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A comparative study of West Germany and
the United States

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Abstract

This article studies wage mobility over the early careers in West Germany and the United States. Through an institutional lens, we examine (1) the extent of intragenerational wage fluctuations; (2) whether they structure into upward mobility trends or remains volatile variations; and (3) whether mobility trends align with classical stratification dimensions. We highlight three main findings. First, intragenerational wage fluctuations are stronger in the United States compared with Germany. Second, wage fluctuations translate into steeper trends of upward mobility in Germany, but the heterogeneity in wage trends across individuals and the year-to-year volatility around the individual trends are larger in the United States. Lastly, we find persistent intragenerational wage inequality by gender, social origin, education, and race. These results point toward the idea that higher wage fluctuations in the United States do not reflect opportunities for upward mobility but rather uncertainty around the prospects of progression.

Keywords: intragenerational mobility, social stratification, wage mobility, economic sociology

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Introduction

The labour market is one of the central institutions channelling economic resources and determining who gets what in Western societies. Labour earnings (i.e., income from the labour market) represent the largest source of income for individuals and families and made up for two thirds of the total individual income at the turn of the 20th century in the largest economy of the Western World, that is the United States (Ehrenberg and Smith, 2016). Earnings are conventionally expressed by $E = w \times h$, where h represents the working hours and w is the wage rate, namely the price of one hour of labour (Blau and Kahn 2009). Variations in the wage rate (w) explain a major portion of variations in earnings in many countries. In the mid-90s, about 70 percent of the earning inequality was attributable to variations in the wage rate in the United States (Blau and Kahn 2009). If we equalized the wage rate in a thought experiment, earning inequality in the United States would drop to 30% of the amount of inequality we observed in the mid-90s. Therefore, the wage rate is a central component of individual and family income and variation of the wage rate in a society, that is wage dispersion, is a key aspect of economic inequality.

Wage dispersion reflects a meritocratic principle of job allocation in classic economic accounts. Human capital theories predict that better educated individuals, having higher skills and abilities, will be more productive on the job and will secure higher wages compared to lower educated and skilled individuals. Wage dispersion also depends on the age profile of the working population because the wage rate is a function of workers' acquired tenure and labour market experience. However, wage dispersion does not reflect only the allegedly meritocratic principle of the market. Sociological accounts have long been stressing that ascriptive characteristics, such as gender, socioeconomic background or race help individuals securing advantages on the labour market irrespective of the own level of education and skills. What is more, such advantages may not be confined to the labour market entry but persist throughout the occupational career. Finally, institutional characteristics of the labour market and the education systems co-determine wage dispersion. Collective bargaining and agreements affect the variability of wages across individuals and bound the room for wage progression over the career. And yet the linkage between the skills acquired in school and demanded on the labour market impacts wage

inequality throughout the life course via initial job-skill matches and subsequent labour-market adjustments.

A plethora of economic and sociological scholarship have focused on wage variations between individuals in a variety of countries and historical periods. And yet wage variations over the life cycle (hereafter, wage fluctuations) and their alignment with classical stratification dimensions has received much less attention. The existing longitudinal scholarship mostly focused on occupational dimensions other than the wage rate, such as occupational prestige (Härkönen and Bihagen 2011; Lersch, Schulz, and Leckie 2020; Manzonì, Härkönen, and Mayer 2014) or socioeconomic status (Barone, Lucchini, and Schizzerotto 2011; Passaretta et al. 2018), and peculiar income concepts, such as the equivalised disposable income (Gangl 2004) or earnings (Yaish and Gabay-Egozi 2021). Although interesting, these studies cannot inform us about patterns of intra-cohort inequality in one of the most important components of income and a crucial dimension of occupational attainment: the wage rate. The few studies which focused specifically on wages examined one single country at a time and seem confined to the United States (Cheng 2014a; Yaish et al. 2021). What is more, the latter studies focused on intra-generational inequality by looking at average wage trajectories across groups but paid little to no attention to the theoretical and empirical relationships between the evolution of between-group inequality and the overall level of wage fluctuations over the occupational careers.

This study reconstructs the wage trajectories over the first ten years of career for individuals entered the labour market in the period 1984–2005 in the United States and West Germany. We estimate the degree of intra-generational wage fluctuations and assess the extent to which wage fluctuations reflect opportunities for wage progression and uncertainty. And yet we descriptively link the degree of intra-generational variability in wages with patterns of between-group inequality by classical stratification dimensions in Western societies, that is gender, social background, the own education level, and race (when relevant). Our research is guided by the following research questions: *Are intra-generational wage fluctuations more prominent in Germany or the United States? To what extent do intra-generational wage fluctuations translate into upward mobility in the two countries? Does intra-generational upward mobility structure according to classical lines of social stratification? And does it translate into rising or weakening between-group inequality along the early occupational careers?*

The United States and Germany represent institutional opposites in the Western World. The United States embodies the *liberal market economy* (LME) combining weak interference of the State on the labour market dynamics, weak unionization, and education systems offering general skills (Hall and Soskice 2001). On the contrary, Germany represents a *coordinated market economy* (CME) whose coordination rely on the provision of specific skills, strong trade unionism and centralised collective bargaining. As we will argue, these differences are likely to affect the nature and the extent of intra-generational wage fluctuations and the chances that group-based inequality in the wage rate will change once individuals have first entered the labour market. Our article offers insights on the links between intra-generational wage fluctuations and the evolution of between group inequality over the life course by providing a qualitative comparison between two countries characterised by sharply different institutional contexts.

Varieties of capitalism and wage fluctuations

Liberal and coordinated market economies represent two distinct institutional equilibria in the varieties of capitalism (VoC) approach (Cusack et al., 2006; Estevez-Abe et. al 2001; Hall and Soskice, 2001; Iversen and Soskice, 2001). Coordination depends mostly on market dynamics in LMEs as national legislations hardly protect employee-employer relationships. Trade unionism is typically weak and collective bargaining highly decentralized. This arrangement makes it more profitable and rational for firms and workers to invest in general skills, which are transferable across employers and even employment sectors. In fact, LMEs typically combine academically oriented education systems, limited on the-job training, and a production regime based on radical innovation. Coordination among economic actors does not rely exclusively on market dynamics in CMEs but also on non-market forms of bargaining and collaboration between the organization of companies, unions, and work councils. This mode of coordination incentivizes both workers and firms to invest in specific skills that are hardly transferable among employers and sectors. In these contexts, educational systems provide specific and occupational skills that are easily recognizable by employers, and employment relationships are protected by the law.

