Adult Labour Market Outcomes: the Role of Economic Conditions at Entry into the Labour Market

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Abstract

This study investigates whether local economic conditions at entry into the labour market affect adult career outcomes. If the stage of the business cycle determines later outcomes, then there are long-term costs associated with entering the labour market in a recession. The focus is on the local unemployment rate (LUR) at entry - at detailed regional level - and its overall effects on earnings and experience accumulation.These outcomes are investigated throughout the adult life-cycle, using detailed German register data (IABS). Results draw upon variation in LURs related to both the moment and place of entry. We find small but significant adverse effects of economic conditions at entry on earnings. Moreover, the negative effect on earnings gains in strength throughout the career. Work experience does not seem negatively affected in the early stages of the adult career and involves only very small adverse effects later on in the life-cycle.

1 Introduction

This study investigates the role of economic conditions at labour market (LM) entry in adult labour market outcomes in former West-Germany. It wants to shed light on the extent to which individuals are restricted in their outcomes by the economic conditions in the region at entry, or put alternatively: Does a deep recession permanently harm the future of LM entrants?

If it is indeed the case that worse regional conditions when young affect adult LM performance negatively, then there is a lifelong cost associated with starting work in an environment characterised by poor economic conditions. Therefore, it might be important from a policymaker's perpective to be aware of these and potentially compensate for them: e.g. by stimulating economic activity in economic slumps and potentially in backward regions, in order to avoid these costs.

The focus is on the local unemployment rate (LUR) - at detailed regional level - at the time of LM entry and its overall effects wages (daily earnings) and experience accumulation when adult. Potential effects of initial economic conditions on later career outcomes can occur through a number of channels. The experiences of individuals searching for a first job can be directly affected. Also the stability of the first (and possibly also subsequent) jobs taken might be affected through e.g. the length of the job contract, restructuring within a firm or even job loss (with associated unemployment experiences). In addition, the job/firm match quality might be affected by the economic situation - with lower match quality in recessions (e.g. Bowlus, 1995). Finally, individuals might decide upon the level of schooling depending on the stage of the business cycle. Recessions might push individuals to take more schooling (as the opportunity cost of additional schooling is lower) - which delays entry into the LM, but might also affect their career outcomes positively.

These experiences might have persistent consequences over time. This could depend on the structure of the labour market. Margolis et al. (2002) discuss and test different theoretical models and their implications[1]. Employers might use observed LM experiences as a proxy for unobserved productivity (e.g. Farber and Gibbons, 1996). Or individuals might be sorted into different jobs/LM segments: Margolis et al.'s findings support the existence of a dual labour market in Germany, in which the effects of early LM experiences of individuals do not diminish over time[2]. Also discouragement effects or true scarring effects might damage the LM position of individuals who experience unemployment (e.g. Clark et al., 2001). In addition, human capital accumulation might be interrupted due to unemployment or the rate of accumulation might be below its potential if the match is not optimal.

This study does not focus on measuring the effect of LURs via a particular channel. It rather intends to report on *overall* effects on adult career outcomes. In addition, the emphasis is on how the effects vary over the life-cycle, as we observe individuals over a major part of their careers. This way, I try to provide a more complete picture of how individuals' careers are affected by initial economic conditions.

2 Related literature

A few studies look directly into the effect of local labour market conditions on adult LM outcomes - and use local unemployment rates as a proxy. Burgess, Propper, Rees and Shearer (2003) use cross-cohort variation in unemployment rates at school-leaving age in the UK to investigate effects of early LM conditions on later employment prospects. Pooled and fixed effect analyses lead them to find permanent adverse effects of aggregate unemployment rates on employment experience for low-skilled workers. Negligible or even small beneficial effects exist for more skilled workers. However, the question remains to what degree selection into skill-levels (driven by economic conditions) is relevant as opposed to a causal effect.

Closest to this work, however, is a study on Norwegian data by Raaum & Roed (2006). The study considers net (direct) effects of economic conditions at entry and provides evidence for small but persistent negative effects of local unemployment rates in the region of entry on non-employment experiences at age 25-36. Both longitudinal and cross-sectional variation in LURs is used as source of identification. They find that a business cycle slump at age 16/19 (defined as 6% versus 1% local unemployment rate) increases the adult rate of unemployment by 1-2% points.[3]

The existing literature on causal mechanisms is mainly concerned with how LM *experiences* affect later career outcomes. Mainly unemployment or employment experiences are considered, but also experiences related to overall job stability are studied. This literature relies on two common explanations for a potential effect on later outcomes: these experiences involve a period with lower HC accumulation - or even HC loss - and/or employers use past (un)employment experiences as a screening device, i.e. as an indicator of (unknown) productivity.

