial level of education. Previous studies on other countries have predominantly demonstrated favourable outcomes of adult education, as shown for Sweden (Hällsten, 2012), the UK (Blanden et al. 2012), and Finland (Kauhanen & Virtanen, 2021). Only the study by Jenkins and colleagues (2003), conducted in the UK context, reports largely non-significant effects.

While the empirical evidence on our research question is still scarce, the previously identified patterns suggest that, while educational upgrading appears to be associated with labour market benefits, it seems to be socially selective. The few studies that consider how upgrading influences the association between social origin and labour market outcomes overall tend to focus on non-monetary outcome measures, such as social class or status. We know little about how upgrading influences wage inequalities by social background. In contrast to non-monetary outcomes, wages tend to increase with labour market experience at different rates for different occupations, which might lead to more complex dynamics (cf. Figure A1, panels A and B in the appendix). For that reason, it will be desirable to explore whether the influence of

educational upgrading will be different when considering wages as an outcome. In the remainder of this article, we want to address this research gap. In the subsequent section, we will present theoretical arguments regarding the potential influence of educational upgrading on the level of social inequality in terms of wages.

4. Theoretical approach

4.1. Educational upgrading and wage returns

Educational upgrading after labour market entry can increase wages via two mechanisms: first, it can lead to mobility into higher-paying jobs and occupations; second, it raises wages within the same occupation, or even within the same job. In Germany's highly occupationalized labour market, it can be assumed that the first mechanism primarily drives wage benefits from educational upgrading (cf. Virdia & Schindler, 2019). Formal educational qualifications are closely connected to occupations and their related labour market outcomes (DiPrete et al. 2017). In the public sector, but also in collective labour agreements, wages are often categorized by qualifications with higher education degrees yielding higher wages than lower-level vocational degrees, while those without vocational degrees earn the least (Ammermüller & Weber, 2005; Friedrich & Horn, 2018). Upgrading vocational degrees typically leads to greater labour market returns than upgrading school-leaving degrees (Schindler & Bittmann, 2025). Although the second mechanism, wage increases within the same occupation, seems less relevant in Germany, differences in skills and productivity associated with different levels of formal educational attainment (Rammstedt et al. 2023) may lead to wage benefits, especially in less regulated labour market segments. In rare cases, salary schemes might also increase wages within jobs or occupations when they are bound to formal qualification categories.

While upgrading is expected to lead to individual wage premiums, it does not necessarily mean that upgraders receive the same wage levels as persons who have acquired the same qualification as their initial qualification. As wages tend to increase with job experience (Mincer, 1974), wages of upgraders always lag behind the wages of persons who hold the same qualification for longer and thus benefit from cumulative advantage processes (DiPrete and Eirich, 2006, see Fig. A1, panel C in the appendix). This holds particularly in labour markets such as Germany where seniority payments are common (Zwick, 2009).

4.2. The association between social origins and wages over the life course and the role of educational upgrading

In Germany, the average level of formal education with which individuals enter the labour market differs considerably according to social origin (Manzoni et al. 2014). Consequently, the allocation of jobs and wages of labour market entrants are stratified by social origin (Hillmert, 2011). Through cumulative advantage processes, it can be expected that, even in the absence of any formal educational upgrading activities, these wage inequalities by social origin tend to increase over the life course. The reason is that higher-level jobs are more likely connected with non-formal training (dos Santos et al., 2024), internal labour markets and career progression (Doeringer & Piore, 1971), and associated with steeper wage growth.

A distinct explanation for the increasing wage-gaps based on origin may arise from disparities in resources and opportunities among individuals from different social backgrounds, regardless of their previous position in the labour market. Such disparities can include firstly, social capital (Lin, 2001), as higher-class network partners can be particularly beneficial for highly educated adult children (Kratz et al. 2022, p. 867), providing direct or indirect contacts to gatekeepers for available positions and potentially offering an information advantage (Granovetter, 1995; Lin, 1999). Secondly, privileged classes may benefit from being better equipped with economic resources that, for example, enable prolonged job searches (cf. Mortensen, 1986). Thirdly, the cultural codes of individuals from privileged backgrounds may for example offer advantages in salary negotiations (Friedman & Laurison, 2020).

The core question that concerns us in this paper is whether educational upgrading activities have a compensating or reinforcing influence on this process. The combination of three key factors is decisive for the effect of educational upgrading processes on wage inequalities by social origin.

The first factor concerns differences by social origin in the *propensity of educational upgrading*. Larger fractions of the privileged social groups face ceiling effects due to their higher initial educational attainment, meaning they have already reached the highest possible level of education. This means that larger fractions among the disadvantaged social group are still 'at risk' of upgrading. However, in accordance with the theoretical arguments from relative risk aversion (Breen & Goldthorpe, 1997) and compensatory advantage theory (Bernardi, 2014), one could assume that individuals from higher social origins have both higher incentives and better resources to accomplish educational upgrading. Alternate approaches focus on the 'barriers' that hinder upgrading (Boeren, 2023; Rubenson & Desjardins, 2009). Similar to the compensatory advantage mechanism, individuals from privileged social backgrounds should be less affected by situational barriers. Situational barriers include, for example, family responsibilities or scarce resources (Boeren, 2023). Similarly, institutional barriers, like the requirement of educational certificates (Rubenson, 2010), restrict access to certain programmes and disproportionately affect individuals from lower backgrounds who possess fewer formal qualifications. Dispositional barriers (Rubenson, 2010), such as lack of confidence in one's own capabilities to succeed or low interests in education, might be more common among persons from low educated or working class backgrounds (Rubenson & Desjardins, 2009). Finally, informational barriers regarding the opportunities and rewards of adult education should also be more prevalent among persons of disadvantaged social origin (Boeren, 2016). Taken together, the postulated differences in the ceiling effects and the differences in upgrading motivations and barriers might cancel each other out, so that overall disparities in the unconditional upgrading propensities should be of minor importance.

The second factor relates to social differences in the *'quality' of the upgrades*. Upgrading may be associated with different wage premiums. In general, upgrades spanning many educational levels should be associated with larger premiums than those involving fewer levels, and vocational upgrades are likely more rewarding than mere upgrades of school-leaving degrees, for the reasons stated above. To what extent these processes influence differences in the returns to upgrading between social groups depends on how their group-specific upgrading patterns are distributed. There is no a priori theoretical reason to assume that the ratio between upgrades to school-leaving and vocational degrees differs by social background, which is backed by empirical evidence (Virdia & Schindler, 2019). Although individuals from disadvantaged backgrounds have a greater potential for long-range educational upgrades due to initial educational distributions, this does not necessarily translate into upgrading behaviour. Such upgrades require sequential training periods in different contexts, resulting in considerable costs, such as direct expenses like fees, as well as opportunity costs such as foregone income. Individuals from disadvantaged backgrounds may not be able to bear these costs. In addition, the barriers discussed above (see factor 1) come into play here as well, as they not only hinder participation in general but also make engagement in upgrades spanning multiple educational levels more costly in financial, time-related, and psychological terms. In addition, individuals from privileged backgrounds might have greater incentives for long-range upgrades and upgrades to higher education degrees due to status maintenance considerations. Taken together, this second factor might play out in favour of a reinforcement of social differences in wages.

The third factor concerns differences by social background in the *'exploitation' of upgrades*, where the same type of upgrade is associated

with larger wage premiums for one social group than for another (interaction effect). This may be attributed to the disparities in resources and opportunities (see above), including social capital (Lin, 2001), economic resources, or cultural codes (Friedman & Laurison, 2020). Additionally, it can be assumed that different social origins make different choices (Breen & Goldthorpe, 1997), as evidenced, for example, by the selection of different fields of study (Reimer & Pollak, 2010), which are associated with varying outcomes (Jacob & Klein, 2013). However, prior research has shown that such direct associations between social origins and social destinations, which are independent of educational attainment are of minor relevance in Germany (Grätz & Pollak, 2016). It can thus be concluded that disparities by social origins in the returns to upgrading after entering the labour market do not have a substantial influence on the association between social origins and labour market returns.

Whether formal educational upgrading processes have a compensating or a reinforcing influence on the association between social origin and wages overall depends on the interplay of these three factors. The theoretical arguments suggest a reinforcing effect, mainly due to quality differences in upgrading. However, the potential of the postulated mechanisms appears to be rather weak. Given the low overall incidence rate of upgrading, it might not change much in the association between social origin and wages. However, if this were the case, the effect would probably manifest in a further widening of the inequality gap between individuals of different social backgrounds. Therefore, we hypothesise that: *Upgrading of formal educational qualifications reinforces wage inequalities by social origin* (hypothesis).

5. Data and methodology

5.1. Data and sample

Our analyses employ the linked NEPS-SC6-ADIAB dataset, which combines survey data from the German National Educational Panel Study (NEPS)[1] with administrative data from the social security system, provided by the Institute for Employment Research (IAB, Bachbauer & Wolf, 2022). We utilise NEPS-SC6 data (NEPS Network 2021, 2022), up to Wave 12 which encompasses retrospective life course data from 17,139 individuals born between 1944 and 1986. A prerequisite for data linkage is the respondents' consent. Administrative data offer detailed and reliable information on gross daily wages in euros, derived from employers' social insurance notifications (Bachbauer & Wolf, 2022: 57). Approximately 73 per cent of respondents have linked administrative data. Wages above the upper earnings limit for the statutory pension insurance are right-censored, while those falling below the marginal earnings limit are left-censored until 1999. Unlike the NEPS data, the data derived from the social security reports do not include data on soldiers, self-employed individuals, freelancers, or civil servants and are only available from 1975 for West Germany and 1992 for East Germany, with marginal employment data available only since 1999. Contractual and working hour details are present in the NEPS data but absent from the administrative records.

Our analysis data includes individuals born between 1959 and 1978, excluding older birth cohorts due to the availability of wage data in the administrative records, which only date back to 1975. Individuals with higher levels of education typically enter the labour market at a later age than those with lower levels of educational attainment. Thus, those with higher levels of education would be heavily overrepresented among the older cohorts in the sample, as availability of wage data at the time of labour market entry is a prerequisite. Younger birth cohorts are also excluded to avoid underrepresentation of individuals with higher education. Additionally, individuals younger than 14 or older than 45 years at their labour market entry are excluded, along with those lacking information on their social origin or who obtained their first school degree outside Germany.

Labour market entry is defined as the year an individual starts their first significant job, lasting at least 12 consecutive months and requiring a minimum of 20 h per week, without simultaneous engagement in education, vocational training, military or civilian service. If the individual lacks an educational degree at labour market entry, the condition must also be met that no time has been spent in the education system or in military or civilian service for a total of 36 consecutive months. We observe individuals from their entry into the labour market for a maximum of 20 career years, tracking their career duration until the observation period ends or they are right censored after 20 years. The observation period may be shorter if individuals withdraw from the study, no longer meet inclusion criteria (e.g., available wage data), or if fewer than 20 years have passed since their labour market entry at the last interview. Cases with less than five years available were excluded from the sample.

Wage information must be available within the first 12 months after labour market entry. Administrative data exclusively encompasses wages for dependent employees, excluding individuals who entered the labour market as self-employed individuals or civil servants. As wage data for East Germany are only available from 1992 onwards, individuals who entered the labour market prior to this date are only included if they entered the labour market in West Germany. In terms of place of work, Berlin is considered as part of West Germany until 1991 and as East Germany from 1992 onwards (Stüber et al. 2023: 59). If the place of work is missing from the administrative data for one year, but available for prior or subsequent periods, that data is used. Cases without information on the region of the establishment are excluded.

Our analyses are based on two samples covering the career of individuals from labour market entry, spanning the calendar years 1973–2019. The main sample includes NEPS-SC6-ADIAB data for all analyses involving wages. Due to strict conditions for the use and publication of administrative data, tables and graphs cannot be published for individual categories with case numbers below a certain threshold. For that reason, we draw on a second auxiliary sample, which is based on the standard NEPS-SC6 data und which is not subject to these restrictions. We will employ this sample for all descriptive analyses that do not involve wages. Since ID information cannot be transferred from the secure environment of the Research Data Centre to outside, it is not possible to restrict the auxiliary sample (NEPS-SC6) to the same IDs as in the main sample (NEPS-SC6-ADIAB).[2] The main sample (NEPS-SC6-ADIAB) includes 70,241 person-year observations from 3969 individuals, of which 2621 were observed for the full 20-year period, while 1348 individuals contribute fewer than 20 years. This right-censoring occurs for two reasons: first, some individuals exit the survey or the labour market before reaching 20 years; second, for 318 individuals, fewer than 20 years have elapsed since their labour market entry, meaning their 20th career year is not yet observable. The auxiliary sample (NEPS-SC6) includes 87,915 person-years from 4873 individuals, with 3626 observed for the full 20 years. A total of 1247 contribute less data including 413 individuals, for whom fewer than 20 years have passed since their labour market entry, so their 20th career year is unobservable.

[1] This paper uses data from the National Educational Panel Study (NEPS; see Blossfeld & Roßbach, 2019). The NEPS is carried out by the Leibniz Institute for Educational Trajectories (LIfBi, Germany) in cooperation with a nationwide network. NEPS-SC6 builds on the earlier ALWA pre-study (IAB 2007/08).

[2] We aimed to closely reconstruct the NEPS-SC6-ADIAB sample within the NEPS-SC6 sample. However, due to missing or implausible data in the social security files, we had to exclude some observations from the former that cannot be identified in the latter.

5.2. Operationalisation

Formal educational upgrading is defined as successfully obtaining a higher level of formal education after entering the labour market. Education is measured by combining school and vocational degrees, including higher education. Using data from the NEPS dataset, we created a variable that categorises typical German school-leaving and vocational degrees into 11 categories, adapted from CASMIN (Zielonka & Pelz, 2015). School qualifications include: no school degree, basic (Hauptschule/CASMIN 1b), intermediate (Mittlere Reife/CASMIN 2b), and high (Abitur or Fachhochschulreife/CASMIN 2c_gen). Vocational degrees comprise (see appendix Table A1): no vocational degree, vocational training (VOC1), higher-level vocational training (VOC2) and higher education (HE). Only successfully completed and recognised qualifications are considered, resulting in 11 empirically existing final educational degree categories (see Table A1 and Table A2 in appendix), with higher education being the highest qualification, regardless of prior school qualification and whether it is a university or a university of applied sciences degree. We distinguish five categories for upgrade destinations: no upgrade, school upgrade only, VOC1, VOC2, and HE. Our primary focus is on vocational upgrades (VOC1, VOC2 and HE). The upgrade variable reflects only the highest upgrade, with school upgrade ranked lower than vocational upgrades.

The main outcome variable analysed in this paper is the gross hourly wage. To prepare the wage data (see appendix B for details), we follow the procedure of Stüber et al. (2023) and, in some parts, Reichelt (2015). Due to the lack of wage information below the marginal earnings threshold until 1999, we delete all wages below this threshold for subsequent years (Reichelt, 2015) to maintain a consistent sample. Right-censored wages above the income threshold are imputed. Next, we link survey data with administrative data, following Reichelt (2015). To assign wages in the administrative data to the defined main episodes of the NEPS data, we follow the construction of individual wage histories by Reichelt (2015): 8ff.) and smooth wages over time. This means that the wage information no longer corresponds exactly to individual spells, but gaps can be filled and outliers smoothed out. This is done by regressing daily wages on time polynomials per person, with predictions for wages after the last observed information excluded from the analysis. Daily wages are converted to hourly wages based on working hours from the NEPS data, assuming that contractual working hours remain constant throughout the employment period, which may be problematic especially for women (Reichelt, 2015: 12). If contractual working hours are missing, we use data for fulltime employed individuals from the NEPS and NEPS-SC6-ADIAB datasets and set working hours to 38. Finally, we exclude wages above the 99th percentile.