The institutional arrangement in LMEs and CMEs bears important consequences for the extent of intra-generational wage fluctuations. Tight school-to-work linkages and the strong protection of employment relationships reduce job turnover in Germany and other CMEs. Employers have little reasons to fire workers after the provision of in-house training, nor they can easily lay-off workers due to strict rules to firing practices. Neither do workers have incentives in changing job after having received tailored training because their specific skills are hardly transferable across firms or sectors. Conversely, the loose school-to-work linkages and weak employment protection increase job turnover in the US and other LMEs. Because job turnover is often accompanied with a wage change (although the relationship is not deterministic), we would expect larger and more frequent intra-generational fluctuations of the wage rate in the US compared to Germany.

The level of (de)centralization of collective bargaining and union strength are other fundamental pieces of the puzzle. Wage settings in CMEs are rather centralized and dependent on collective agreements. These agreements usually set the pay scale and the wage progression in different occupations or industries. And yet strong unions, which are typically found in CMEs, contribute to lower wage dispersion not only across individuals but also over the lifecycle by boosting the bottom of the wage distribution (Card 1996; Card, Lemieux, and Riddell 2004, 2020). Wage settings are centralized, and collective bargaining takes place at the industry level or even at the economy level in Germany. Conversely, wage settings are highly decentralized in the US, which allows for larger discretion over the wage rate as workers acquire tenure and labour market experience. Centralized bargaining processes and strong unionization in Germany should contribute further to lowered intra-generational fluctuations in the wage rate compared to the US.

Opportunity and uncertainty

What is the nature of wage fluctuations in the two institutional settings? Do they reflect long-term trends of upward mobility or transient changes? Do they reflect opportunities for wage progression or uncertainty around the own wage prospects? The literature on income development often separates income fluctuations over the life cycle in two components: fluctuations which follow a directional

(either upward or downward) trajectory; and fluctuations that are transient income changes around the trajectory (Gangl 2005; Latner 2018). The first component is often referred to as the individual ‘income trend’; the second component is often referred to as ‘income volatility’. We borrow these terms and distinguish between *wage trend* and *wage volatility* as two main components of wage fluctuations over the life cycle (see Figure 1).

Human capital theory predicts positive wage trends over the occupational careers as the wage rate increases with the years of working experience (Mincer, 1958). Upward mobility trends usually flatten around the mid-thirties, the point in time when individuals reach occupational maturity. Flattening trends of upward mobility are consistent with human capital accounts postulating decreasing returns to specific skills over tenure (Mincer, 1974), and with the idea that promotions on internal labour markets concentrate among young employees (Kerckhoff, 1995; Marsden and Ryan, 1995). Nonetheless, human capital accounts fall short when it comes to explain the heterogeneity of wage trends between individuals and the volatility of wage rates around the individual trends of progression.

Wage trend heterogeneity and *volatility* are not only important from an economic standpoint but bear important consequences for the real-life experiences of workers in a society. Strong heterogeneity in individual’s wage trends reflects the idea that labour market entrants in a country will have more uncertainty around their own prospects of progression in the long term. Strong volatility around individual wage trends reflects the idea that individuals will experience more uncertainty in term of year-to-year wage changes in the short-term. Therefore, both the levels of *wage trend heterogeneity* and *wage volatility* are meaningful pieces of information to qualify wage fluctuations as opportunity for upward progression and quantify the uncertainty around wage progression in a country.

Institutional explanations may help where human capital theories fall short. The strictness of school-to-work linkages, the protection of employment relationships, and the (de-)centralization of collective bargaining in CMEs and LMEs may bear consequences for both *heterogeneities* of individual wage trends and the *volatility* around these trends. Strong school-to-work linkages in Germany should facilitate job matching process and put most workers on a clear-cut and predictable career path. And yet comparatively higher levels of employment protection and centralised bargaining should reduce the uncertainty around the career progression by limiting job turnover and possible year-to-year changes in

the wage rate. This is the scenario of comparatively lower trend heterogeneity and low volatility we expect in Germany (Figure 1a, c). Conversely, poor school-to-work linkages, weak restrictions over firing practices, and decentralised bargaining at the occupation or even the firm-level in the US may favour both year-to-year wage changes and stronger heterogeneity in the trends of upward progression between individuals. This is the scenario of comparatively high wage trend heterogeneity and high volatility we expect in the US (Figure 1b, d).

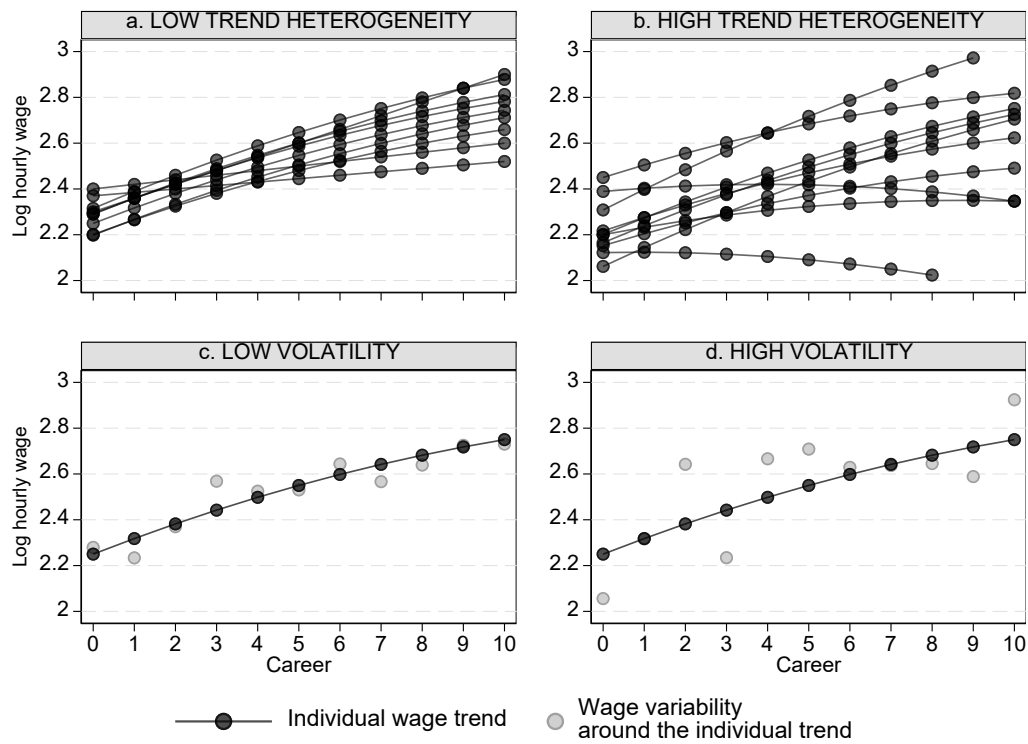


Figure 1. Wage trend heterogeneity (upper panel, a–b) and wage volatility (lower panel, c–d). Expectation for Germany: a. low trend heterogeneity and c. low volatility. Expectation for the US: b. high trend heterogeneity and d. high volatility.

Note: in the upper panel (a, b), the black line represents the wage trends of different individuals in the population. In the lower panel (c, d), the black line represents an individual's wage trend and the grey dots the wage rate at different points over the life cycle for the same individual.

Between-group inequality over the life cycle: do wage fluctuations matter?

How do wage fluctuations and wage trend heterogeneity translate into intra-generational patterns of between-group inequality? The previous literature has extensively shown that intra-generational upward mobility structures along social lines in many countries (for example, see Cheng 2014; Manzoni et. al 2014; Gangl, 2005). In the following, we outline some considerations regarding the evolution of wage inequality by four classical stratification dimensions in Western societies: gender, social origin, education, and race (for the US only). In the end, we derive some general expectations regarding the association between the extent of wage fluctuations in a country and the evolution of group-based inequality over the early career.

Previous findings

Gender inequality in wages is well ascertained in the literature and linked to many individual and occupation-level mechanisms (Becker 1985). One important mechanism is segregation into female-dominated occupations. Female-dominated occupations pay lower wages and offer less chances of upward mobility as compared to male-dominated occupations (Bayard et al. 2003; del Río and Alonso-Villar 2015). Career interruptions due to childbirth and childrearing responsibilities is another important mechanism explaining women's penalties. Career interruptions are associated with human capital decay and the accumulation of shorter tenure that slow down wage growth over the working career (Becker 1985; Gupta and Smith 2002; Ruhm 1998). These considerations lead us to expect a gender penalty at labour market entry and slower wage growth over the career for women as compared to men. Hence, the gender penalty at the career onset is likely to increase over the early life course.

One of the most robust associations in the social sciences is the one between the own level of education and the labour market returns. Human capital and signalling theories trace back this positive association to the higher productivity of better-educated individuals (Becker, 1967; Spence, 1974). Credentialism and control theories point towards education as a signal of status membership that serves status reproduction (Bowles and Gintis, 1976; Collins, 1979). Regardless the underlying mechanisms, both set of theories predicts that wage premiums to education will increase over the occupational career.

Workers with low productivity on the job and/or lacking signals of high-status membership are more at risk of involuntary work interruptions and experience comparatively long unemployment spells, both of which have negative implications for wage growth. The existing research confirmed these expectations and shown that the larger wage growth of highly-educated individuals compared to the low educated stems both from within-job dynamics, reflecting higher returns to working experience, and between-jobs dynamics, reflecting wage premia to improved job matches (Connolly and Gottschalk 2006). Based on these considerations, we expect the initial wage gap of low compared to high educated individuals to increase over the early occupational career.

Social origin is another crucial social stratification dimension in Western societies. Social mobility research repeatedly stress that social origin influences occupational destinations, and that large part of this gross association is mediated by educational attainment (Blau and Duncan, 1967; Breen, 2004; Erikson and Goldthorpe 1992). And yet many studies pointed out that social origin plays a role above and beyond educational credentials (Erikson and Jonsson, 1998; Breen and Luijkx, 2004; Ballarino & Bernardi, 2016). The direct association between origin and occupational outcomes is perhaps the most hideous form of social inequality because it is disconnected (at least in part) from meritocratic principles. But when does the direct effect of social origin emerge and how does it evolve over the life course? More recent literature took a longitudinal leap and suggested that the direct effect of social origin on various occupational outcomes is visible at the career onset and tend to persit over the lyfecycle (e.g, Manzoni et. al. 2015; Passaretta et al. 2018; Yaish et al. 2021). Hence, we expect the direct social origin effect on wages to follow a patter of persistency over the early career.

When it comes to the US, one of the crucial dimensions of social stratification is race. Racial minorities suffer a disadvantage above and beyond the own education level. Such disadvantage stems of a variety of mechanism; one of the most important is discrimination. Non-whites and especially blacks are more often allocated to occupations which pay lower wages, are more subject to human capital devaluation, and are more likely to be laid-off compared to whites (Alonso-Villar, Rio, and Gradin 2012; Couch and Fairlie 2010; del Río and Alonso-Villar 2015; Tomaskovic-Devey, Thomas, and Johnson 2005). All these factors suggest that non-white workers experience less favourable

conditions not only at the career start but also for career advancements. Hence, in line with Cheng (2014), we expect the black-white gap in wages to increase over the career in the US.

Expectations in Germany and the United States

The existing research support the idea that wage trend heterogeneity aligns with classical lines of social stratification in Western societies. Therefore, we expect increasing or at least persistent patterns of between-group inequality in wages over the early occupational careers. But do higher wage fluctuations in the United States compared to Germany translate into stronger increases of between-group inequality over the life course? Answering this question *a priori* is a formidable intellectual challenge. Nonetheless, the institutional configuration of the two countries leave room for more nuanced expectations.

On the one hand, institutional characteristics constrain wage fluctuations in Germany. The lowered levels of wage fluctuations limit the degree of upward and downward mobility over one's career. In this scenario, the amount of between-group wage inequality settled at the career onset would likely persist and increase only slightly over the life cycle. For example, if there is only little room for wage mobility along one's career, gaps between men and women at the career onset would likely remain constant or increase to a limited extent. On the other hand, the institutional configuration of the US favours intra-generational wage fluctuations. Although there is no guarantee that such fluctuations will structure along patterns of upward (or downward) mobility at the individual level, strong fluctuations increase the likelihood of changing patterns of between-group inequalities over the life course. Back to the gender example, when institutional conditions favour intra-generational wage fluctuations, women may lose even more ground compared to men after the first job placement, thus causing initial gender wage gaps to increase sharply along the life cycle (note, however, that gaps may even remain constant if wage fluctuations do not align along gender lines or even decrease). All in all, we expect stronger wage fluctuations in the US compared to Germany will translate into stronger increases in between-group inequality over the life cycle.

Data and variables

We used data from two of the largest and most reliable households panel studies in the Western World: the German ‘Socio-Economic Panel’ (SOEP) and the American ‘Panel Study of Income Dynamics’ (PSID). Both datasets collected prospectively a large variety of demographic, educational and occupational information on representative samples of households starting from 1968 (PSID) and 1984 (SOEP) onwards. The two datasets are largely similar in the overall aim and design. Information was gathered annually for the SOEP and – until 1997 – also for the PSID (biannually afterward). Importantly, the prospective nature of the surveys prevents problems of recall bias, which is a common problem in widely used retrospective surveys.