Social class of origin, the main independent variable, is based on the EGP class scheme (Goldthorpe, 2000) to ensure comparability with previous studies on social mobility (e.g. Virdia & Schindler, 2019), where it serves as a common measure. EGP class information is available for both parents in the NEPS data, unless missing. We employ a threefold classification, resulting in categories: salariat class (EGP I and II), intermediate class (EGP IIIa, IV, and V), and working class (EGP IIIb, VI, and VII) using the highest (available) social class of the parents. Additionally, we conduct separate analyses for two birth cohorts: 1959–1968 and 1969–1978. We provide an overview of the sample descriptives in the appendix (Table A4).

5.3. Analytical strategies

Our analyses proceed in two steps. First, we conduct descriptive analyses to provide an overview of key structural patterns and relevant factors related to our theoretical reasoning. Second, we perform multivariate analyses to test our hypothesis, employing decomposition models based on OLS-regressions to account for differences in wage growth over the career by social origin. Wage is operationalized in different forms in the different types of analyses: In the descriptive analyses, we use the gross hourly wage directly. The variables used in the decomposition analyses reflect wage gains (the difference in hourly wage between labour market entry and various points throughout the career). The decomposition analyses display the differences in these wage gains between social classes of origin and estimate to what extent differences in educational upgrading account for them.

Using a threefold decomposition approach (Blinder, 1973; Kitagawa, 1955; Oaxaca, 1973), we decompose group differences into three parts (Jann 2008a: 455): the endowments part captures differences in variable distributions between the groups (e.g. educational upgrading patterns), the coefficients part addresses differences in relationships between explanatory and outcome variables, and the interaction part accounts for jointly existing differences in characteristics and coefficients (Jann 2008a: 455). We report only the overall contributions of our explanatory variables, with detailed decomposition tables in the appendix (Tables A8-A19).

Separate decomposition models are run for each career year to decompose the respective gap in the wage growth between the salariat and working classes (salariat and intermediate classes, see appendix) examining the extent to which differences in educational upgrading account for that gap. We control for the education degree at labour market entry, place of birth (former West German federal states, former east German federal states or abroad), gender and birth cohort, using only control variables unaffected by upgrading. To address the identification problem with categorical predictor variables in the decomposition, we normalised them using Yun's method (Yun, 2005). All analyses were conducted with Stata 17 using the *oaxaca* command (Jann, 2005, 2008a,b).

We conduct the main analyses separately by birth cohort, because we expect heterogeneous effects given that the younger age groups have a higher level of education, and their career paths fall into a period with a wider range of formal further education opportunities. Furthermore, we perform sensitivity analyses by gender, as we expect heterogeneous effects, because gender differences in educational and occupational careers have become less pronounced.

6. Analyses

6.1. Descriptive results

The first step sets out to examine the differences in wage development since entering the labour market for the different groups of social origin. Fig. 1 illustrates this development for both birth cohorts. In the older birth cohort, we observe a persistent and widening gap between the salariat and both other classes of origin. Individuals from the salariat classes show the highest average wages, while those from working classes the lowest. Individuals from the intermediate classes are located in-between, but closer to the working classes. In the younger cohort, the class gap is narrower and does not widen with age. In later years of the career, the average wages of working classes are similar to those of the intermediate classes. As already pointed out, the data for the younger cohort should be treated with caution, as individuals with higher qualifications might be underrepresented in the later years of one's career.

Fig. 2 illustrates wage trajectories by qualification level at labour market entry for individuals who upgraded their qualifications and those who did not. By definition, it is not possible to upgrade from HE. The number of upgrades from VOC2 is too low to allow for an acceptable estimation of their wage trajectories. Therefore, VOC2 and HE are included only for non-upgraders and serve as references. The figure shows wage differences based on individuals' initial degrees, indicating that, generally speaking, higher degrees lead to higher wages. Individuals holding a higher education entrance qualification, but no vocational degree stand out with higher wages compared to persons with a vocational qualification. Most likely, this is due to selection processes into rewarding niche jobs (e.g. in the ICT sector) that do not require formal vocational credentials. Wage growth varies over initial

Fig. 1. Mean wage over career by social origins.
Note: N: 3969. Main sample (NEPS-SC6-ADIAB).

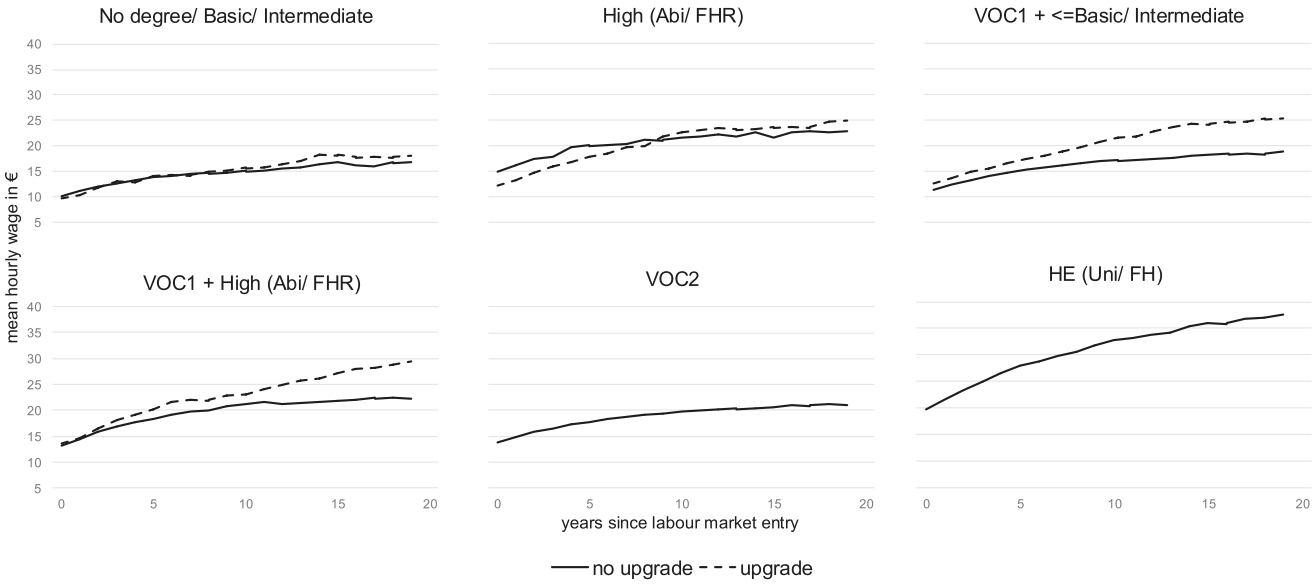

Fig. 2. Mean wage over career by initial degree.
Note: N: 3969. Main sample (NEPS-SC6-ADIAB). No degree: no vocational degree and no school degree, Basic: no vocational degree + basic school degree, Intermediate: no vocational degree + intermediate school degree, High: no vocational degree + high school degree, VOC1 + < =Basic: VOC1 (vocational training degree) + no or basic school degree, VOC1 + Intermediate: VOC1 + intermediate school degree, VOC1 + High: VOC1 + high school degree, VOC2 + < =Basic: VOC2 (advanced vocational training degree) + no or basic school degree, VOC2 + Intermediate: VOC2 + intermediate school degree, VOC2 + High: VOC2 + high school degree, HE: higher education degree, Abi: Abitur, FHR: Fachhochschulreife.The group of upgraders includes all individuals who have ever completed an upgrade within the observation period or after 20 career years at the latest. As there are very few people upgrading an upper vocational training qualification (VOC2), these figures are not shown here.

degrees, with the steepest growth for individuals holding a higher education degree. Individuals who upgrade their qualification earn more than non-upgraders, on average, with individuals upgrading from a VOC1 qualification showing the highest wage increase. An exception occurs for individuals with a high school degree but no vocational degree, as higher wages for the upgraders emerge only in later career stages. However, it is not possible to determine whether the premiums associated with upgrading are causally related to upgrading from this descriptive presentation. To illustrate this point, consider the category of individuals with a basic or intermediate school degree and a VOC1 degree as their initial degree. It is evident that the wages of individuals who upgrade are slightly higher at the time of entering the labour market than those who never upgrade. This suggests the presence of selection effects in the context of upgrading.

Assuming that the combination of three key factors (see 4.2) is decisive for the effect of educational upgrading processes on wage inequalities by social origin on the macro-level, the next steps will present several descriptive analyses to explore this issue. The first factor addresses differences in educational upgrading propensities among social classes of origin. Table 1 illustrates the distribution of initial degrees by social background for the two birth cohorts to indicate differences in the 'at-risk populations' for upgrading. In both cohorts, the distribution of educational degrees at labour market entry shows the typical social gradient: individuals from the salariat classes show the highest share of higher education qualifications while those from the working classes are overrepresented in the lower parts of the educational distribution. Individuals from intermediate classes are positioned in between. The results demonstrate that a larger proportion of individuals from privileged social backgrounds have already attained the highest level of education upon entering the labour market, thereby facing ceiling effects, while a higher proportion of individuals from disadvantaged backgrounds is still 'at risk' of upgrading.

Table 2 shows the shares of educational upgrading by birth cohort. The two parts of the table differ only in the definition of the total: the

Table 1
Initial degrees by social origin and birth cohort, in percent.

	1959–1968				*1969–1978*			
Vocational + School	Salariat	Interm.	Working	Total	Salariat	Interm.	Working	Total
No degree	0.6	0.5	1.4	0.9	0.1	0.2	2.0	0.8
Basic	1.0	2.5	5.9	3.3	1.1	3.1	6.0	3.3
Intermediate	3.6	4.8	4.4	4.2	3.4	4.8	5.9	4.6
High	6.9	3.9	3.6	5.0	5.1	3.6	2.0	3.7
VOC1 + < =Basic	8.2	17.9	28.6	18.3	5.5	15.5	22.3	13.5
VOC1 + Intermediate	22.1	29.1	29.2	26.4	21.6	33.1	32.8	28.0
VOC1 + High	13.3	11.5	6.9	10.4	14.0	10.6	9.5	11.7
VOC2 + < =Basic	0.8	1.1	1.3	1.0	0.6	1.0	1.4	1.0
VOC2 + Intermediate	5.1	7.0	5.3	5.6	6.3	6.0	4.8	5.7
VOC2 + High	5.0	4.5	3.0	4.1	6.6	5.6	3.3	5.2
HE	33.3	17.3	10.5	20.8	35.7	16.4	10.1	22.6
	N = 2972				*N = 1901*			

Note:
N: 4873.
Auxiliary sample (NEPS-SC6).
Class of social origin: Salariat = Salariat I + II, Interm. = intermediate class, Working = working class.
Vocational + School = vocational degree + school degree, see Fig. 2.

Table 2
Educational upgrading rates by social origin in per cent.

	Persons without HE as initial degree		*All persons*	
	1959–1968	1969–1978	1959–1968	1969–1978
Salariat	24.4	23.8	16.3	15.3
Interm.	19.2	19.7	15.9	16.4
Working	17.3	18.1	15.4	16.3
Total	20.0	20.5	15.9	15.9
	N = 3825		*N = 4873*	

Note: Auxiliary sample (NEPS-SC6).
Persons without HE as initial degree: Only persons who did not acquire HE as initial degree.
All persons: the whole sample, regardless of any initial degree qualification.

left-hand side of the table presents upgrading rates based on the sample of individuals who are still at risk of upgrading, i.e. those who have not yet obtained a higher education degree. The right-hand side displays upgrading rates based on the entire sample, including those who already obtained a higher education degree as initial degree. When only considering those at risk of upgrading (left columns), individuals from salariat class families exhibit higher upgrading rates compared to those from the other two classes. This pattern is similar in both cohorts, although the gaps are somewhat larger in the older cohort. These differences in the upgrading rates of the at-risk populations indicate that individuals from salariat class families exploit opportunities of upgrading more than those from the other two classes, aligning with our expectations regarding behavioural differences. Considering the entire sample (right columns), the upgrading rates across categories of social origin are more similar in both cohorts. In the younger cohort, overall upgrading rates among the salariat class are even slightly lower than those in the other two classes. This indicates that the differences in the at-risk populations and the behavioural differences largely cancel each other out. Hence, the differences in the mere incidences of upgrading overall cannot be expected to produce substantive changes in social wage differentials over the life course.

The second key factor relates to the quality of an upgrade. Table 3 shows the destinations of upgrades by social origin. As most upgrades after labour market entry involve vocational qualifications (*VOC1*, VOC2, *HE*, cf. Schindler & Bittmann, 2025), the focus is on these qualifications. These upgrades may also include simultaneous upgrades of school-leaving degrees, which are not differentiated here. Upgrades that only comprise an upgrade of a school-leaving degree (basic, intermediate, high) are classified into one category *school degree only*. For both cohorts, this analysis indicates that upgrading to higher education is most prevalent among individuals with salariat class origin, and least prevalent among those with working class origin. Upgrades to VOC1 and VOC2 are more widespread among individuals of intermediate or working class background.

Factor 3 addresses differences in the exploitation of qualifications based on social background. In order to illustrate this point, it would be necessary to present the wage premiums for the different upgrade categories by social origin. However, the number of observations in several cells is too small to allow for a reliable estimation of social class

Table 3
Educational upgrading rates by destinations and social origin in per cent.

	1959–1968				*1969–1978*			
Final upgrade	Salariat	Interm.	Working	Total	Salariat	Interm.	Working	Total
HE	4.7	3.4	1.9	3.3	5.2	2.9	2.1	3.6
VOC2	8.7	8.9	9.6	9.1	8.1	10.1	10.1	9.3
VOC1	1.6	2.0	2.8	2.2	1.3	1.9	2.4	1.8
School only	1.2	1.6	1.1	1.2	0.6	1.4	1.7	1.2
No upgrade	83.8	84.1	84.6	84.2	84.7	83.6	83.7	84.1
	N = 2972				*N = 1901*			

Note: N = 4873.
Auxiliary sample (NEPS-SC6).
See Table 1.
HE: the final upgraded degree was a higher education degree.
VOC2: the final upgraded degree was an advanced vocational training degree.
VOC1: the final upgraded degree was a vocational training degree.
School degree only: a (higher) school degree was acquired by upgrading but not a vocational degree.

differences, and we wouldn't be able to differentiate a null finding (as expected) from a statistically insignificant result. For that reason, we abstain from displaying a corresponding descriptive analysis. Nonetheless, we have already gained some insights regarding the first two factors. While differences in the quality of upgrading appear to act reinforcing on social inequalities in both cohorts, the patterns regarding the overall upgrading rates seem neutral in the older cohort but show a minor compensating potential in the younger cohort. This might explain to some extent the different cohort patterns that we observe in Fig. 1.

6.2. Educational upgrading and social stratification over the life course

This final analysis investigates whether and to what extent differences in upgrading patterns[3] across social classes of origin act reinforcing or compensating on the development of wage gaps over the career. Our descriptive analyses have already provided some clues on at least two of the three factors that we have theorised to be relevant in this regard. The decomposition analyses now consider the contribution of these factors jointly in an integrated analysis.