We reconstructed in detail the (bi)annual earnings trajectories of a significant number of individuals who left education for the last time between 1985 and 2005 up to 10 years after school leaving. We retained only those individuals for which we could observe the ‘last exit’ from the education system and most of the 10-year period thereafter. We observe individuals up to 8 and 9 years on average in the SOEP and the PSID, respectively. It is worth noting that observing a longer career span would come at either the expense of excluding recent cohorts of entrants (with right-censored careers) or extrapolating their group-based trajectories at the right-hand side of the observation window.

Career duration refers to the number of years since the first labour market entry after the attainment of the highest level of education. We limit the sample to those individuals whose career started at a minimum of 16 to a maximum of 35 years of age. Annual episodes of non-employment are removed from the sample. After list-wise deletion of missing variables, we are left with an overall sample of 24,316 yearly-observations from 3,505 individuals in the US, and 19,109 yearly-observations from 2,406 individuals in Germany.

Information on individual earnings rely on the *Cross-National Equivalent File* (CNEF) supplement of each panel. The CNEF was prepared at the Ohio State University in collaboration with national institutions of participating countries with the specific aim of providing comparable information across national contexts (Frick et al. 2007). The US and Germany contributed the CNEF with the PSID and the SOEP, thus allowing us to rely on pre-harmonized information on numerous definitions of

individual income. Individual labour earnings are perhaps the most adequate measure for studying the stratification of individuals' economic resources over the early life course. Alternative measures, such as equalized or disposable household income, would indeed capture the redistributive role of the family or the state which are not at the stake in this work. We focus on hourly wages to get as close as possible to a measure of individual productivity and earning potential. The hourly wages are computed based on comparable information provided by the CNEF supplements on both individual labour earnings and the number of hours worked on a yearly basis.¹ Our final measure is the average annual *logged hourly wage* adjusted for inflation (reference: dollars in 2010) and purchase power parity.

Social origin is proxied by the highest parental socioeconomic status when respondents were 15 years of age in Germany, and when respondents were growing up in the US.² measured by the International Socioeconomic Index (ISEI) developed by Ganzeboom and Treiman (1996). Parental ISEI represents a good compound indicator of the resources available in the family of origin and has the main advantage of being comparable both across historical time and countries.

Individual *education level* is measured by the number of years of completed education and retrieved from pre-harmonized information reported in the CNEF supplements. The variable ranges from a minimum of 7 to a maximum of 18 (17 in the US) and is coded based on the highest grade-level and type of education achieved in the respective national education systems. For example, in Germany, individuals with a school leaving degree are assigned from a minimum of 9 to maximum of 12 years based on the type of institution attended. From 2 to 3.5 years are added in case of a subsequent vocational degree, 4 in case of a technical college degree, until a total of 18 years of completed education in case of a university degree (see Couch, 1994 for more information on the coding). Hence, while parsimoniously considering differences in the level of education, the CNEF variable also reflects major horizontal lines of differentiations within the two national education systems.

Race is a dummy variable distinguishing white Americans from non-white Americans (black and other non-white Americans, representing respectively 38.3% and 3.7% of the final sample). Race is a peculiar stratification dimension in the US with no counterpart in the German context. Therefore, racial differences (white vs non-white) are estimated and commented in the US context only.

Finally, we distinguish four *labour market entry cohorts* in both countries and enter this information as a control variable in the analyses. While we are not substantively interested in variations across cohorts, which is nonetheless analysed extensively by previous research, it is important to level out possible composition effects with respect to main dimensions of social stratification considered. Table 1 presents summary statistics for all variables included in the analyses (Table A1 in the Appendix shows summary statistics at the career star, 5 years, and 10 years after labour market entry).

Table 1. Descriptive statistics for all variables included in the analyses, by country.

	Germany ^a			United States ^b		
	Mean – %	Median	S.d.	Mean – %	Median	S.d.
Log-hourly wage	2.55	2.57	0.63	2.62	2.62	0.77
Hourly wage	13.66	11.89	9.31	19.06	13.78	22.80
Career	8.07	10.00	2.52	9.14	10.00	1.64
Sex						
Men	54.57			50.02		
Women	45.43			49.98		
Education (years)	12.87	12.00	2.82	13.18	13.00	1.95
Social origin (ISEI)	44.23	40.00	15.13	42.87	35.85	15.09
Cohort						
1985-1990	22.14			45.32		
1991-1996	22.13			23.54		
1997-2001	32.65			15.62		
2002-2005	23.08			15.52		
Race						
White				57.95		
Non-white				42.05		

Notes: ^a N = 19,109 yearly observations – 2,406 subjects. ^b N = 23,245 observations – 3,230 subjects.

Methods

We apply growth curve models with annual observations of hourly wage nested within individuals, separately in each country (Halaby 2003). This strategy represents a parsimonious solution to model

wage variations across individuals and over the occupational career in a single-equation framework. The most complex specifications used in the analyses has the following general form:

$$\begin{aligned} \ln wage_{it} = & \beta_0 + \beta_1 CAR_{it} + \beta_2 CAR_{it}^2 \\ & + \sum_{k=1}^5 [\beta_{3k} X_{ki} + \beta_{4k} (CAR_{it} \times X_{ki}) + \beta_{5k} (CAR_{it}^2 \times X_{ki})] \\ & + (U_{0i} + U_{1i} + e_{it}) ; \end{aligned}$$

where the logged hourly wages at time t of the individual i is regressed on a linear and quadratic term for career duration, $K = 5$ time-fixed characteristics X_i – which are gender, education level, social origin, race (US only), and labour market entry cohort – and the three-ways interaction terms between the individual characteristics X_i and the linear and quadratic term for career duration. In this way, we assess the separate contribution of our stratifying dimensions to earning differentials at the career onset and the evolution of the differentials over the early work lives.

The model decomposes the total variance in the logged hourly wages in a between component that summarizes variations between individuals – and a within component – which summarizes the extent of wage variations over the occupational career. The within component reflects the concept of *wage fluctuations* outlined in the theoretical section. The random part of the equation includes a random component for the intercept (U_{0i}) and a random component for the linear term for career duration (U_{1i}). Hence, the model assumes individual-specific intercepts – i.e., different average levels of earnings along the career – and individual-specific slopes for the rates of linear career progression – i.e., different yearly rates of change in wages. Individual intercepts and slopes define the individual wage trend. Therefore, the variance of the intercepts (U_{0i}) and the variance of the slopes (U_{1i}) reflect *wage trend heterogeneity* across individuals. Instead, the residual within-level variation once conditioned on the linear and quadratic terms for career duration conveys information on the variability around the individual trend of progression, that is *wage volatility*.

We assume similar curvilinear terms of progression across individuals in line with many of the previous studies using a similar approach (Cheng 2014; Passaretta et al. 2018). The decision over the functional form to model career duration is critical in our approach. We experimented with many other functional forms. More precisely, we i) augmented the model by a cubic term for career duration and ii) we split career duration in 2, 3 and 4 splines according to various cut-off points (and included stepwise the splines in the random part of the equation). However, these less-parsimonious alternatives added small value to the simpler curvilinear trend, which we therefore retained. We will also show how the most complex specification of the functional form, that is adding yearly career dummies, resulted in very similar pattern of wage progression compared to the curvilinear trend.

Results

Wage variability across individuals and over the career

We start by decomposing the total variance in the logged hourly wages in the between- and within-individual components in Germany and the US. Figure 2 reports results from the variance decomposition based on the null model in Table 2. Wage variability (Total) is higher in the US compared to Germany (0.61 and 0.41, respectively).

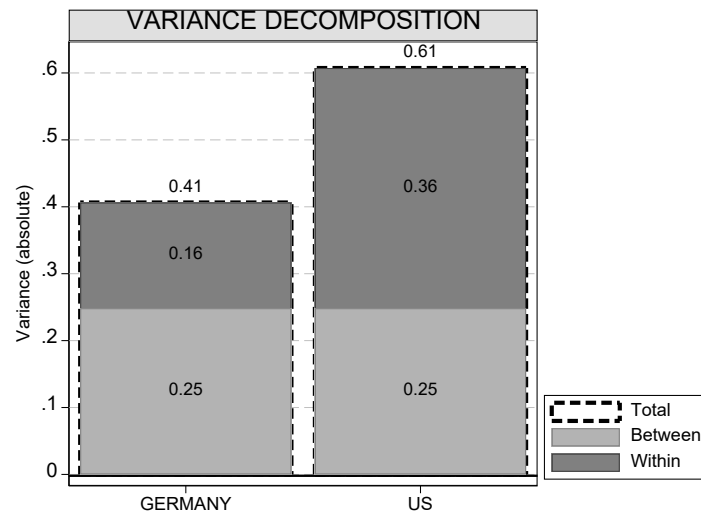


Figure 2. Variance decomposition: Total, between (across individuals), and within (along the career) components (Model 1 in Table 2).

Notes: Intra-class correlation (ICC) is 61% and 41% for Germany and the US, respectively.

However, the stronger variability in the US seems mainly attributable to variations occurring along the occupational career, that is to wage fluctuations, rather than variations occurring between individuals. While differences between individuals are astoundingly similar in the two countries (0.25), wage fluctuations are more than doubled in the US (.36) compared to Germany (.16). As suggested by intra-class correlations (ICC) – computed as the ratio of the between- and the total variance – the lion's share of wage variability in Germany hails from differences between individuals (ICC = 61%). Conversely, most of the wage variability is attributable to wage changes occurring over the career in the US ($1 - \text{ICC} = 59\%$).

Table 2. Null model and curvilinear trend for career duration, by country.

	Germany ^a		United States ^b	
	Model 1	Model 2	Model 1	Model 2
	Null	+ Curvilinear	Null	+ Curvilinear
Career		0.0672*** (0.003)		0.0565*** (0.004)
Career ²		-0.00167*** (0.000)		-0.00176*** (0.000)
Intercept	2.483*** (0.011)	2.263*** (0.012)	2.607*** (0.010)	2.421*** (0.013)
Variance components				
Between (intercept)	0.248	0.246	0.248	0.306
Within (residual)	0.158	0.117	0.359	0.312
Slope (career)		0.002		0.003
Cov. intercept–slope		-0.005		-0.013

Standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

But does higher variability over the career translate into stronger pattern of wage progression in the US? The question seems legit as higher wage fluctuations leave room for steeper trends of upward (or downward) progression. We augment the null model with a curvilinear trend (Model 2 in Table 2) to inspect the plausibility of this scenario. To ease the interpretation of the results, we present wage trend predictions in Figure 3. Hourly wages follow a monotonic upward trend over the career in both countries. The coefficients in Table 2 reveal that wages grow faster in the first years of the career

(positive coefficient for the linear term) and tend to flatten afterwards (negative coefficient for the squared term). The shape of the wage trend is rather similar in the two institutional contexts. However, wages seem to increase at a faster rate in Germany than in the US. Hence, the larger wage variability that Americans experience over their career seems not to translate into a stronger pattern of upward wage progression.

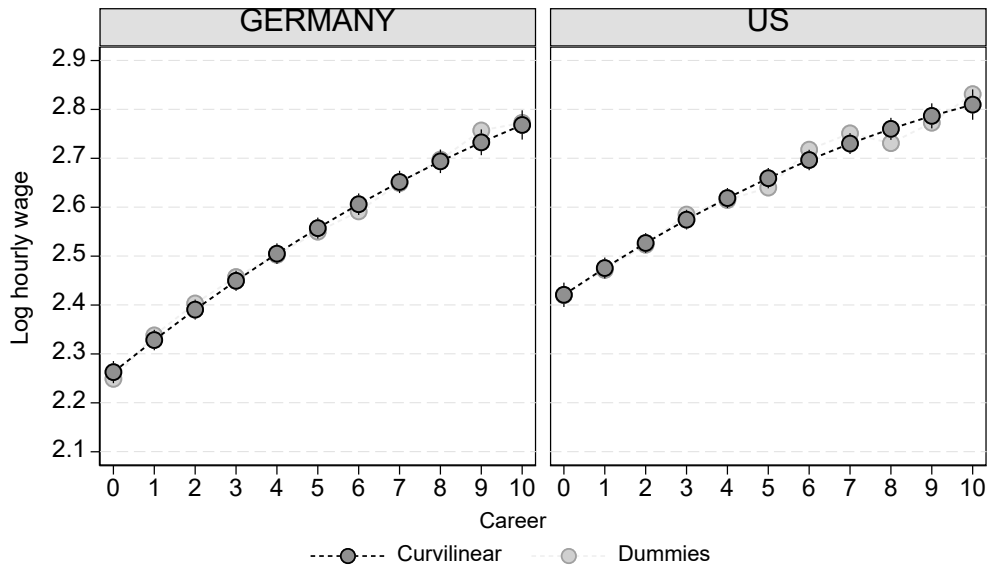


Figure 3. Curvilinear-trend model for career duration (Model 2 in Table 2).

Notes: Shade grey dots are prediction from a growth model including eleven career-dummies (fixed part only).