Figs. 3 and 4 present the decomposition results for the 1959–68 and 1969–78 cohorts, respectively. In the decomposition models, the dependent variable is the wage difference between labour market entry and each career year. We then decompose these differences in the average wage growth between individuals of salariat and working class origins (results for the contrast between salariat and intermediate class origins are provided in the appendix). The black bars indicate the gap in the wage growth between the two classes for each career year, while the light grey bars indicate the share of these differences accounted for by our five-category variable indicating differences in upgrading between classes, and the dark grey bars reflect the share of the differences that is accounted for by initial degrees.

Fig. 3 shows that much of the widening of wage gaps between social origins in the older cohort over the career is attributable to the initial level of education at labour market entry. This indicates that different educational degrees are associated with differences in wage growth over the career. A closer inspection of the decomposition results (cf. Table A8) reveals that the contribution of the initial degree is predominantly due to endowment differentials: the more beneficial distribution of initial education among individuals from salariat class backgrounds accounts for their steeper wage growth over the career compared to those from working class backgrounds. While the explanatory contribution of initial education appears rather stable across the career trajectory, the contribution of upgrading is more irregular and not significant. First, if there is any indication of a contribution of upgrading to the widening of wage gaps between social origins over the career, it is mostly negative, suggesting that, in these cases, upgrading tends to benefit individuals with working class backgrounds: thus, the wage gap between social origins would have been larger if the upgrading patterns were identical for both groups. However, none of these contributions can be considered statistically significant according to conventional standards (cf. Table A8). Second, the volatility of contributions across the career suggests that unequal changes in the upgrading patterns between the groups from one year to the next have a strong influence on the estimation of the explanatory contributions in the decomposition models, which might again be a consequence of missing statistical significance. This might also be reflected by the fact that not endowment differences but (non-significant) differences in the coefficients are driving these results (cf. Table A8). Hence, we conclude that social differences in the initial level of education but not any differences related to educational upgrading, account for the growing wage gap between individuals of salariat and working class origin over the career that we can observe for the 1959–68 cohort. We would draw a tentatively similar conclusion regarding the contrast between persons of salariat and intermediate class origin. However, the explanatory contribution of the initial degree accounts for increasingly smaller parts of the gap at later stages of the career (cf. Table A9). Additional analyses separately by gender (cf. Tables A12-A15) suggest that much of these patterns that we observe for the 1959–68 cohort are driven by men. For women, there is no significant wage gap between social origins at all. However, it should be borne in mind that these women were born at a time when women's life courses, with their strong focus on family and housework, were very different from those of men and, moreover, from those of women today. For more recent cohorts, the results for women may therefore be different.

The situation is different for the cohort born 1969–78. Here, we only observe a widening wage gap between persons of salariat and working class origin during the early years of the career. After career year 11, the differences are not statistically significant according to conventional standards (cf. Table A10). We already pointed out that, most likely, this is due to sample selection as we under-capture persons with higher-education degrees with long-term labour market experience. For that reason, we will only interpret results up to ten years after labour market entry. As Fig. 4 shows, the wage gaps between individuals of salariat and working class origin are even somewhat larger for the younger cohort than for the older one during the first seven years of a career. Again, the initial level of education accounts for the widening gap between social origins during the early years of the career. During these years, we also observe in most cases negative contributions of educational upgrading as we did for the older cohort. Negative contributions of educational upgrading mean that the differences in upgrading patterns are beneficial for individuals of working class origin. However, most of these contributions do not turn out statistically significant according to conventional standards (cf. Table A10). We observe positive contributions of educational upgrading as of year seven. This would mean that at later stages of the career, differences in upgrading patterns between social origins contribute to a growing wage gap between individuals of salariat and working class origin. However, these contributions are statistically not significant in most cases. Furthermore, the largest contributions appear after career year 10, when sample selection starts to become an issue. Like for the older cohort, a closer inspection of the decomposition results reveals that, in particular, differences in the coefficients are driving the results. Hence, with all due caution, we might conclude that, in the early years of the career, upgrading pays off more for individuals of working class origin, while in the later years of the career, it appears to pay off more for individuals of salariat origin. Similar analyses for the contrast between individuals of salariat and intermediate class origin reveal less interesting insights (cf. Table A11). During the early years of the career, the wage gap between the two classes remains rather constant (cf. Fig. 1). Although the contribution of educational upgrading has been negative for these years, it has not been statistically significant according to conventional criteria in most cases. As with the older cohort, we also observe for individuals born 1969–78 that wage differences between social classes of origin are predominantly driven by men. In separate analyses by gender (Tables A16–19), we do not find any significant wage differences between social origins over the career among women.

6.3. Sensitivity analyses

The composition of the sample changes over the course of a career (see Table A4) due to individuals leaving the NEPS panel study, exiting the labour market, or transitioning to self-employment, civil service positions, and so on. Another relevant issue is the underrepresentation of highly educated individuals over time, as the proportion of individuals with higher education qualifications decreases for both initial and final degrees (see Table A4). To assess the impact of right-censoring and changes in sample composition on the results, we repeated the decomposition analyses using only the 2621 individuals who could be tracked

[3] The timing of which individuals upgrade is very similar across different social classes of origin (compare Fig. A2 in the appendix).

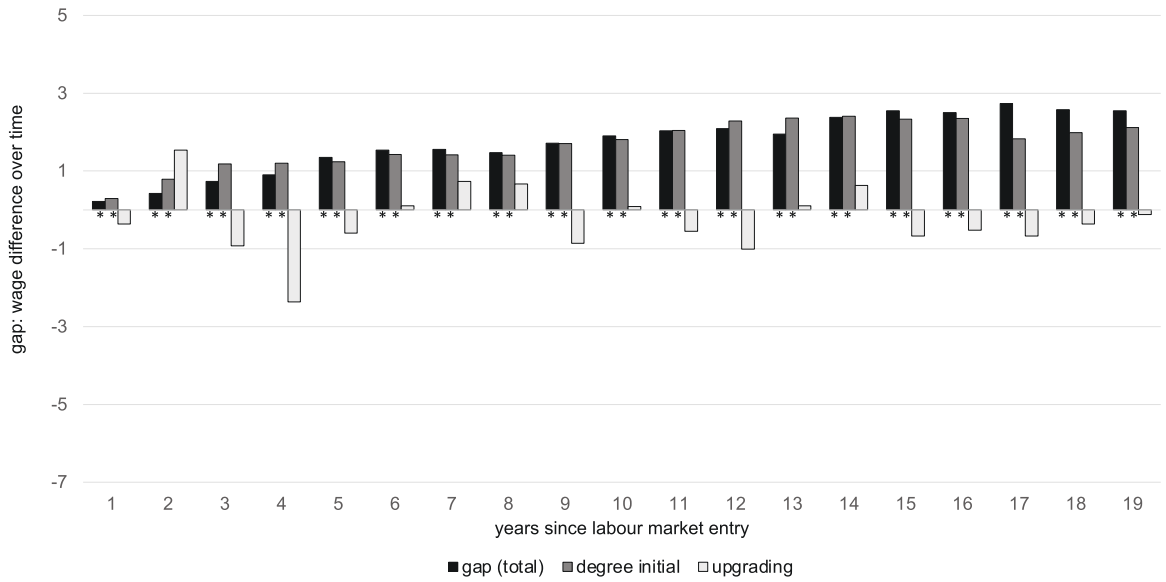

Fig. 3. .Gap between salariat and working class in mean hourly wage growth over time in Euros for birth cohort 1959–68
Note: Compare Table A8 in appendix.The contributions presented in Figs. 3 and 4, as well as in Tables A8-A27 in the appendix, do not necessarily add up to the observed class wage gap in a straightforward manner. In decomposition analyses, individual components may contribute positively or negatively to the gap and can therefore offset one another. It is also important to note that the figures and tables display only the contributions of initial degree and upgrading, while the decomposition models additionally include a range of control variables whose contributions are not shown.

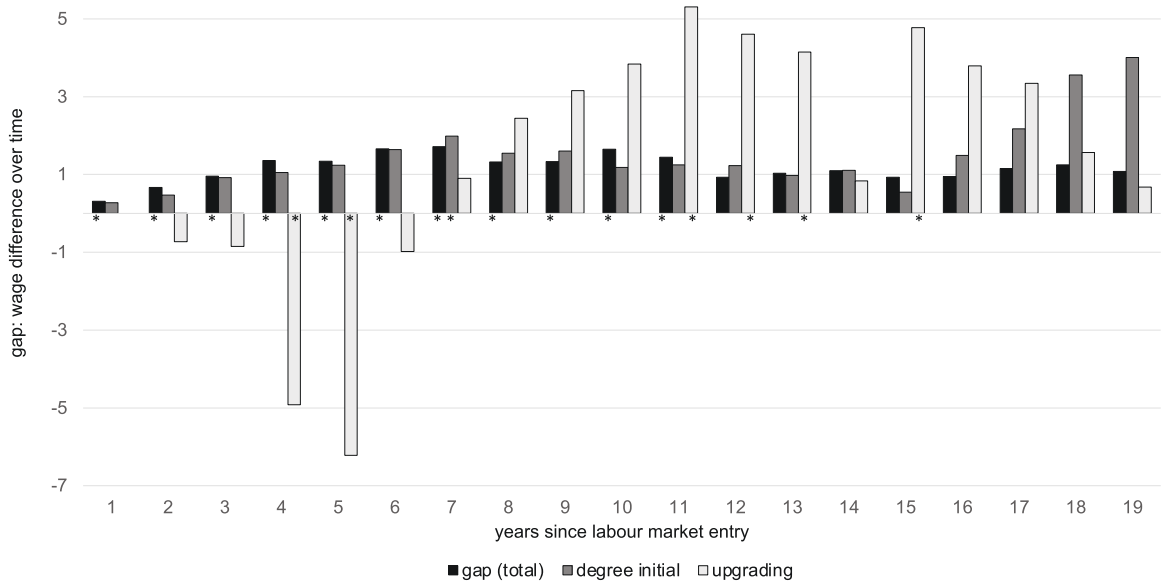

Fig. 4. .Gap between salariat and working class in mean hourly wage growth over time in Euros for birth cohort 1969–78
Note: Compare Table A10 in appendix and Fig. 3.

for 20 years. These models confirm the results of the main analyses of the full sample, indicating that attrition or the inclusion of individuals with shorter observation periods does not affect our findings (see appendix Tables A20–23).

Again, significant values were primarily found for initial qualifications, and these values were similar to those found in the decomposition analyses for the entire sample. Even fewer values for upgraded degrees were statistically significant than in the analyses with the entire sample, implying that the values for upgrades should be interpreted with caution; as there is considerable uncertainty about their effect on overall social inequality. Nevertheless, the data clearly reveal a significant endowment effect of upgrading beginning in the 15th career year for upgraders; in both the main and sensitivity analyses for the younger birth cohort (1969–78). This finding suggests that, at this stage in their careers, upgrading has the potential to reduce wage inequality between social origins. However, it can be assumed that the upgrading processes are still incomplete for this younger cohort, indicating that these figures are not yet definitive.

A large proportion of cases are lost in the sensitivity analyses when only individuals with values up to the 20th career year are included. Many individuals have gaps in their employment history, which can result in a lack of data available between labour market entry and the 20th year of the career. Nevertheless, the sensitivity analyses for the two birth cohorts produce results that are consistent with those of the main analyses. This suggests that, despite all the uncertainties, the results appear robust. As a further sensitivity check, we conducted analyses

including only individuals who entered the labour market in the former West German federal states. However, even in this case, the results of the main analyses are not contradicted (see appendix Tables A24–27).

7. Discussion and conclusion

We started out from the question whether educational upgrading after labour market entry contributes to a reinforcement or compensation of wage inequalities by social background in Germany. Over the course of their careers, a widening wage gap between social classes of origin is observed for cohorts born 1959–68. For cohorts born 1969–78, we observe a widening wage gap only over the first years of the career trajectory. For subsequent years, our data source is not reliable as we suspect selective undercoverage of highly educated persons. Given these developments, the question we ultimately seek to answer is whether socially selective upgrading patterns contribute to the widening of wage gaps between social origins over the career or compensate for what would otherwise be even larger gaps? Those are counterfactual questions that we cannot finally resolve with the kind of analyses that we have presented here and the data that we have at our disposal. But our findings nevertheless provide some clues about the relevance of educational upgrading processes for intergenerational mobility in Germany.

Our descriptive analyses already suggested that, even though the incidence and quality of educational upgrading (factors 1 and 2) show some variation across social origins, the amount of variation might not be large enough for a substantive contribution to wage differentials between social origins. We could not provide descriptive insights into the differences in returns to upgrades across social backgrounds (factor 3), although this factor emerged as pertinent in our decomposition analyses, albeit significant only in certain instances within the younger cohort. For the older cohort, our analyses suggest that upgrading does not appear to have been a driver of wage inequality by social origin over one's career. If anything, it seems to have a very weak compensating effect. However, none of these contributions can be considered statistically significant according to conventional standards (cf. Table A8). It is important to note that the absence of any significant effects found does not necessarily mean that no effects actually exist. It may also reflect limited sample size or other sources of statistical uncertainty. For the younger cohort, our conclusions are more tentative, due to the shorter observation period for which we are confident to provide interpretations of our data. It seems as if educational upgrading plays a compensatory role in the first years of the career, but then starts to reinforce wage differences between individuals of different social origin in later years of the career. We might speculate that this reflects differences in the quality of the upgrades that we observe to some extent and which unfold with some time lag. We consider this as a more plausible explanation than potential differences in the timing of upgrading, which would show up in the endowment part of our decompositions rather than in the coefficient part. Unfortunately, we cannot provide reliable longer-term insights across the career trajectory for this cohort due to the limitations stated above.

Apart from the rather weak contributions of educational upgrading, our analyses revealed some very striking results somewhat beyond our key research interest. The decomposition analyses clearly underline the central role of the initial educational degree for the widening wage inequality across social backgrounds over the life course. This finding accords with previous research emphasizing the outstanding role of early educational outcomes and labour market entry in predefining individual life courses and life chances in Germany (Blossfeld, 1985; Hillmert, 2015; Scherer, 2005). One obvious explanation why initial education explains so much and educational upgrading so little is the fact that only about 16 % of the cohorts under view in this study do upgrade their educational credentials after labour market entry, which leaves 84 % who do not. Yet, the overwhelming explanatory contribution of initial education for social wage differentials observed long into employment careers is quite impressive. It does not mean that educational upgrading has no effect on the individual level. Even though this was not at the core of our analyses, our comparisons between non-upgraders and upgraders showed that the latter end up with a wage premium. Unless these results are purely the consequence of selection processes of persons with higher wage potentials into upgrading, it suggests that upgrading does pay off individually. However, we have to leave it to subsequent research to disentangle the exact causal effects. Another side result that emerged from our sensitivity analyses (cf. Tables A.12-A.19) is the finding that any widening of the wage gap between individuals of different social origin over the career appears to be driven by men. While it is beyond the scope of this paper to dig deeper into that finding, it is certainly worth the effort to have a closer look at the interaction between social origin and gender against the background of wage inequality.

As our study addressed a very complex interplay of various factors and dynamics, it should not come as a surprise that we faced several limitations – in particular regarding the data that our analyses are based on. A first limitation is that we only could observe individuals who were employed in a job subject to social security contributions, excluding significant portions of the workforce, such as those in precarious employment (wages below the marginal income threshold), civil servants, and self-employed individuals. Consequently, our results may not represent the entire population. In addition, in the administrative data, wages of high-income receivers are top-coded. All these factors can be assumed to be unevenly distributed over social origins. In addition, the association between education and wage trajectories might be somewhat different for those segments of the workforce. For example, seniority pay schemes are very prevalent among civil servants, while the connection between formal education and wages can be assumed to be weaker for self-employed persons. Hence, the results presented in this paper cannot be assumed to be representative of the entire population. Therefore, future research should extend the analysis to the entire workforce. Moreover, going beyond hourly wages to consider lifetime earnings, incorporating non-right-censored data for high-income earners, and using longer observation periods would allow for a more comprehensive assessment.