The variance of the slope of the linear term for career duration and the variance of the intercept in Model 2 (Table 2) also inform us about the extent of wage trend heterogeneities in the two countries. Both the average initial wages (.31 vs .25) and the liner trends of progression (.003 vs .002) are more heterogeneous in the US compared to Germany. These results speak in favour of larger wage trend heterogeneity in the US than Germany and are in line with the ideas expressed by Figure 1b and 1a, respectively. These results suggest that, as expected, American school-leavers experience larger uncertainty in their long-term prospect of wage progression over the early career.

The amount of ‘within variance’ that remains unexplained by the curvilinear trend of upward mobility (see Model 1 and 2 in Table 2) provides insights on wage volatility in the two countries. In

Germany, the curvilinear trend explains almost 26% of the wage changes which workers experience over the career (the within variance drops from 0.158 to 0.117). In the US this share is halved, around 13% (from 0.359 to 0.312). These figures imply that around 74% and 87% of wage variations over the career in Germany and the US (respectively) are fluctuations around individual wage trends. These patterns are in line with ideas presented in panels d. and c. of Figure 1 and imply that US workers experience larger uncertainty in their year-to-year wage changes in the short term compared to Germans'.

It is important to stress that unexplained within-variance may reflect imperfect specification of the functional form used to model wage mobility. An utterly biased specification of the functional form artificially inflates the residual within-variation and overestimates volatility. The misspecification may even bias the cross-country comparison if stronger in either of the two countries. However, country differences in volatility seem not trace back to misspecification of the functional form used to model wage mobility. As shown in Figure 3, predictions based on the curvilinear trend (dark grey dots) perfectly overlap with predictions from the most consumptive alternative, that is modelling career progression *via* single yearly dummies (light grey dots).

All in all, the higher variability of wages along occupational careers in the US does not translate into steeper wage profiles on average, comes with more heterogeneity in individual wage trends, and higher volatility. These findings seem to point toward the idea that lower institutional barriers to wage fluctuations in the US translate to higher uncertainty around the long and year-to-year prospects of upward wage mobility rather than to opportunities for wage progression.

Do group-based inequalities in wages increase or decrease over the early career?

We now focus on the heterogeneities in the patterns of wage progression along four of the main stratification dimensions in Western societies: gender, social origin, education, and race. Group-based differences at labour market entry and their evolution along the occupational career are shown in graphical form to ease interpretation. All figures hail from a single model including all four stratification dimensions and their multiplicative terms with the curvilinear trend for career duration. Hence, group-based differences must be interpreted net of the other characteristics.

Figure 4 plots the predicted average hourly wage of men and women at the career start up to 10 years after labour market entry. A gender wage gap exists already at the beginning of the work life in both countries. On average, women's hourly wages in the first job after educational attainment (at career equal to 0) are 22 and 25% lower compared to men in Germany and the US, respectively (see Table A3 in the Appendix). The magnitude of women's penalty is astounding if we consider that our estimates hails from the comparison of men and women having the same educational attainment. Moreover, men's wages seem to grow faster than women's wages. After 10 years on the labour market, women's penalty has increased in both the German and US samples. However, the differential wage among men and women growth is within the range of estimation error in both countries, thus letting us conclude for no evidence of enlarging gap along the career (see Table A3 in the Appendix).

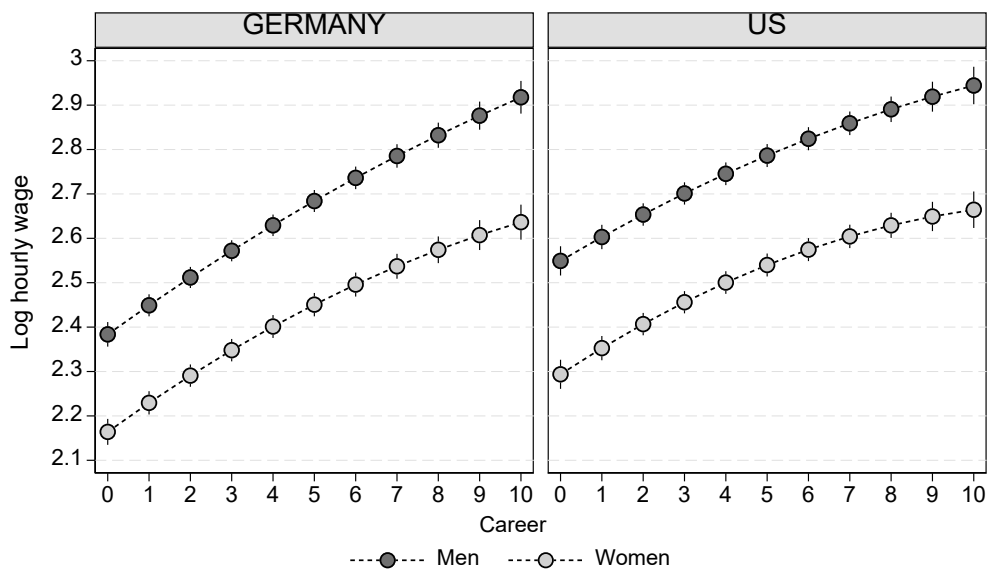


Figure 4. Gender wage gap at labour market entry and along the first ten years of the occupational career.

Figure 5 plots the estimated wage trajectories for individuals whose parents had elementary (ISEI 20), clerical (ISEI 45), and professional (ISEI 70) occupations at best. In sociological terms, differences in those trajectories represent the direct effect of social origin, that is the residual origin-wage association once controlled for own's education level. The figure shows stark differences in Germany and the US. When comparing similarly educated individuals at the career onset, there is no wage

premium to social background in Germany. Nor such a premium emerges along the occupational career. Instead, in the US, substantive social differences remain when accounting for own education. In the first job, individuals whose parents had a “professional” occupation gain on average 16% higher wages compared to equally educated counterparts whose parents had an “elementary” occupation. What is more, the social gap increases over the career, but such increase seems to be statistically significant at a 10% level only (see Table A3 in the Appendix). While part of the direct effect of social origin in the US may be explained by an imperfect measurement of own educational attainment, it is unlikely that measurement error explains the large residual gap we found entirely. First, the previous studies using administrative data were in the position to account for the entire range of educational differentiation and still found substantive social disparities in occupational destinies (Erikson and Jonsson, 1998). Second, although parsimoniously, our education measurement considers both level and horizontal differentiation of educational degrees. Third, although Germany has one of the most differentiated and stratified education systems in the Western World, we used the same measurement logic and found no residual social differences.