A second limitation concerns the time horizon that we are able to observe. It lies in the nature of our object of research that we cannot observe younger and more recent birth cohort, since we require them to possess a certain amount of labour market experience. In addition, data of such complex kind always come with a substantial lag between the time of data collection and the time when the data is ready to be analysed. Yet, unless there are very radical changes in the education system or the labour market, we believe that we can still extrapolate our conclusions to contemporary cohorts.

A further limitation derives from the sensitive nature of the data. While possible in principle, the very strict regulations regarding data access and data processing did not allow for very fine-grained analyses. We also would have wished to replicate our sample of the NEPS-SC6-ADIAB data in the standard NEPS-SC6 data for more detailed examinations of the education and labour market trajectories. But unfortunately, an export of the NEPS case identifiers is not possible.

Another limitation relates to the causal attributions that we can make regarding upgrading. It concerns the problem of unobserved heterogeneity among upgraders and non-upgraders and its interaction with social origin. For example, there might be selection into upgrading based on cognitive and non-cognitive skills, which also have a direct effect on earnings (Bukodi et al. 2019). While our findings still provide some insights about the factual role of educational upgrading for intergenerational mobility processes, disentangling the causal impact of upgrading is essential to inform potential policy measures that seek to intervene on lifelong learning measures for disadvantaged social groups.

Beyond this, future research should examine potential disparities in the returns to educational upgrading across social backgrounds. Such disparities may, for example, arise from the specific upgrading pathways

pursued, including the types of qualifications obtained, fields of study chosen, and the prestige of the institutions attended. In addition, access to favourable employment prospects may be mediated by social networks, which may advantage individuals from more privileged backgrounds. In addition, greater economic resources may further enable individuals from privileged families to prolong their job search, securing positions with higher returns to upgrading.

Regional disparities, notably East–West differences and urban–rural divides, represent another avenue for investigation. It would be valuable to examine whether variation in the availability of formal further education opportunities and employment prospects in different regions shapes the relationship between educational upgrading and wage inequality by social origin, potentially reinforcing or mitigating social-origin disadvantages.

Finally, our study considers only formal educational upgrading. As a more substantive part of lifelong learning measures in the German labour market falls within the area of non-formal learning (Ehlert, 2017), an obvious extension of our study would investigate the role of these further education measures for intergenerational mobility processes.

Despite these limitations, we are confident that our main conclusion holds for the population under investigation, namely that, in Germany, formal educational upgrading processes are no decisive factor influencing the development of wage inequality over the career between individuals of different social origin.

CRediT authorship contribution statement

Steffen Schindler: Writing – review & editing, Writing – original draft, Project administration, Methodology, Funding acquisition, Conceptualization. **Anja Grauenhorst:** Writing – review & editing, Writing – original draft, Visualization, Project administration, Methodology, Funding acquisition, Formal analysis, Data curation.

Declaration of Generative AI and AI-assisted technologies in the manuscript preparation process

During the preparation of this work the authors used DeepL Write and HAWKI in order to improve readability and language. After using this these tools, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

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Declaration of Competing Interest

None.

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Appendix A

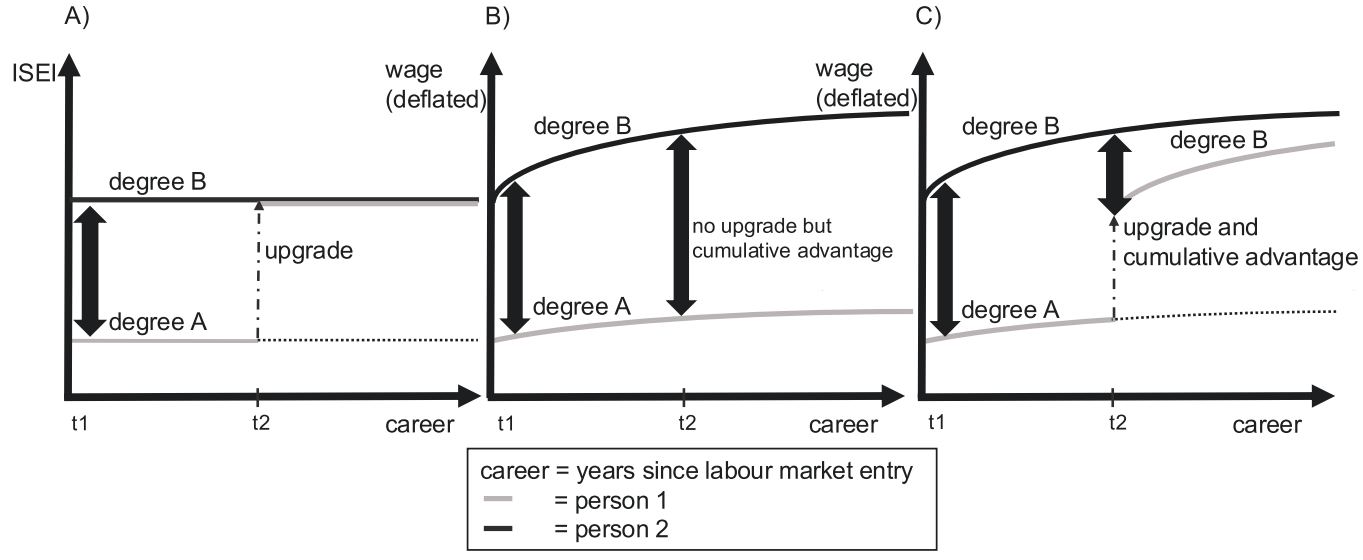

Fig. A1. Educational degree and labour market returns over the career

Table A1
Vocational degrees in source (NEPS-SC6: ts15219_ha) and recoding

ID*	label english (german)	new ID	new label
0	no degree (kein Abschluss)	0	no degree
1	journeyman's/journeywoman's certificate (Gesellen- oder Gehilfenbrief)	1	VOC1: vocational training
2	leaving certificate of Berufsfachschule or school of public health (Berufsfachschulabschluss oder Abschluss Schule im Gesundheitswesen	1 or 2**	VOC1: vocational training or VOC2: advanced (postsecondary) vocational training
3	leaving certificate of a Fachschule (Fachschulabschluss)	2	VOC2: advanced (postsecondary) vocational training
4	master craftsman's/craftswoman's diploma (Meisterbrief)	2	VOC2: advanced (postsecondary) vocational training
5	technician's qualification (Technikerabschluss)	2	VOC2: advanced (postsecondary) vocational training
6	certificate from a Berufs-, Verwaltungs-, Wirtschaftsakademie or college of public administration (Abschluss an Berufs-, Verwaltungs-, Wirtschaftsakademie oder Verwaltungshochschule)	2	VOC2: advanced (postsecondary) vocational training
7	degree from a university of applied science (Fachhochschulabschluss)	3	HE: higher education
8	university degree (Universitätsabschluss)	3	HE: higher education
9	medical specialist (Facharzt)	3	HE: higher education
10	doctorate (Promotion)	3	HE: higher education
11	habilitation (Habilitation)	3	HE: higher education
12	civil service examination subclerical class (Laufbahnprüfung einfacher Dienst)	1	VOC1: vocational training
13	civil service examination clerical class (Laufbahnprüfung mittlerer Dienst)	1	VOC1: vocational training
14	civil service examination executive class (Laufbahnprüfung gehobener Dienst)	2	VOC2: advanced (postsecondary) vocational training
15	civil service examination administrative class (Laufbahnprüfung höherer Dienst)	2	VOC2: advanced (postsecondary) vocational training
16	IHK (Chamber of Industry and Commerce) examination (IHK-Prüfung)	0	no degree
17	other qualification (sonstiger Abschluss)	0	no degree

Note:
* ID in NEPS-SC6: ts15219_ha
** Recoded as VOC1 or VOC2 depending on duration (< 24 months (=VOC1) or > = 24 months (=VOC2))

Table A2
Degree variable: combined vocational and school degrees (own recoding)

label	abbreviation
no vocational + no school degree	no degree
no vocational degree + basic school degree (e.g. Hauptschule)	Basic
no vocational degree + intermediate school degree (e.g. Mittlere Reife)	Intermediate
no vocational degree + high school degree (higher education entrance qualification, e.g. Abitur or Fachhochschulreife)	High
vocational training degree + no or basic school degree (e.g. Hauptschule)	VOC1 + < =Basic
vocational training degree + intermediate school degree (e.g. Mittlere Reife)	VOC1 + Intermediate
vocational training degree + high school degree (higher education entrance qualification, e.g. Abitur or Fachhochschulreife)	VOC1 + High
advanced (postsecondary) vocational training degree + no or basic school degree (e.g. Hauptschule)	VOC2 + < =Basic
advanced (postsecondary) vocational training degree + intermediate school degree (e.g. Mittlere Reife)	VOC2 + Intermediate
advanced (postsecondary) vocational training degree + high school degree (higher education entrance qualification, e.g. Abitur or Fachhochschulreife)	VOC2 + High
higher education degree + any school degree	HE

Table A3
Family class background in source (egp) (NEPS-SC6: 731403_g8/t731453_g8) and recoding

ID*	label english (german)	new ID	new label
1	[I] Upper service class (Obere Dienstklasse)	1	Salariat (I+II)
2	[II] Lower service class with high qualifications (Untere Dienstklasse mit hohen Qualifikationen)	1	Salariat (I+II)
3	[IIIa] Employees performing non-manual class with limited decision-making authority (Angestellte der ausführenden nicht-manuellen Klasse mit beschränkten Entscheidungsbefugnissen)	2	Intermediate Class
4	[IIIb] Employees performing non-manual class with low-skilled routine tasks (Angestellte der ausführenden nicht-manuellen Klasse mit gering qualifizierten Routinetätigkeiten)	3	Working Class
5	[IVa] Self-employed with employees (Selbständige mit unterstellten Mitarbeitern)	2	Intermediate Class
6	[IVb] Self-employed without employees (Selbständige ohne unterstellte Mitarbeiter)	2	Intermediate Class
7	[IVc] Self-employed farmers and fishermen (Selbständige Landwirte und Fischer)	2	Intermediate Class
8	[V] Supervisors in trade and industry (master craftsman/craftswoman, technician, foreman/forewoman and those of equal rank) (Aufsichtskräfte in Gewerbe und Industrie (Meister, Techniker, Vorabeiter und gleichrangige))	2	Intermediate Class

(*continued on next page*)

Table A3 (*continued*)

ID*	label english (german)	new ID	new label
9	[VI] Skilled worker and other qualified personnel (Facharbeiter und andere qualifizierte Arbeitskräfte)	3	Working Class
10	[VIIa] Unskilled and semi-skilled workers (not in agriculture and fishing) (Un- und angelernte Arbeiter (außer Landwirtschaft und Fischerei))	3	Working Class
11	[VIIb] Agricultural and fishing workers (Arbeiter in Landwirtschaft und Fischerei)	3	Working Class

Note: * ID in NEPS-SC6: t731403_g8, t731453_g8
The constructed variable of social origin for the analyses includes in "working class" the low skilled non-manual class (IIIb).

Table A4
Descriptives by career year

Career year	0	2	4	6	8	10	12	14	16	18	19
Social origin (EGP)											
Salariat	40.0	39.6	39.5	39.1	39.5	39.6	39.3	38.5	38.0	37.1	36.6
Intermediate class	21.8	21.9	21.9	22.0	21.5	21.5	21.9	21.9	21.8	21.8	22.3
Working class	38.2	38.5	38.5	38.9	39.1	39.0	38.8	39.6	40.3	41.1	41.1
Degree initial											
No degree/Basic/Intermediate	7.0	6.6	6.7	6.5	6.5	6.5	6.6	6.7	6.6	6.8	6.7
High (Abi/FHR)	3.6	3.1	3.1	3.3	3.5	3.3	3.3	3.5	3.4	3.3	3.5
VOC1 + Basic/Intermediate	45.7	46.2	46.3	46.3	46.1	46.4	47.0	47.4	48.5	49.6	50.0
VOC1 + High (Abi/FHR)	11.9	12.0	11.8	11.9	12.2	12.4	12.6	12.6	12.3	12.0	11.9
VOC2	11.2	11.5	11.3	11.3	11.5	11.4	11.1	11.3	11.5	11.0	11.3
HE (Uni/FH)	20.6	20.6	20.9	20.7	20.2	19.9	19.4	18.4	17.8	17.3	16.6
Degree final											
No degree/Basic/Intermediate	5.3	5.3	5.3	4.9	5.0	4.9	5.1	5.1	5.0	5.1	4.9
High (Abi/FHR)	2.2	2.2	2.2	2.2	2.1	2.0	1.9	1.9	1.7	1.8	1.9
VOC1 + Basic/Intermediate	38.0	38.8	39.0	38.7	38.4	38.1	38.2	38.6	39.4	40.3	40.9
VOC1 + High (Abi/FHR)	10.2	10.1	10.3	10.3	10.2	10.2	10.5	10.7	10.4	10.0	10.0
VOC2	20.5	20.2	20.4	21.1	21.6	21.7	21.7	22.1	22.2	22.1	22.5
HE (Uni/FH)	23.8	23.4	22.9	22.9	22.8	23.1	22.6	21.6	21.3	20.6	19.8
Gender											
Men	48.4	48.2	48.8	50.7	51.7	53.3	53.5	53.6	52.7	51.6	51.0
Women	51.6	51.8	51.2	49.3	48.3	46.7	46.5	46.4	47.3	48.4	49.0
Birth cohort											
1959–1968	61.7	62.1	62.4	62.2	62.3	62.7	63.5	65.2	66.4	69.4	70.9
1969–1978	38.3	37.9	37.6	37.8	37.7	37.3	36.5	34.8	33.6	30.6	29.1
Place of birth											
Western Germany	85.6	86.0	85.9	85.9	85.7	86.0	86.3	87.2	87.4	88.8	89.1
Eastern Germany	9.1	8.9	9.0	8.8	9.0	9.0	8.9	8.5	8.4	7.3	7.2
Abroad	5.2	5.1	5.1	5.3	5.3	4.9	4.8	4.4	4.2	3.8	3.6
N	3969	3720	3600	3433	3333	3173	3067	2938	2832	2694	2621

Note: N: 3969
Main sample (NEPS-SC6-ADIAB)
Percentages may sum slightly over 100 per cent due to rounding.
Abbreviations: degree initial and degree final:
No degree/Basic/Intermediate: no vocational degree + no, basic or intermediate school degree
High (Abi/FHR): no vocational degree + high school degree (Abitur/Fachhochschulreife)
VOC1 + Basic/Intermediate: vocational training degree + no, basic or intermediate school degree
VOC1 + High (Abi/FHR): vocational training degree + high school degree (Abitur/Fachhochschulreife)
VOC2: advanced (postsecondary) vocational training degree + any school degree
HE: higher education + any school degree