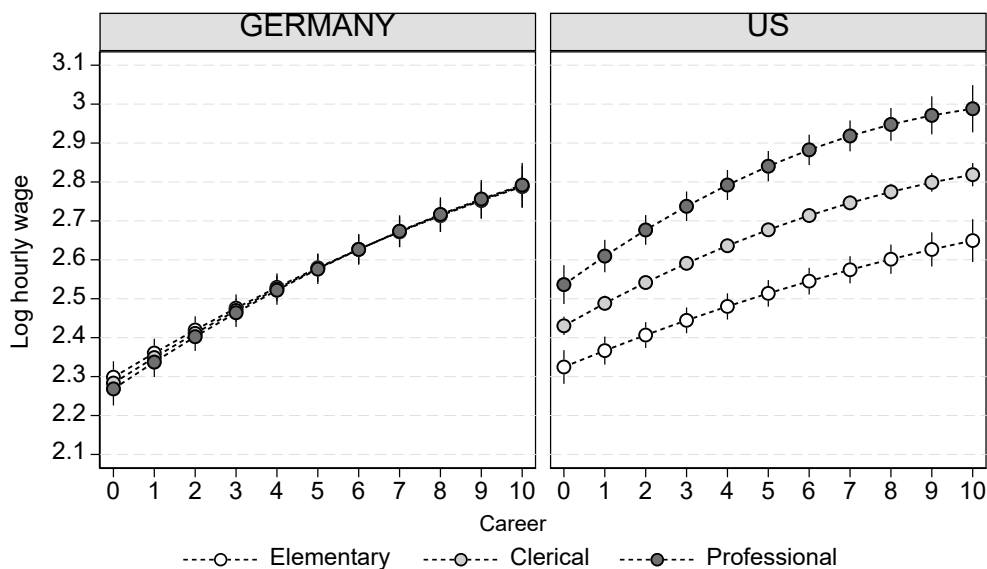


Figure 5. The direct effect of social origin on wages at labour market entry and along the first ten years of the occupational career.

Notes: Prediction for ISEI 20 (elementary occupation), ISEI 45 (clerical occupations), and ISEI 70 (professional occupations).

The absence of a direct effect of social origin on hourly wages does not imply social background plays no role for occupational success in Germany. There are strong social disparities in educational attainment that translate into considerable social differences in hourly wages. Table 3 shows results from models including social origin and own education level (and its multiplicative terms with the curvilinear trend for career duration) stepwise. Model 3 (Total) shows that wage inequality aligning along social lines is already apparent at the career onset and tends to increase over the occupational career in both countries. However, comparing estimates with Model 4 (Direct) makes it apparent that social advantages are fully mediated by educational attainment in Germany. Own education only mediates around half of the overall association between social origin and wages in the US, however.

Table 3. Total and direct effects of social origin along the career.

	Germany		United States	
	Model 3	Model 4	Model 3	Model 4
	Total	Direct	Total	Direct
Social background (parental ISEI \div 10)	0.046*** (0.007)	-0.006 (0.007)	0.065*** (0.009)	0.031*** (0.009)
Social background \times Career	0.005** (0.002)	0.001 (0.002)	0.005* (0.003)	0.005* (0.003)
Social background \times Career ²	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Education	NO	YES	NO	YES

Notes: Parental ISEI is divided by 10 to ease interpretation. Model 3 includes all terms in Equation 1 except for own education and its multiplicative terms with career duration. Model 4 includes all terms in Equation 1. Full models available in Table A2 in the Appendix. Standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Figure 6 contrasts estimated wage trajectories for individuals with low (12 years), medium (14 years), and high (16 years) educational attainment. We deliberately avoided contrasting extreme values; rather, the values used for the predictions correspond to typical education levels – compulsory, upper secondary, and postsecondary schooling – in both Germany and the US.³ At labour market entry, the educational gradient is higher in the US than Germany and correspond to a 39% difference between

high and low educated individuals. The initial gap is lower in Germany, around 29%, but then it significantly increases over the career. Hence, while being significantly lower in relative term at the career onset, the education premium almost approaches US standard over the course of the early occupational career.

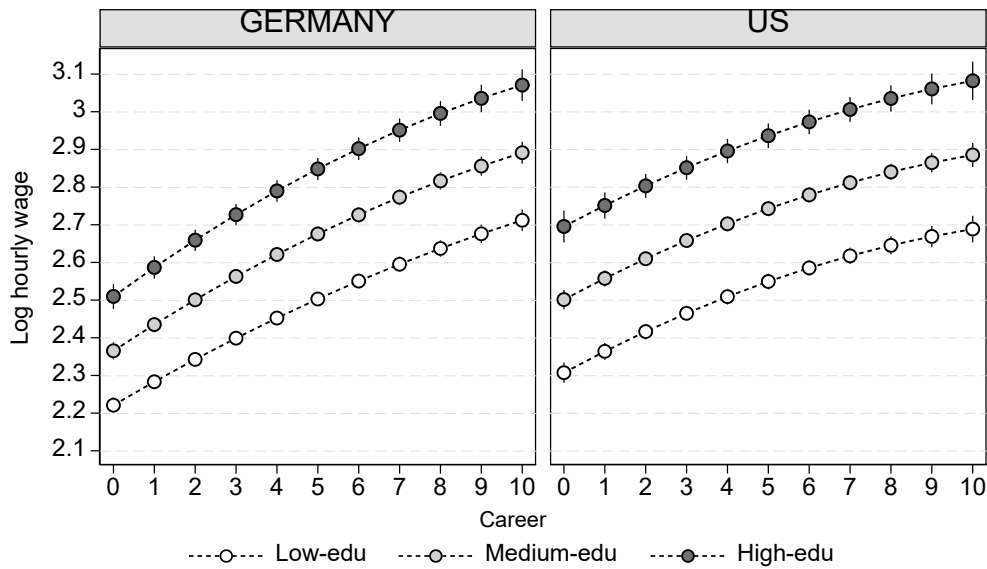


Figure 6. Wage premiums to education at labour market entry and along the first ten years of the occupational career.

Notes: Prediction for 12 (low), 14 (medium), and 16 (high) years of completed education.

Finally, Figure 7 offers some insights on racial disparities in wages in the US context. The results are astounding. Non-whites gain on average 11% lower hourly wages compared to equally educated counterparts coming from similar social backgrounds. At a visual inspection, the wage gap almost double over the early career, although such increase is not statistically significant (see Table A3 in the Appendix). These results imply a dramatic disadvantage for non-white communities. Non-whites disadvantages often cumulates with social disadvantages on the road to a college degree. Our results suggest that even when non-whites overcome such adversities in educational attainment, they are still lagging behind their white counterparts on the labour market. Moreover, our results imply a huge overall gap between whites and non-whites wages when compositional differences in terms of social background and education level are not levelled out.