Fig. A2. Upgrades per career year in per cent of all upgrades by social origin

Table A5
Final degrees by social origin and birth cohort in per cent

	1959–1968				*1969–1978*			
Vocational + School	Salariat	Interm.	Working	Total	Salariat	Interm.	Working	Total
No degree	0.6	0.5	1.2	0.8	0.1	0.0	1.8	0.7
Basic	0.7	1.9	4.8	2.6	0.7	2.4	5.6	2.8
Intermediate	2.5	3.0	3.3	2.9	1.7	3.6	3.8	2.8
High	4.0	2.6	1.9	2.9	3.0	2.7	1.1	2.3
VOC1 + < =Basic	6.4	14.3	24.8	15.4	5.1	13.3	19.4	11.9
VOC1 + Intermediate	17.7	25.5	25.6	22.5	17.1	27.5	28.3	23.3
VOC1 + High	11.3	10.4	7.3	9.5	10.4	9.2	8.6	9.5
VOC2 + < =Basic	2.1	3.3	4.8	3.4	1.1	3.1	3.0	2.2
VOC2 + Intermediate	8.3	10.6	9.2	9.2	9.4	10.6	9.5	9.7
VOC2 + High	8.5	7.3	4.8	6.8	10.3	8.2	6.8	8.6
HE	37.9	20.7	12.4	24.1	40.9	19.3	12.2	26.2
	N = 2972				*N = 1901*			

Note: N: 4873
Auxiliary sample (NEPS-SC6)
No degree: no school and no vocational degree
Vocational degrees:
VOC1: vocational training
VOC2: advanced vocational training
HE: higher education
School degrees:
Basic: basic school degree (e.g. Hauptschule)
Intermediate: intermediate school degree (e.g. Mittlere Reife)
High: high school degree (e.g. Abitur or Fachhochschulreife)

Table A.6
Educational upgrading rates by social origin in per cent (at risk population)

	1959–1968				*1969–1978*			
Final upgrade	Salariat	Interm.	Working	Total	Salariat	Interm.	Working	Total
HE	7.0	4.1	2.1	4.2	8.1	3.5	2.3	4.7
VOC2	13.1	10.7	10.8	11.5	12.7	12.1	11.2	12.0
VOC1	2.5	2.4	3.1	2.8	2.1	2.3	2.7	2.4
School only	1.8	1.9	1.2	1.6	0.9	1.7	1.8	1.5
No Upgrade	75.6	80.8	82.7	80.0	76.2	80.3	81.9	79.5
	N = 2353				*N = 1472*			

Note: N: 3825
Auxiliary sample (NEPS-SC6)

Table A7
Distribution of initial degree and upgrade to final degree by initial degree

Degree initial	***Degree final***										
	No degree	Basic	Interme-diate	High	VOC1 + < =Basic	VOC1 + Interme-diate	VOC1 + High	VOC2 + < =Basic	VOC2 + Interme-diate	VOC2 + High	HE
No degree	*90.2*	2.4			**7.3**						
Basic		*80.5*	1.3		**13.2**	2.5		2.5			
Intermediate			*65.6*	1.9		**18.4**	0.5		**9.9**	0.5	3.3
High				*57.1*			**14.8**			**11.1**	**17.1**
VOC1 + < =Basic					*82.2*	1.5	0.8	**11.5**	2.0	1.1	1.0
VOC1 + Intermediate						*80.2*	2.2		**11.8**	2.5	3.3
VOC1 + High							*74.6*			**17.1**	**8.3**
VOC2 + < =Basic								*95.9*	2.0		2.0
VOC2 + Intermediate									*95.3*	1.5	3.3
VOC2 + High										*91.9*	**8.1**
HE											*100.0*

Note: N: 4873
Auxiliary sample (NEPS-SC6)
Percentages may sum slightly over 100 per cent due to rounding.
Vocational degrees:
VOC1: vocational training
VOC2: advanced vocational training
HE: higher education
School degrees:
Basic: basic school degree (e.g. Hauptschule)
Intermediate: intermediate school degree (e.g. Mittlere Reife)
High: high school degree (e.g. Abitur or Fachhochschulreife)
Bold: upgrading rate > 5%. Italics: No upgrading from initial to final degree.

Table A8
Decomposition of mean hourly wage difference over time in Euros: salariat versus working class, birth cohort 1959–68

Y	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Overall																			
S	1.42	2.81	4.15	5.16	6.19	6.92	7.57	7.96	8.75	9.33	9.62	10.11	10.35	11.18	11.52	11.63	11.89	11.91	12.06
W	1.20	2.39	3.43	4.26	4.85	5.38	6.01	6.49	7.03	7.43	7.59	8.03	8.40	8.80	8.98	9.13	9.15	9.33	9.52
G	**0.22**	**0.42**	**0.73**	**0.90**	**1.35**	**1.54**	**1.56**	**1.47**	**1.72**	**1.90**	**2.03**	**2.09**	**1.95**	**2.38**	**2.55**	**2.50**	**2.74**	**2.58**	**2.55**
Detailed																			
Degree initial																			
E	**0.17**	**0.45**	**0.69**	**0.94**	**1.06**	**1.21**	**1.61**	**1.58**	**1.73**	**1.92**	**2.02**	**2.19**	**1.99**	**2.23**	**2.25**	**2.05**	**2.14**	**1.95**	**1.98**
C	0.05	0.28	0.39	0.21	−0.03	−0.02	−0.09	−0.22	−0.15	−0.23	−0.10	0.11	0.33	0.16	0.07	0.13	−0.70	−0.59	−0.51
I	0.07	0.06	0.10	0.05	0.21	0.24	−0.10	0.05	0.13	0.12	0.12	−0.01	0.04	0.02	0.01	0.17	0.39	0.63	0.65
T	**0.29**	**0.79**	**1.18**	**1.20**	**1.24**	**1.43**	**1.42**	**1.41**	**1.71**	**1.81**	**2.04**	**2.29**	**2.36**	**2.41**	**2.33**	**2.35**	**1.83**	**1.99**	**2.12**
Upgrading																			
E	0.00	0.00	0.00	0.00	0.02	0.03	0.03	0.04	0.00	0.00	0.00	−0.03	−0.01	0.02	−0.02	0.02	0.00	0.04	0.08
C	−0.36	1.54	−0.91	−2.36	−0.59	0.13	0.78	0.70	−0.80	0.12	−0.55	−1.02	0.04	0.56	−0.76	−0.65	−0.75	−0.45	−0.23
I	0.00	0.00	−0.01	0.00	−0.03	−0.05	−0.08	−0.07	−0.06	−0.03	0.00	0.04	0.08	0.05	0.11	0.11	0.08	0.05	0.03
T	−0.36	1.54	−0.92	−2.36	−0.60	0.11	0.73	0.67	−0.86	0.09	−0.55	−1.01	0.11	0.63	−0.67	−0.52	−0.67	−0.36	−0.12
N	1903	1808	1770	1759	1713	1668	1630	1631	1590	1564	1547	1521	1512	1499	1480	1473	1477	1468	1456

Note:
Main sample (NEPS-SC6-ADIAB)
The calculations for 'sum' were made to two decimal places, which may lead to slight discrepancies in the figures shown here.
Bold values: $p < 0.05$
Abbreviations in Tables A8-A27:
Y: Career year
S: Salariat (I+II)
M: Intermediate class
W: Working class
G: Class wage gap of wage difference between a specific career year and wage at labour market entry.
E: Endowments effect
C: Coefficients effect
I: Interaction effect
T: Total effect (E +C+I)

Table A9
Decomposition of mean hourly wage difference over time in Euros: salariat versus intermediate class, birth cohort 1959–68

Y	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Overall																			
S	1.42	2.81	4.15	5.16	6.19	6.92	7.57	7.96	8.75	9.33	9.62	10.11	10.35	11.18	11.52	11.63	11.89	11.91	12.06
M	1.46	2.81	3.80	4.63	5.34	5.84	6.42	7.01	7.38	8.18	8.16	8.59	8.82	9.03	9.52	9.60	9.91	10.04	10.44
G	−0.04	0.00	0.35	0.54	**0.85**	**1.08**	**1.15**	**0.95**	**1.37**	**1.14**	**1.46**	**1.52**	**1.53**	**2.15**	**2.01**	**2.03**	**1.98**	**1.87**	**1.62**
Detailed																			
Degree initial																			
E	**0.19**	**0.41**	**0.62**	**0.68**	**0.82**	**0.90**	**0.96**	**0.91**	**0.87**	**1.16**	**1.33**	**1.20**	**1.30**	**1.36**	**1.49**	**1.33**	**1.33**	**1.38**	**1.51**
C	−0.04	0.06	0.07	0.18	0.26	0.43	0.24	0.04	0.19	−0.19	0.17	0.38	0.99	0.93	0.74	0.55	−0.01	−0.20	−0.60
I	−0.04	−0.10	−0.13	−0.08	−0.09	−0.05	−0.03	0.04	0.19	0.02	−0.10	0.00	−0.23	−0.10	−0.24	−0.17	−0.02	0.02	−0.04
T	0.11	0.37	0.56	0.78	0.99	**1.28**	1.17	0.99	1.25	0.99	1.40	1.58	2.06	**2.19**	1.99	1.71	1.30	1.20	0.87
Upgrading																			
E	0.00	0.00	0.00	−0.05	−0.01	−0.01	0.01	0.05	0.04	0.03	−0.01	0.04	0.09	0.04	−0.02	−0.01	0.00	0.04	0.04
C	−0.31	0.77	0.93	**−4.08**	−1.10	0.50	1.55	1.32	0.53	0.72	0.55	−0.21	0.57	−0.42	−0.44	−0.72	−1.26	−1.34	−0.58
I	0.00	0.00	0.00	0.04	0.01	0.02	−0.02	−0.06	−0.05	−0.03	−0.02	−0.08	−0.06	−0.01	−0.01	−0.02	−0.03	−0.06	−0.07
T	−0.31	0.77	0.93	**−4.09**	−1.10	0.51	1.54	1.31	0.52	0.72	0.52	−0.25	0.60	−0.39	−0.47	−0.75	−1.29	−1.36	−0.61
N	1449	1375	1358	1336	1297	1266	1242	1228	1203	1181	1179	1159	1143	1128	1110	1102	1093	1087	1079

Note: See Table A8

Table A10
Decomposition of mean hourly wage difference over time in Euros: salariat versus working class, birth cohort 1969–78

Y	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Overall																			
S	1.16	2.31	3.24	4.23	4.98	5.70	6.15	6.29	6.71	7.58	7.80	7.90	8.13	8.58	8.93	9.17	9.50	9.79	9.93
W	0.85	1.64	2.28	2.87	3.64	4.03	4.43	4.97	5.37	5.92	6.37	6.97	7.10	7.48	8.00	8.22	8.35	8.54	8.85
G	**0.31**	**0.67**	**0.96**	**1.36**	**1.34**	**1.66**	**1.72**	**1.32**	**1.33**	**1.65**	**1.44**	0.93	1.03	1.10	0.93	0.95	1.15	1.25	1.08
Detailed																			
Degree initial																			
E	**0.14**	**0.36**	**0.50**	**0.70**	**0.88**	**1.18**	**1.18**	**1.35**	**1.41**	**1.47**	**1.73**	**1.81**	**1.78**	**1.69**	**1.75**	**1.80**	**2.03**	**1.88**	**1.85**
C	0.03	0.03	0.22	0.08	0.18	0.36	0.39	−0.23	−0.20	−0.82	−0.84	−0.99	−1.12	−1.20	−1.92	−0.95	−0.24	0.88	1.38
I	0.10	0.08	0.20	0.27	0.18	0.10	0.42	0.43	0.39	0.53	0.36	0.41	0.32	0.62	0.72	0.64	0.38	0.80	0.78
T	0.27	0.47	0.92	1.05	1.24	1.64	**1.99**	1.55	1.60	1.18	1.25	1.23	0.98	1.11	0.55	1.49	2.17	3.56	4.01
Upgrading																			
E	0.00	0.00	0.01	0.00	0.00	0.11	0.11	0.22	0.25	**0.38**	0.31	0.22	0.30	0.34	**0.54**	**0.53**	**0.51**	0.40	**0.55**
C	0.00	−0.73	−0.87	**−4.92**	**−6.25**	−1.05	0.94	2.49	3.14	3.72	**5.11**	**4.55**	**3.94**	0.85	**4.61**	3.57	3.05	1.20	0.24
I	0.00	0.00	0.01	0.00	0.03	−0.04	−0.15	**−0.26**	−0.23	−0.26	−0.11	−0.16	−0.09	−0.35	−0.37	−0.31	−0.22	−0.03	−0.11
T	0.00	−0.73	−0.85	**−4.92**	**−6.22**	−0.98	0.90	2.45	3.16	3.84	**5.31**	**4.61**	**4.15**	0.84	**4.78**	3.79	3.34	1.57	0.68
N	1178	1096	1070	1051	1021	1011	1003	987	966	927	915	874	844	795	756	743	686	638	581

Note: See Table A8

Table A11
Decomposition of mean hourly wage difference over time in Euros: salariat versus intermediate class, birth cohort 1969–78

Y	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Overall																			
S	1.16	2.31	3.24	4.23	4.98	5.70	6.15	6.29	6.71	7.58	7.80	7.90	8.13	8.58	8.93	9.17	9.50	9.79	9.93
M	0.97	1.95	2.78	3.81	4.33	5.20	5.55	5.76	6.30	6.47	6.65	6.45	6.57	6.87	6.85	7.02	7.43	7.41	7.89
G	0.19	0.36	0.46	0.42	0.66	0.49	0.60	0.54	0.41	1.10	1.15	**1.45**	**1.56**	**1.71**	**2.08**	**2.14**	**2.07**	**2.38**	**2.04**
Detailed																			
Degree initial																			
E	**0.29**	**0.55**	**0.69**	**0.90**	**1.08**	**0.75**	**0.81**	**1.07**	**1.30**	**1.36**	**1.71**	**1.89**	**1.61**	**1.55**	**1.78**	**1.58**	**1.22**	**1.08**	0.81
C	0.13	0.01	0.16	0.15	0.22	1.26	−0.11	−0.08	−0.61	−0.88	0.15	−0.09	1.18	0.94	−0.36	0.57	0.40	2.33	2.34
I	−0.10	−0.22	−0.17	−0.17	−0.27	0.20	0.44	0.30	0.09	0.25	0.01	−0.08	0.02	0.19	0.04	0.35	0.53	0.79	0.90
T	0.32	0.34	0.68	0.88	1.03	2.21	1.14	1.29	0.78	0.73	1.87	1.72	2.81	2.68	1.46	2.50	2.15	4.20	4.05
Upgrading																			
E	0.00	0.01	0.03	0.01	0.02	0.02	−0.01	−0.09	−0.06	−0.22	−0.09	−0.08	−0.01	0.08	0.31	0.43	0.03	0.03	0.05
C	0.00	−0.98	−0.75	**−3.99**	**−5.31**	**−3.68**	−0.86	−0.53	1.54	0.92	2.60	3.55	2.55	0.12	**5.01**	3.82	1.35	1.34	1.35
I	0.00	−0.01	0.00	−0.12	−0.22	−0.06	−0.03	0.08	0.06	0.29	0.25	0.24	0.17	−0.33	−0.31	−0.43	0.15	0.28	0.31
T	0.00	−0.98	−0.72	**−4.10**	**−5.51**	**−3.72**	−0.90	−0.54	1.54	0.99	2.76	3.71	2.71	−0.13	**5.01**	3.82	1.53	1.65	1.71
N	986	913	889	877	852	830	817	803	783	756	745	719	681	646	616	589	540	500	464

Note: See Table A8

Table A12
Decomposition of mean hourly wage difference over time in Euros: salariat versus working class, birth cohort 1959–68, male only

Y	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Overall																			
S	1.70	3.47	5.11	6.55	7.99	9.08	10.19	11.00	12.08	12.81	13.52	14.20	14.49	15.46	15.97	16.07	16.71	16.99	17.29
W	1.37	2.63	3.81	4.83	5.64	6.41	7.11	7.80	8.47	9.25	9.56	10.05	10.42	10.96	11.42	11.73	11.89	12.15	12.38
G	**0.32**	**0.85**	**1.30**	**1.72**	**2.35**	**2.67**	**3.08**	**3.21**	**3.61**	**3.56**	**3.96**	**4.14**	**4.07**	**4.50**	**4.55**	**4.34**	**4.82**	**4.84**	**4.91**
Detailed																			
Degree initial																			
E	**0.31**	**0.67**	**1.04**	**1.52**	**1.94**	**2.22**	**2.70**	**3.06**	**3.41**	**3.78**	**4.03**	**4.36**	**4.10**	**4.32**	**4.54**	**4.51**	**4.74**	**4.62**	**4.57**
C	−0.05	0.00	−0.02	−0.44	−0.20	−0.04	−0.39	−0.80	−0.57	−0.81	−0.63	−0.40	−0.13	−0.09	0.18	−0.38	−0.31	−2.52	−1.95
I	0.15	0.24	0.32	0.11	0.24	0.40	0.32	0.15	0.20	−0.08	0.04	−0.24	−0.16	−0.09	−0.33	−0.63	−0.55	−0.89	−0.80
T	0.41	**0.91**	**1.34**	1.19	**1.98**	**2.58**	**2.63**	**2.41**	**3.04**	**2.89**	**3.44**	**3.72**	**3.81**	**4.14**	**4.39**	**3.50**	**3.88**	1.21	1.82
Upgrading																			
E	0.00	0.00	0.01	0.01	0.03	0.01	−0.03	0.00	−0.03	−0.01	−0.02	−0.10	−0.10	−0.11	−0.14	−0.10	−0.14	−0.12	−0.11
C	0.00	−2.00	−0.46	−1.33	1.14	−0.51	−0.76	−0.24	−2.86	−1.32	−0.94	−2.30	−1.63	−2.12	−2.37	−1.51	−1.39	−0.59	−1.27
I	0.00	−0.01	−0.01	0.01	−0.02	−0.01	−0.03	−0.04	−0.03	−0.02	−0.01	0.12	0.11	0.14	0.21	0.16	0.15	0.16	0.22
T	0.00	−2.01	−0.46	−1.31	1.15	−0.51	−0.82	−0.28	−2.92	−1.35	−0.97	−2.28	−1.62	−2.09	−2.30	−1.45	−1.38	−0.55	−1.16
N	913	873	863	859	863	856	842	849	847	845	844	829	825	817	801	789	786	775	765

Note: See Table A8

Table A.13
Decomposition of mean hourly wage difference over time in Euros: salariat versus intermediate class, birth cohort 1959–68, male only

C	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Overall																			
Y	1.70	3.47	5.11	6.55	7.99	9.08	10.19	11.00	12.08	12.81	13.52	14.20	14.49	15.46	15.97	16.07	16.71	16.99	17.29
M	1.72	3.32	4.65	5.87	7.04	7.61	8.38	9.05	9.43	10.17	10.53	11.19	11.52	11.93	12.27	12.65	13.10	13.49	13.83
G	−0.02	0.16	0.46	0.67	0.95	**1.47**	**1.80**	**1.95**	**2.65**	**2.64**	**2.99**	**3.01**	**2.97**	**3.53**	**3.70**	**3.41**	**3.61**	**3.50**	**3.46**
Detailed																			
Degree initial																			
E	**0.35**	**0.64**	**0.91**	**1.40**	**1.69**	**1.87**	**1.89**	**1.85**	**1.93**	**1.89**	**2.01**	**2.30**	**2.14**	**2.25**	**1.74**	**2.40**	**2.32**	**2.48**	**2.48**
C	0.21	0.43	0.52	0.84	1.17	1.53	1.21	0.77	0.95	−0.29	0.08	0.83	1.30	1.60	0.04	1.27	0.94	−1.81	−2.52
I	−0.13	−0.15	−0.14	−0.44	−0.47	−0.33	−0.13	−0.05	0.14	0.21	0.31	−0.02	−0.08	−0.01	0.48	−0.43	−0.30	−0.65	−0.61
T	0.43	0.92	1.29	1.80	**2.39**	**3.07**	**2.97**	2.57	3.02	1.81	2.40	3.11	3.36	**3.84**	2.26	3.24	2.96	0.02	−0.65
Upgrading																			
E	0.00	0.00	0.00	0.01	0.00	−0.01	−0.07	−0.05	−0.03	−0.04	−0.05	−0.09	−0.06	−0.04	−0.02	−0.05	−0.06	−0.06	−0.09
C	0.44	−1.09	1.74	0.40	2.54	1.56	2.07	1.13	−1.20	−1.04	−0.78	−2.24	−2.05	−2.82	−2.67	−2.18	−2.13	−2.18	−2.05
I	0.00	−0.02	0.01	0.03	0.08	0.01	0.03	−0.03	−0.03	−0.02	−0.04	−0.06	0.07	0.07	0.00	−0.01	−0.01	−0.05	−0.01
T	0.44	−1.11	1.75	0.44	2.62	1.56	2.03	1.05	−1.26	−1.10	−0.87	−2.39	−2.04	−2.79	−2.69	−2.24	−2.20	−2.29	−2.15
N	682	649	649	637	632	632	620	621	628	627	622	609	604	596	587	578	574	558	547

Note: See Table A8

Table A.14
Decomposition of mean hourly wage difference over time in Euros: salariat versus working class, birth cohort 1959–68, female only

Y	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Overall																			
S	1.17	2.20	3.26	3.88	4.47	4.72	4.96	4.84	5.14	5.45	5.33	5.54	5.66	6.40	6.66	6.80	6.67	6.56	6.68
W	1.04	2.16	3.05	3.70	3.99	4.26	4.76	5.01	5.30	5.17	5.01	5.44	5.84	6.04	5.88	5.97	5.92	6.02	6.14
G	0.13	0.04	0.20	0.18	0.48	0.46	0.20	−0.16	−0.17	0.28	0.32	0.11	−0.19	0.36	0.78	0.84	0.76	0.54	0.54
Detailed																			
Degree initial																			
E	0.07	**0.29**	**0.42**	**0.41**	0.25	0.18	**0.53**	0.11	−0.11	−0.20	0.04	0.15	−0.04	0.30	0.02	−0.30	−0.31	−0.48	−0.36
C	0.08	0.48	0.81	0.41	0.16	0.03	0.23	0.23	−0.02	0.19	0.48	0.88	0.57	0.04	−0.05	0.54	−0.92	−0.86	−1.01
I	−0.01	−0.15	−0.20	−0.09	0.00	−0.24	−0.71	−0.41	−0.20	0.71	0.34	0.26	0.19	0.01	0.29	1.20	1.23	1.34	1.24
T	0.14	0.62	1.03	0.73	0.41	−0.03	0.05	−0.07	−0.33	0.70	0.86	1.29	0.72	0.71	0.26	1.44	0.00	0.00	−0.13
Upgrading																			
E	0.00	0.00	0.00	0.05	0.03	0.02	0.05	0.09	0.08	0.02	0.00	0.08	0.03	0.02	0.04	0.09	0.08	0.06	0.05
C	−0.34	0.55	−0.99	−1.28	−1.38	−0.59	1.24	0.88	0.74	1.16	−0.19	0.18	1.07	2.72	1.03	0.98	0.20	0.05	0.46
I	0.00	−0.01	0.00	−0.03	0.01	−0.02	−0.06	−0.08	−0.12	−0.02	0.03	−0.07	0.06	0.01	0.00	0.07	0.05	0.01	0.01
T	−0.34	0.54	−0.99	−1.26	−1.34	−0.59	1.23	0.89	0.70	1.16	−0.16	0.19	1.16	2.75	1.07	1.14	0.33	0.12	0.52
N	990	935	907	900	850	812	788	782	743	719	703	692	687	682	679	684	691	693	691

Note: See Table A8

Table A.15
Decomposition of mean hourly wage difference over time in Euros: salariat versus intermediate class, birth cohort 1959–68, female only

Y	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Overall																			
S	1.17	2.20	3.26	3.88	4.47	4.72	4.96	4.84	5.14	5.45	5.33	5.54	5.66	6.40	6.66	6.80	6.67	6.56	6.68
M	1.23	2.37	3.06	3.52	3.75	4.13	4.48	4.94	5.13	5.86	5.42	5.77	5.84	5.75	6.27	6.15	6.26	6.39	6.97
G	−0.06	−0.18	0.20	0.37	0.72	0.59	0.48	−0.09	0.01	−0.41	−0.09	−0.23	−0.19	0.65	0.39	0.66	0.42	0.17	−0.29
Detailed																			
Degree initial																			
E	0.05	0.17	**0.29**	0.12	−0.05	−0.31	−0.32	−0.37	**−0.71**	−0.53	−0.35	−0.40	−0.33	−0.09	0.18	0.01	0.09	−0.19	0.19
C	−0.17	−0.18	−0.26	−0.40	−0.36	−0.47	−0.57	−0.78	−0.92	−0.42	−0.19	0.03	0.38	0.34	0.43	0.12	−0.44	−0.74	−0.85
I	−0.02	−0.10	−0.13	0.09	0.26	0.30	0.24	0.18	0.48	0.74	0.47	0.45	0.20	0.20	−0.01	0.52	0.49	0.74	0.40
T	−0.14	−0.11	−0.10	−0.19	−0.15	−0.48	−0.65	−0.97	−1.15	−0.21	−0.07	0.08	0.25	0.45	0.60	0.65	0.14	−0.19	−0.26
Upgrading																			
E	0.00	0.00	0.00	−0.08	0.00	−0.02	0.01	0.08	0.12	0.17	0.09	0.28	0.28	0.12	−0.07	0.12	0.16	0.47	0.71
C	−0.34	−0.68	−0.33	**−4.23**	−2.28	−0.40	0.54	0.68	2.20	2.84	2.72	2.20	2.32	1.25	1.58	1.35	0.02	0.87	2.73
I	0.00	0.00	−0.01	0.12	0.05	0.06	0.08	−0.02	−0.10	−0.12	−0.09	−0.25	−0.22	−0.12	0.03	−0.14	−0.15	−0.39	−0.69
T	−0.34	−0.68	−0.34	**−4.19**	−2.23	−0.36	0.63	0.74	2.22	2.89	2.72	2.23	2.38	1.25	1.54	1.33	0.03	0.95	2.75
N	767	726	709	699	665	634	622	607	575	554	557	550	539	532	523	524	519	529	532

Note: See Table A8

Table A.16
Decomposition of mean hourly wage difference over time in Euros: salariat versus working class, birth cohort 1969–78, male only

Y	7	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Overall																			
S	1.38	2.76	4.08	5.21	5.87	7.08	7.64	8.22	8.77	9.80	10.21	10.62	11.18	11.42	12.10	12.64	13.73	14.65	15.06
W	0.87	1.75	2.38	3.06	4.06	4.54	5.12	5.71	6.33	6.80	7.50	8.12	8.17	8.62	9.24	9.51	9.59	9.77	10.01
G	**0.50**	**1.02**	**1.70**	**2.15**	**1.80**	**2.55**	**2.53**	**2.51**	**2.44**	**3.00**	**2.71**	**2.50**	**3.00**	**2.79**	**2.86**	**3.12**	**4.13**	**4.88**	**5.05**
Detailed																			
Degree initial																			
E	**0.25**	**0.50**	**0.74**	**1.02**	**1.13**	**1.44**	**1.75**	**2.13**	**2.33**	**2.60**	**3.02**	**3.38**	**2.93**	**2.81**	**2.92**	**2.69**	**3.41**	**2.76**	**2.55**
C	−0.08	−0.06	−0.13	−0.22	−0.16	−0.13	0.31	−0.33	−0.13	−0.30	−0.55	−0.52	−1.41	−1.23	−1.35	0.35	1.88	−0.14	0.61
I	0.08	0.22	0.43	0.68	0.79	0.80	0.91	0.77	0.65	0.52	0.09	−0.16	0.41	0.67	0.92	1.19	0.53	1.52	1.58
T	0.25	0.66	1.04	1.48	1.76	2.11	**2.97**	2.57	**2.85**	2.82	2.56	2.70	1.93	2.25	2.49	4.23	**5.82**	4.14	4.74
Upgrading																			
E	0.00	0.00	0.02	0.05	0.04	0.13	0.12	0.21	0.21	0.41	0.46	0.55	0.60	0.63	0.72	0.75	0.63	0.58	0.95
C	0.00	−0.28	−1.34	−1.74	−2.04	0.12	2.31	**3.96**	3.90	4.03	**4.86**	**5.49**	**6.11**	**5.82**	**5.89**	**4.82**	4.03	2.09	1.97
I	0.00	0.00	−0.01	−0.11	−0.07	−0.18	−0.24	−0.36	−0.34	−0.43	−0.35	−0.58	−0.62	−0.72	−0.93	−0.91	−0.82	−0.57	−0.78
T	0.00	−0.28	−1.33	−1.80	−2.07	0.07	2.19	3.81	3.77	4.01	**4.97**	**5.46**	**6.09**	**5.73**	**5.68**	**4.66**	3.84	2.10	2.14
N	567	527	512	510	502	499	500	502	490	475	470	453	431	410	386	375	346	313	277

Note: See Table A8

Table A.17
Decomposition of mean hourly wage difference over time in Euros: salariat versus intermediate class, birth cohort 1969–78, male only

Y	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Overall																			
S	1.38	2.76	4.08	5.21	5.87	7.08	7.64	8.22	8.77	9.80	10.21	10.62	11.18	11.42	12.10	12.64	13.73	14.65	15.06
M	1.05	2.14	3.19	4.08	4.66	5.40	5.85	6.24	6.81	7.12	7.56	7.97	8.43	8.65	9.01	9.04	9.94	10.15	10.54
G	0.33	0.62	**0.89**	**1.13**	**1.20**	**1.68**	**1.79**	**1.99**	**1.96**	**2.68**	**2.65**	**2.65**	**2.75**	**2.77**	**3.09**	**3.59**	**3.78**	**4.50**	**4.52**
Detailed																			
Degree initial																			
E	**0.53**	**0.95**	**1.34**	**1.82**	**1.92**	**1.69**	**1.48**	**1.95**	**2.51**	**2.63**	**2.94**	**3.00**	**2.72**	**2.57**	**2.74**	**3.33**	**2.56**	**2.66**	2.31
C	0.15	0.30	0.58	0.87	0.65	0.60	1.10	1.30	1.32	1.69	1.53	0.41	0.35	1.41	0.49	3.27	2.75	3.03	4.07
I	**−0.28**	**−0.43**	−0.52	−0.48	−0.35	0.06	0.58	0.35	−0.14	−0.08	−0.54	−0.50	−0.26	0.03	−0.02	0.02	0.67	0.55	0.93
T	0.40	0.82	1.40	2.21	2.22	2.35	3.16	3.60	**3.69**	**4.24**	**3.93**	2.91	2.81	**4.01**	3.21	**6.62**	**5.98**	**6.24**	**7.31**
Upgrading																			
E	0.00	0.00	0.06	0.03	0.10	0.06	−0.05	−0.18	−0.28	−0.25	−0.10	0.03	0.09	0.14	0.20	0.37	−0.12	−0.09	0.01
C	0.00	−2.02	−1.53	−1.87	−1.70	−2.52	−0.10	0.38	0.86	1.36	3.07	3.65	2.77	2.28	3.30	2.04	0.08	−0.42	−0.47
I	0.00	−0.02	−0.05	−0.06	−0.06	0.03	0.18	0.26	0.26	0.31	0.36	0.26	0.08	−0.06	−0.45	−0.66	−0.14	0.26	0.30
T	0.00	−2.04	−1.52	−1.90	−1.66	−2.43	0.03	0.46	0.84	1.42	3.33	3.94	2.94	2.36	3.05	1.75	−0.18	−0.25	−0.16
N	476	440	429	427	428	413	407	408	392	384	381	368	344	325	312	288	260	234	212