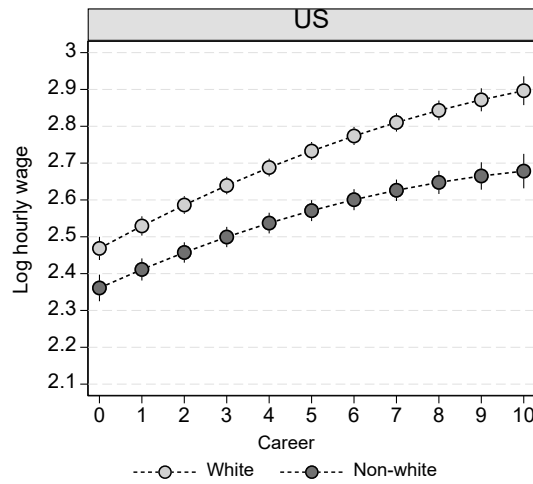


Figure 7. White non-white wage gap at labour market entry and along the first ten years of the occupational career.

All in all, these results are only partly consistent with our expectations. Gender, education-based and racial (US only) gaps in hourly wages are well established at the labour market entry and persist over the early occupational careers in both countries. However, we found no compelling evidence for increasing group-based inequality across the early life course neither in Germany nor the US. And yet we did not find any evidence for a direct social origin effect in Germany, while the direct advantage of workers from better-off families is well established at the career start and do not increase but rather persist over the labour market career. These results speak against the idea that stronger wage fluctuations in the US translate to rising between-group inequality over the early career.

Discussion and conclusions

This paper investigated wage variations over the early occupational career (wage fluctuations) and their alignment with classic stratification dimensions in West Germany and the United States. Contrary to most of the existing studies, we paid particular attention to the overall levels of intragenerational wage

fluctuations and the extent to which they translate into intragenerational patterns of between-group inequality.

Our results show stronger wage fluctuations in the United States, that embodies a liberal market economy, compared with West Germany, that instead embodies the typical coordinated market economy in the landscape of Western societies. Wage fluctuations over the career, as opposed to variations across individuals, represents the most relevant source of variability in wages in both samples. And yet country-differences in wage fluctuations explain country differences in the overall levels of wage variability entirely. Wage fluctuations structure into trends of upward wage mobility in both countries, in line with human capital theories. However, contrary to our expectations, larger wage fluctuations in the United States do not translate into stronger patterns of wage progression compared to Germany but rather result into flatter wage profiles over the first ten years of career.

While reflecting opportunities of upward mobility, wage fluctuations also reflect uncertainty around the individuals' long-term prospects of wage progression (wage trend heterogeneity) and the short-term, year-to-year wage changes (wage volatility). Our results point toward the idea that both heterogeneity in individual wage trends as well as wage volatility around these trends is strongest in the United States. Hence, it seems that the lower institutional and structural barriers to wage fluctuations in the United States translate into higher uncertainty rather than opportunities for wage progression.

Our study also found stark differences in the opportunities of wage progression across groups in both institutional contexts. First, we found astounding and persistent (but not growing) gender inequality in wages with men earning up to 25% higher wages than women. Second, we found strong wage inequality by social origin that emerges already at the career onset and remains constant thereafter. However, while we found a stable direct effect of social origin over the early career in the United States, the social origin effect seems fully mediated by educational attainment in Germany. Relatedly, our analyses confirm the own education level as a crucial dimension of wage inequality. On average, we found a 30% and a 40% gap between low and high educated workers at the career start in Germany and the US, respectively. What is more, such gap is constant over the career in the United States and even increases in Germany. Finally, our results confirm the well know disadvantage that non-whites experience as compared to white in the labour market, a disadvantage that do not ameliorate with career

progression. While some of these findings are well-established in the economic and sociological literature, it is worth noting that we could not find any evidence for the idea that stronger intragenerational variations in wages in the United States translates into (even more) rising between-group inequality in wages over the occupational career.

Our findings with respect to between-group inequality may also bear implications beyond wages. We highlighted that the wage rate is a central component of individual and family income and that wage variations play a major role for the overall level of inequality in a society. However, hourly wages are only one piece of the broader picture. Wages measure earning potential but not the actual economic resources available from labour. The amount of labour, in addition to the price paid to labour, is another key aspect of inequality. Individuals and groups who are not able to fully participate to the labour market will be economically disadvantaged, hourly wages being equal. And yet low wages and weak labour market attachment often combine and exacerbate between-group inequality in labour earnings. This is certainly the situation experienced by many women across the globe, as family constraints and other demand and supply side factors impaired their labour market participation.

This paper focused on some overlooked dimensions of wage inequality which bear important consequences for the real-life experiences of workers in a society. The uncertainty around the prospects of wage progression (*wage trend heterogeneity* and *wage volatility*) trends may impact individuals' standards of living. Wage trend heterogeneity captures the uncertainty of wage prospects that workers face at labour market entry. Wage volatility captures the uncertainty implied by year-to-year changes in wages. Economic theory postulates that individuals seek stability in living conditions and average their consumption to smooth fluctuations in their expected income (Friedman 1957). Contexts characterized by high heterogeneity in wage trend, are thus characterized by little predictability of the extent to which individual wages will increase over the career. This means that individuals face great difficulties in anticipating their expected income and thus in smoothing their consumptions. Consequently, in such contexts, individuals and families are exposed to a higher risk of living either below or above their means. While living below the own means boosts savings, exceeding the own spending capacity heightens the likelihood of indebtedness and may bear serious economic, social, and even health consequences for individuals and their families. Our article suggests that the risks connected to the

uncertainty of wage prospects particularly apply to the United States, where high wage volatility and wage trend heterogeneity co-exist with lower-to-no buffers from the welfare state.

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Endnotes

¹ Labour earnings in Germany include wages and salary from all employment including training, primary and secondary jobs, and self-employment, plus income from bonuses, overtime, and profit-sharing (Grabka, 2017). Labour earnings in the US include wages and salary from all employment including self-employment, professional practice or trade, and bonuses, overtime, and commissions (Lillard, 2015). Working hours in Germany are retrieved by the SOEP team based on the employment status in the survey year, average number of hours worked per week, and the number of months worked in the previous year (reported in the activity calendar) (Grabka, 2017). In the US, information on working hours refers to the sum of annual hours worked on the main job, annual hours worked on extra jobs, and annual hours of overtime in the previous year. For family members other than the head and her partner, this information was derived from the number of weeks worked in the previous year and the number of hours usually worked per week (Lillard, 2015).

² Occupational information in the US is retrieved from the 1970 and 2000 *Census of Population and Housing*. This classification was first converted into the ISCO-88 classification of occupation and then to ISEI scores.

³ In Germany, 12 years of education correspond upper secondary education, 14 years to a vocational degree, and 16 years to tertiary education. In the US, 12 years of education correspond to high school degrees, 14 years to some college; and 16 years to college bachelor.