Note: See Table A8

Table A.18
Decomposition of mean hourly wage difference over time in Euros: salariat versus working class, birth cohort 1969–78, female only

Y	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Overall																			
S	0.97	1.91	2.52	3.37	4.17	4.45	4.77	4.43	4.79	5.48	5.50	5.30	5.35	6.01	6.07	6.21	5.91	5.96	6.11
W	0.82	1.53	2.19	2.68	3.21	3.50	3.68	4.14	4.26	4.87	5.02	5.53	5.80	6.03	6.49	6.63	6.83	7.10	7.58
G	0.14	0.38	0.33	0.69	0.96	0.95	1.09	0.30	0.53	0.61	0.47	−0.24	−0.45	−0.01	−0.41	−0.43	−0.92	−1.14	−1.47
Detailed																			
Degree initial																			
E	0.08	**0.29**	**0.38**	0.43	**0.68**	**0.92**	0.64	0.59	0.51	0.54	0.65	0.21	1.31	1.13	1.07	1.43	1.43	1.66	1.83
C	0.15	0.38	0.49	0.04	0.22	0.47	0.29	−0.19	−0.16	0.14	−0.73	−1.02	0.34	0.45	−0.18	−0.06	0.68	0.61	3.13
I	0.10	−0.16	−0.18	−0.14	−0.47	−0.60	−0.22	−0.08	−0.03	0.05	0.06	0.70	−0.67	−0.44	−0.25	−0.75	−0.57	−0.94	−1.12
T	0.33	0.51	0.69	0.33	0.43	0.79	0.71	0.32	0.32	0.73	−0.02	−0.11	0.98	1.14	0.64	0.62	1.54	1.33	3.84
Upgrading																			
E	0.00	0.00	0.00	0.01	0.05	0.07	0.02	0.03	0.22	0.04	0.13	−0.35	−0.43	−0.30	−0.41	−0.50	−0.11	−0.15	−0.14
C	0.00	0.28	−0.73	**−3.95**	**−5.86**	−1.78	−0.08	0.33	2.04	4.15	5.92	−0.31	−5.90	−8.43	−5.06	−6.26	−5.23	−5.15	−8.26
I	0.00	−0.01	0.00	0.13	0.23	0.05	−0.02	−0.02	−0.16	0.02	−0.17	0.38	0.70	0.68	0.59	0.70	0.41	0.31	0.31
T	0.00	0.27	−0.73	**−3.81**	**−5.58**	−1.66	−0.08	0.34	2.10	4.21	5.88	−0.28	−5.63	−8.05	−4.88	−6.06	−4.93	−4.99	**−8.09**
N	611	569	558	541	519	512	503	485	476	452	445	421	413	385	370	368	340	325	304

Note: See Table A8

Table A.19
Decomposition of mean hourly wage difference over time in Euros: salariat versus intermediate class, birth cohort 1969–78, female only

Y	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Overall																			
S	0.97	1.91	2.52	3.37	4.17	4.45	4.77	4.43	4.79	5.48	5.50	5.30	5.35	6.01	6.07	6.21	5.91	5.96	6.11
M	0.88	1.75	2.34	3.52	3.92	4.97	5.21	5.19	5.70	5.67	5.52	4.53	4.23	4.65	4.08	4.65	4.71	4.53	5.21
G	0.08	0.16	0.18	−0.15	0.24	−0.52	−0.44	−0.75	−0.91	−0.19	−0.02	0.77	1.12	1.37	1.99	1.56	1.20	1.43	0.90
Detailed																			
Degree initial																			
E	0.05	0.15	0.08	0.27	0.34	−0.21	0.17	0.04	0.15	0.16	0.19	0.39	−0.44	−0.30	0.00	0.10	0.02	−0.22	−0.22
C	0.28	0.17	0.13	0.17	0.36	1.74	0.32	0.59	0.08	−0.37	0.96	−0.88	0.67	1.61	−3.82	−1.19	−1.38	−1.24	−0.80
I	0.10	0.01	0.12	−0.03	−0.17	0.51	0.21	0.41	0.21	0.38	0.39	0.31	0.98	0.75	0.57	0.31	0.34	0.66	0.54
T	0.43	0.33	0.33	0.41	0.53	2.04	0.70	1.04	0.44	0.17	1.54	−0.18	1.21	2.06	−3.25	−0.78	−1.02	−0.80	−0.48
Upgrading																			
E	0.00	0.00	0.01	0.01	0.00	0.07	0.13	0.10	0.05	0.12	0.16	−0.04	0.01	0.02	0.13	0.16	−0.09	−0.16	−0.10
C	0.00	0.18	−1.00	−4.06	**−6.78**	**−5.50**	−2.42	−5.21	−3.64	−1.60	−2.47	2.47	−0.52	−1.32	3.92	0.49	−2.35	−1.31	−1.61
I	0.00	0.02	0.05	−0.13	−0.23	−0.02	−0.17	−0.09	−0.02	0.04	−0.07	0.30	0.19	−0.26	0.00	−0.06	0.18	0.24	0.17
T	0.00	0.20	−0.94	−4.18	**−7.01**	**−5.45**	−2.46	−5.20	−3.61	−1.44	−2.38	2.73	−0.32	−1.56	4.05	0.59	−2.26	−1.23	−1.54
N	510	473	460	450	424	417	410	395	391	372	364	351	337	321	304	301	280	266	252

Note: See Table A8

Table A.20
Sensitivity analysis: Decomposition of mean hourly wage difference over time in Euros: salariat versus working class, birth cohort 1959–68

Y	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Overall																			
S	1.38	2.78	4.20	5.32	6.32	7.13	7.84	8.37	9.00	9.67	9.95	10.34	10.60	11.38	11.71	11.80	11.91	11.96	12.06
W	1.24	2.42	3.46	4.42	5.03	5.61	6.26	6.75	7.27	7.72	7.82	8.27	8.60	8.96	9.06	9.20	9.22	9.40	9.52
G	0.14	**0.36**	**0.74**	**0.90**	**1.29**	**1.52**	**1.58**	**1.62**	**1.73**	**1.95**	**2.13**	**2.07**	**2.00**	**2.42**	**2.65**	**2.60**	**2.68**	**2.56**	**2.55**
Detailed																			
Degree initial																			
E	**0.13**	**0.38**	**0.65**	**0.92**	**1.00**	**1.20**	**1.58**	**1.57**	**1.70**	**1.82**	**2.00**	**2.13**	**2.19**	**2.39**	**2.43**	**2.29**	**2.30**	**2.09**	**1.98**
C	−0.05	0.02	0.05	0.19	−0.17	0.03	−0.06	−0.31	−0.11	−0.32	−0.28	−0.19	0.31	0.14	0.19	0.78	−0.32	−0.33	−0.51
I	0.10	0.16	0.23	0.20	0.40	0.37	0.06	0.27	0.30	0.26	0.08	−0.01	−0.29	−0.29	−0.30	−0.10	0.15	0.46	0.65
T	0.18	**0.56**	**0.93**	**1.31**	**1.23**	**1.60**	**1.58**	**1.53**	**1.89**	**1.76**	**1.80**	**1.93**	**2.21**	**2.24**	**2.32**	**2.97**	**2.13**	**2.22**	**2.12**
Upgrading																			
E	0.00	0.00	−0.02	0.00	0.02	0.03	0.04	0.03	0.01	0.00	0.02	0.00	0.03	0.04	0.02	0.05	0.04	0.05	0.08
C	−0.40	1.41	−0.42	−0.55	0.38	0.91	1.29	0.90	−0.55	0.45	0.16	0.49	0.43	0.62	−0.70	−0.26	−0.49	0.21	−0.23
I	0.00	0.00	0.00	0.02	−0.02	−0.05	−0.08	−0.05	−0.07	−0.03	−0.01	−0.01	0.02	0.02	0.08	0.09	0.08	0.04	0.03
T	−0.40	1.41	−0.44	−0.53	0.38	0.89	1.25	0.88	−0.61	0.42	0.17	0.48	0.48	0.68	−0.60	−0.12	−0.37	0.30	−0.12
N	1449	1376	1350	1329	1315	1299	1290	1308	1306	1303	1312	1319	1338	1344	1354	1382	1405	1428	1456

Note: See Table A8
Sensitivity analysis: Sample restricted to cases observed over the full 20 career years.

Table A.21
Sensitivity analysis: Decomposition of mean hourly wage difference over time in Euros: salariat versus intermediate class, birth cohort 1959–68

Y	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Overall																			
S	1.38	2.78	4.20	5.32	6.32	7.13	7.84	8.37	9.00	9.67	9.95	10.34	10.60	11.38	11.71	11.80	11.91	11.96	12.06
M	1.54	2.94	3.97	4.74	5.48	5.87	6.51	7.18	7.60	8.27	8.30	8.54	8.88	9.12	9.62	9.60	9.90	10.03	10.44
G	−0.16	−0.15	0.23	0.57	**0.84**	**1.25**	**1.33**	**1.19**	**1.41**	**1.40**	**1.65**	**1.80**	**1.72**	**2.26**	**2.09**	**2.20**	**2.00**	**1.94**	**1.62**
Detailed																			
Degree initial																			
E	**0.15**	**0.39**	**0.58**	**0.69**	**0.78**	**0.84**	**0.99**	**0.95**	**1.00**	**1.34**	**1.51**	**1.38**	**1.38**	**1.36**	**1.62**	**1.47**	**1.54**	**1.49**	**1.51**
C	−0.28	−0.47	−0.60	−0.24	−0.05	0.21	−0.01	−0.26	−0.08	−0.48	−0.39	−0.50	0.03	−0.25	−0.08	−0.26	−0.35	−0.47	−0.60
I	−0.03	−0.06	−0.05	−0.01	0.00	0.05	−0.02	0.10	0.13	−0.09	−0.23	−0.07	−0.28	−0.09	−0.36	−0.18	−0.12	−0.04	−0.04
T	−0.16	−0.14	−0.07	0.44	0.73	1.10	0.96	0.79	1.05	0.77	0.89	0.81	1.13	1.02	1.18	1.03	1.07	0.98	0.87
Upgrading																			
E	0.00	0.00	0.01	−0.04	0.00	−0.04	−0.03	0.04	0.07	0.05	0.01	0.03	0.10	0.07	0.00	0.03	0.02	0.05	0.04
C	−0.34	0.70	1.81	−2.00	0.30	1.51	2.75	2.19	1.09	1.06	0.91	1.06	0.93	−0.41	−0.64	−0.74	−1.11	−0.83	−0.58
I	0.00	0.00	−0.01	0.10	0.02	0.09	0.07	−0.02	−0.04	−0.02	−0.01	−0.05	−0.08	−0.04	−0.02	−0.06	−0.04	−0.08	−0.07
T	−0.34	0.70	1.81	−1.94	0.32	1.56	2.79	2.21	1.12	1.09	0.91	1.04	0.95	−0.38	−0.66	−0.77	−1.13	−0.86	−0.61
N	1072	1019	1006	987	974	965	959	959	962	959	973	974	982	988	1000	1022	1036	1056	1079

Note: See Tables A8 and A20

Table A.22
Sensitivity analysis: Decomposition of mean hourly wage difference over time in Euros: salariat versus working class, birth cohort 1969–78

Y	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Overall																			
S	1.08	2.24	3.11	4.08	4.84	5.39	5.62	5.78	6.29	7.09	7.05	7.27	7.52	8.17	8.28	8.93	9.14	9.43	9.93
W	1.03	1.89	2.60	3.05	3.95	4.31	4.80	5.21	5.70	6.26	6.60	7.06	7.38	7.70	8.24	8.41	8.41	8.47	8.85
G	0.05	0.35	0.51	**1.03**	0.89	**1.08**	0.81	0.57	0.59	0.84	0.45	0.21	0.14	0.47	0.03	0.51	0.73	0.95	1.08
Detailed																			
Degree initial																			
E	0.08	**0.46**	**0.57**	0.48	**0.70**	**0.89**	**0.74**	**0.92**	**0.90**	0.90	0.95	1.17	**1.64**	1.09	1.15	**1.45**	**1.67**	**1.90**	**1.85**
C	0.19	0.52	0.89	0.39	0.41	0.67	0.89	0.74	0.52	−0.44	−0.50	−0.72	0.12	0.34	−0.35	0.52	0.81	1.16	1.38
I	−0.05	−0.39	−0.31	−0.12	−0.21	−0.08	0.50	0.51	0.38	0.77	0.43	0.56	0.22	1.01	1.00	0.90	0.78	0.79	0.78
T	0.22	0.59	1.15	0.75	0.90	1.48	2.13	2.17	1.80	1.23	0.88	1.01	1.98	2.44	1.80	2.87	3.26	3.85	4.01
Upgrading																			
E	0.00	0.00	0.00	−0.01	−0.02	0.21	0.12	0.18	0.21	0.44	0.34	0.62	0.75	0.72	**1.01**	**0.85**	**0.62**	0.50	**0.55**
C	0.00	−1.11	−0.44	−4.64	**−6.54**	−0.42	2.71	2.75	4.48	4.15	4.22	**10.75**	3.66	−0.31	2.93	2.69	2.00	1.06	0.24
I	0.00	−0.01	0.00	0.05	0.08	−0.14	−0.16	−0.20	−0.16	−0.28	−0.28	−0.55	−0.46	−0.40	−0.69	−0.52	−0.28	−0.11	−0.11
T	0.00	−1.12	−0.44	−4.60	**−6.48**	−0.35	2.67	2.73	4.53	4.31	4.28	**10.82**	3.95	0.01	3.25	3.02	2.34	1.45	0.68
N	576	535	523	513	505	503	508	509	511	503	512	517	527	524	528	548	550	566	581

Note: See Tables A8 and A20

Table A.23
Sensitivity analysis: Decomposition of mean hourly wage difference over time in Euros: salariat versus intermediate class, birth cohort 1969–78

Y	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Overall																			
S	1.08	2.24	3.11	4.08	4.84	5.39	5.62	5.78	6.29	7.09	7.05	7.27	7.52	8.17	8.28	8.93	9.14	9.43	9.93
M	1.00	1.95	2.77	3.58	4.44	5.35	5.95	5.83	6.19	6.58	6.66	6.07	6.29	6.67	6.65	7.03	7.60	7.32	7.89
G	0.08	0.29	0.34	0.50	0.40	0.05	−0.33	−0.05	0.10	0.52	0.38	1.21	1.23	1.50	1.63	1.90	1.54	**2.11**	**2.04**
Detailed																			
Degree initial																			
E	0.06	0.11	0.20	0.34	0.67	0.71	0.95	1.06	1.08	0.86	0.85	0.83	0.57	0.75	0.71	0.72	0.68	0.63	0.81
C	0.01	−0.14	0.41	0.71	1.06	2.36	0.94	1.38	0.78	0.86	0.30	1.39	2.47	2.89	1.91	1.98	1.58	2.13	2.34
I	−0.02	−0.05	−0.06	−0.12	−0.39	−0.22	−0.01	−0.01	−0.13	0.38	0.15	0.40	0.60	0.56	0.64	0.81	0.93	1.16	0.90
T	0.05	−0.08	0.55	0.93	1.34	2.85	1.88	2.43	1.73	2.10	1.30	2.62	3.64	4.20	3.26	3.51	3.19	3.92	4.05
Upgrading																			
E	0.00	0.01	−0.02	0.02	0.02	−0.04	−0.09	0.08	0.17	−0.09	−0.14	−0.19	−0.15	−0.17	0.06	0.19	0.02	0.03	0.05
C	0.00	−1.69	−3.61	−4.73	**−5.84**	−4.09	0.24	1.05	3.78	1.80	2.13	3.82	0.78	−2.37	0.90	1.39	0.96	1.35	1.35
I	0.00	−0.01	0.09	−0.04	−0.12	0.08	0.16	−0.06	−0.09	0.21	0.16	0.33	0.32	−0.07	−0.03	−0.13	0.21	0.27	0.31
T	0.00	−1.69	−3.54	−4.75	**−5.94**	−4.05	0.31	1.07	3.86	1.92	2.15	3.96	0.95	−2.61	0.93	1.45	1.19	1.65	1.71
N	461	426	421	407	405	397	395	395	399	394	407	419	422	422	428	441	447	455	464

Note: See Tables A8 and A20

Table A.24
Sensitivity analysis (individuals who entered the labour market in the former West German federal states): Decomposition of mean hourly wage difference over time in Euros: salariat versus working class, birth cohort 1959–68

Y	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Overall																			
S	1.42	2.84	4.21	5.23	6.29	7.01	7.65	8.05	8.88	9.48	9.78	10.26	10.49	11.34	11.71	11.78	11.99	11.97	12.15
W	1.21	2.40	3.43	4.27	4.85	5.39	6.03	6.52	7.03	7.43	7.60	7.97	8.40	8.81	8.96	9.11	9.11	9.30	9.48
G	**0.21**	**0.44**	**0.78**	**0.96**	**1.44**	**1.62**	**1.62**	**1.53**	**1.85**	**2.05**	**2.18**	**2.29**	**2.09**	**2.53**	**2.75**	**2.67**	**2.88**	**2.67**	**2.67**
Detailed																			
Degree initial																			
E	**0.17**	**0.44**	**0.67**	**0.91**	**1.00**	**1.13**	**1.53**	**1.48**	**1.58**	**1.73**	**1.86**	**2.00**	**1.89**	**2.13**	**2.16**	**1.98**	**1.99**	**1.81**	**1.82**
C	0.05	0.29	0.38	0.18	−0.10	−0.05	−0.09	−0.25	−0.20	−0.31	−0.21	0.05	0.25	0.08	0.00	0.04	−0.79	−0.70	−0.66
I	0.05	0.04	0.09	0.05	0.25	0.28	−0.08	0.04	0.16	0.20	0.15	0.06	0.04	0.00	0.02	0.14	0.42	0.64	0.67
T	**0.27**	**0.77**	**1.14**	**1.14**	**1.15**	**1.36**	**1.36**	**1.27**	**1.54**	**1.62**	**1.80**	**2.11**	**2.18**	**2.21**	**2.18**	**2.16**	1.62	**1.75**	**1.83**
Upgrading																			
E	0.00	0.00	0.00	0.00	0.02	0.03	0.04	0.05	0.01	0.02	0.01	−0.01	0.02	0.06	0.02	0.05	0.04	0.07	0.11
C	−1.44	1.67	−0.52	−2.28	−0.42	0.19	0.81	0.73	−0.76	0.26	−0.35	−0.73	0.31	0.87	−0.49	−0.42	−0.58	−0.24	0.02
I	0.00	0.00	0.00	0.01	−0.02	−0.05	−0.08	−0.07	−0.05	−0.03	0.01	0.05	0.07	0.04	0.11	0.11	0.09	0.05	0.03
T	−1.44	1.67	−0.52	−2.27	−0.42	0.17	0.77	0.71	−0.80	0.25	−0.33	−0.69	0.40	0.97	−0.36	−0.26	−0.45	−0.12	0.16
N	1826	1736	1702	1687	1644	1601	1566	1566	1526	1499	1484	1460	1451	1438	1422	1418	1425	1417	1407

Note: See Table A8
Sensitivity analysis: Sample restricted to individuals who entered the labour market in the former West German federal states.

Table A.25
Sensitivity analysis (individuals who entered the labour market in the former West German federal states): Decomposition of mean hourly wage difference over time in Euros: salariat versus intermediate class, birth cohort 1959–68

Y	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Overall																			
S	1.42	2.84	4.21	5.23	6.29	7.01	7.65	8.05	8.88	9.48	9.78	10.26	10.49	11.34	11.71	11.78	11.99	11.97	12.15
M	1.48	2.83	3.84	4.64	5.35	5.87	6.44	7.03	7.39	8.19	8.15	8.59	8.81	8.99	9.48	9.55	9.83	9.98	10.35
G	−0.06	0.01	0.37	**0.59**	**0.94**	**1.14**	**1.21**	**1.02**	**1.49**	**1.29**	**1.63**	**1.67**	**1.68**	**2.35**	**2.23**	**2.23**	**2.16**	**1.99**	**1.80**
Detailed																			
Degree initial																			
E	**0.19**	**0.41**	**0.63**	**0.68**	**0.79**	**0.87**	**0.92**	**0.86**	**0.82**	**1.08**	**1.28**	**1.15**	**1.25**	**1.33**	**1.45**	**1.28**	**1.28**	**1.31**	**1.38**
C	0.00	0.12	0.11	0.17	0.24	0.43	0.25	0.01	0.11	−0.21	0.08	0.32	0.89	0.84	0.63	0.42	−0.18	−0.37	−0.81
I	−0.05	−0.11	−0.14	−0.08	−0.06	−0.03	−0.01	0.04	0.20	0.06	−0.10	0.02	−0.21	−0.12	−0.23	−0.17	0.00	0.02	0.01
T	0.14	0.42	0.60	0.77	0.97	**1.27**	1.16	0.91	1.13	0.93	1.26	1.49	1.93	2.05	1.85	1.53	1.10	0.96	0.58
Upgrading																			
E	0.00	0.00	0.00	−0.06	−0.01	−0.01	0.02	0.06	0.05	0.04	0.00	0.05	0.11	0.07	−0.01	0.00	0.01	0.05	0.06
C	−1.38	0.72	1.17	**−4.00**	−0.92	0.59	1.62	1.40	0.64	0.83	0.78	0.02	0.76	−0.22	−0.22	−0.51	−0.99	−1.05	−0.23
I	0.00	0.00	0.00	0.04	0.01	0.02	−0.02	−0.06	−0.05	−0.04	−0.02	−0.09	−0.07	−0.02	−0.01	−0.03	−0.03	−0.07	−0.09
T	−1.38	0.72	1.17	**−4.02**	−0.92	0.60	1.62	1.40	0.64	0.83	0.76	−0.02	0.80	−0.17	−0.24	−0.54	−1.01	−1.07	−0.26
N	1372	1302	1287	1264	1229	1200	1178	1162	1137	1117	1116	1099	1085	1071	1056	1052	1044	1040	1034

Note: See Tables A8 and A24

Table A.26
Sensitivity analysis (individuals who entered the labour market in the former West German federal states): Decomposition of mean hourly wage difference over time in Euros: salariat versus working class, birth cohort 1969–78

Y	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Overall																			
S	1.25	2.48	3.46	4.52	5.29	6.09	6.42	6.54	6.99	7.91	8.27	8.34	8.55	9.03	9.49	9.69	10.07	10.51	10.33
W	0.98	1.80	2.50	3.13	3.79	4.28	4.70	5.21	5.69	6.27	6.63	7.25	7.37	7.78	8.37	8.53	8.59	8.83	9.08
G	**0.27**	**0.68**	**0.96**	**1.39**	**1.50**	**1.81**	**1.72**	**1.33**	**1.30**	**1.64**	**1.64**	1.09	1.18	1.25	1.12	1.16	1.48	1.68	1.25
Detailed																			
Degree initial																			
E	0.13	**0.35**	**0.52**	**0.74**	**0.95**	**1.24**	**1.24**	**1.30**	**1.52**	**1.75**	**2.11**	**2.04**	**2.05**	**1.99**	**2.16**	**2.04**	**2.32**	**2.19**	**2.04**
C	0.07	0.11	0.42	0.25	0.34	0.52	0.59	0.11	0.26	−0.27	−0.19	−0.62	−0.70	−0.79	−1.43	−0.23	0.42	0.90	1.47
I	0.11	0.07	0.19	0.20	0.09	0.11	0.38	0.47	0.21	0.19	0.00	0.16	0.03	0.30	0.37	0.42	0.31	0.77	0.73
T	0.31	0.53	1.13	1.19	1.38	1.87	**2.21**	1.88	1.99	1.67	1.92	1.58	1.38	1.50	1.10	2.23	3.05	3.86	4.24
Upgrading																			
E	0.00	0.00	0.01	0.00	0.01	0.10	0.14	0.24	0.26	0.38	0.28	0.13	0.24	0.29	0.43	0.42	0.41	0.33	0.41
C	0.00	0.52	−2.73	−3.76	**−6.16**	−1.81	1.05	2.42	3.46	4.09	**5.37**	4.31	3.57	0.36	4.01	3.01	2.66	1.23	0.49
I	0.00	0.00	0.00	−0.03	0.02	−0.03	−0.17	−0.28	−0.26	−0.31	−0.14	−0.13	−0.07	−0.29	−0.31	−0.25	−0.17	0.03	−0.09
T	0.00	0.52	−2.72	−3.79	**-6.13**	−1.74	1.02	2.38	3.46	4.16	**5.51**	4.31	3.74	0.36	4.13	3.18	2.90	1.59	0.81
N	959	895	872	852	836	831	816	802	784	750	736	710	685	644	610	602	559	526	480

Note: See Tables A8 and A24

Table A.27
Sensitivity analysis (individuals who entered the labour market in the former West German federal states): Decomposition of mean hourly wage difference over time in Euros: salariat versus intermediate class, birth cohort 1969–78

Y	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Overall																			
S	1.25	2.48	3.46	4.52	5.29	6.09	6.42	6.54	6.99	7.91	8.27	8.34	8.55	9.03	9.49	9.69	10.07	10.51	10.33
M	1.00	2.08	2.98	4.04	4.53	5.34	5.66	5.85	6.68	6.78	6.91	6.62	6.99	7.24	7.24	7.35	7.79	7.74	8.12
G	0.25	0.40	0.48	0.48	0.76	0.75	0.76	0.69	0.31	1.13	1.36	**1.72**	1.56	**1.79**	**2.25**	**2.34**	**2.28**	**2.77**	**2.21**
Detailed																			
Degree initial																			
E	**0.27**	**0.58**	**0.82**	**1.02**	**1.31**	**1.07**	**1.11**	**1.36**	**1.65**	**1.83**	**2.13**	**2.15**	**1.90**	**1.72**	**1.91**	**1.81**	**1.43**	**1.35**	0.96
C	0.15	−0.02	0.18	0.24	0.35	1.16	0.02	0.08	−0.57	−0.87	0.13	0.07	0.86	1.20	−0.10	1.28	1.07	2.53	2.54
I	−0.06	−0.20	−0.25	−0.25	−0.44	0.07	0.25	0.10	−0.20	−0.15	−0.29	−0.25	−0.25	−0.03	−0.10	0.09	0.45	0.72	0.89
T	0.36	0.36	0.75	1.01	1.22	**2.30**	1.38	1.54	0.88	0.81	1.97	1.97	2.51	2.89	1.71	3.18	2.95	4.60	4.39
Upgrading																			
E	0.00	0.00	0.03	0.01	0.03	0.00	−0.04	−0.15	−0.08	−0.25	−0.14	−0.10	−0.03	0.07	0.38	0.51	−0.04	0.01	0.02
C	0.00	1.42	−1.84	−2.40	**−5.39**	**−4.55**	−1.04	−0.49	2.20	1.87	4.20	**5.29**	3.53	0.86	**5.68**	4.55	1.87	2.00	2.11
I	0.00	0.01	−0.02	−0.07	−0.25	−0.08	0.00	0.14	0.07	0.31	0.28	0.24	0.17	−0.29	−0.37	−0.49	0.19	0.32	0.24
T	0.00	1.43	−1.83	−2.46	**−5.61**	**−4.63**	−1.08	−0.50	2.19	1.93	4.34	**5.43**	3.67	0.64	**5.69**	4.57	2.02	2.33	2.37
N	796	735	713	704	690	673	663	648	632	611	598	578	546	520	499	476	439	410	377

Note: See Tables A8 and A24

Appendix B

Recoding Procedures

We deflated gross daily wages, following the procedure of Stüber et al. (2023): 5), using the consumer price index at 2015 prices. We used the index for West Germany until 1991, and, from 1992 onwards, a unified index covering both the former West German and East German federal states. To impute top-censored wages, observations were clustered (year, region, and education). We then ran Tobit wage regressions controlling for individual characteristics (age, gender, full-time or part-time, job duration, and social origin). If values for the place of work were missing, we replaced them with values from previous and subsequent spells where employer IDs were consistent. We estimate the right-censored values and add an error term to avoid biased results (Stüber et al. 2023, Gartner 2005[4]).

Although NEPS data can be matched with administrative data using person IDs, further manipulation is necessary to match spell information (Reichelt, 2015). As administrative data excludes civil servants, soldiers, self-employed individuals, and freelancers, these spells are deleted from the NEPS data. In many cases, the start and end dates of the spells cannot be matched unambiguously: there are reporting inaccuracies and errors in the NEPS data, such as the recall of incorrect start and end dates (Reichelt, 2015). Similarly, social security data depend on employers and the quality of their reporting (Reichelt, 2015). Furthermore, data are reported by employers per reporting period, i.e. annually or when another reason for reporting arises, such as the termination of an employment contract. Furthermore, consecutive jobs with the same employer are treated as separate spells in the administrative data, whereas NEPS may only report one spell (Reichelt, 2015). Moreover, matching parallel or overlapping spells with different employers across the different datasets is difficult, as there is often insufficient information to identify related spells (Reichelt, 2015). In the case of parallel spells, such as when several jobs are held at the same time, we focus on the main activity. This plays the most important role in terms of career opportunities and wages and should therefore be of superior quality to other activities in terms of respondent recall (Reichelt, 2015: 6). As there is no clear way to identify the main job in the NEPS data, we sort the parallel months based on different variables to determine the main job. The sorting mechanism creates an order of parallel jobs based on the following variables: type of job (order: 1. employee or worker, 2. seasonal work, 3. mini-job), main spell (1.) or side spell (2.), full-time at the start of employment (yes (1.) or no (2.)), contractual hours at the start of employment (higher (1.) or lower), contractual hours at the end of employment (higher (1.) or lower), temporary work (yes (1.) or no (2.)), ISEI (higher (1.) or lower). Similarly, administrative data also contain parallel spells. Here, we define the main employment spell as the episode with the longest duration (Stüber et al. 2023). In terms of wages, after generating the daily wage, we calculate the hourly wage by multiplying the daily wage by 7 (the number of calendar days per week) and then dividing the result by the number of hours worked each week.

Data Availability

The data access was provided via on-site use at the Research Data Centre (FDZ) of the German Federal Employment Agency (BA) at the Institute for Employment Research (IAB), and at the University of Applied Labour Studies (HdBA), and subsequently remote data access.

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