The "scarring" literature attempts to explain and measure the extent to which *unemployment experiences* affect LM outcomes afterwards - usually the probability of unemployment or wages. Heckman & Borjas (1980) examine the conditions to identify different types of

[1] They distinguish between information-based learning models, sorting models, human capital models, contracting models and unobserved heterogeneity models

[2] A 'dual' labour market implies that there are two sorts of jobs: 'good' and 'bad' jobs. Margolis et al. find that there is a primary sector which offers stable jobs with good wage growth prospects, while the secondary sector offers the opposite.

[3] In addition, the authors also investigate a particular causal mechanism through the choice of schooling. A discrete choice panel data approach is used to model the lower/upper secondary schooling decision and transitions into non-employment when adult. No evidence is found for a reaction to higher local unemployment rates through additional schooling, though there are some indications that individuals delay graduation given a particular education level. They also find a clear positive effect of local unemployment rates at entry on the transition into non-employment.

state dependence (Markov, duration, occurrence & lagged duration dependence). They do not find evidence for occurrence dependence or lagged duration dependence in exit rates of (un)employment in US data (using NLS data), once controlling for sample selection bias and heterogeneity[4]. Note, however, that the analysis includes a particular sample, namely white men who just finished high school and these men are observed over a 30-month period only.

Studies with UK data find clear negative scarring effects on unemployment incidence though these are measured over a rather short run horizon only[5]. Both Arulampalam, Booth& Taylor (2000) and, in an extension to that study, Arulampalam (2002) find that state dependence is strong for mature men, while it is much weaker for young men[6]. Note also that scarring effects are the strongest for mature men with some qualifications. Also related to our setting is the finding that local labour market tightness[7] seems to matter more for the unemployment probability of mature men than for men younger than 25.

Arulampalam (2001) and Gregory and Jukes (2001) examine the scarring effect on wages at re-employment and shortly after[8] They find clear evidence of scarring effects, though stronger for older workers and for individuals with initially higher positions in the earnings distribution.

Also studies on Germany indicate strong state dependence in unemployment among adult men in the 1980s. Flaig et al. (1993) find that both unemployment occurrence and duration involve persistent effects, while Muehleisen & Zimmerman (1994) only find evidence of lagged *duration* dependence. However, the period over which persistence is measured is still rather short[9].

A few of these studies on scarring effects take account of LM conditions early in the career. Some studies rely on the exogeneity of early LM conditions to instrument youth LM experiences. Local LM conditions have served e.g. to instrument for early unemployment experiences in investigating effects on adult unemployment (Gregg, 2001, UK data) and as instruments for indicators of individual job stability in studying the effect on adult wages (Neumark, 2002, US data)[10]. Gregg (2001) finds evidence of strong structural dependence induced by early unemployment experiences for men. Neumark (2002) finds that OLS results (as in Gardecki & Neumark, 1998) underestimate the benefits from early job stability on adult wages. Remark that this IV approach considers effects of local unemployment rates only through unemployment experiences. Local unemployment rates might affect outcomes through other channels as well. As Neumark (2002), Margolis et al. (2002) also investigate whether employment stability in the early career[11] affects adult LM outcomes. In particular, monthly earnings and time spent unemployed (within a year) up to 12 years after leaving education are studied. They use GSOEP data and account for unobserved heterogeneity using a fixed effects approach. For males in Germany, they find that there are persistent effects of early career experiences on these adult outcomes. The findings are interpreted as an indication of a dual labour market.

In contrast to some of the above mentioned literature, this study attempts to report on *overall* effects of economic conditions at entry on adult outcomes - as in Raaum & Roed (2006). Both earnings and experience accumulation are considered as outcomes. In addition, the register data used imply some advantages such as detailed earnings information and the long time horizon over which we can follow individuals in the LM (up to 21 years). The latter allows an investigation of the effects throughout a large part of the career.

[4]Occurrence dependence is the effect of previous unemployment spells on the probability of a transition into unemployment, while lagged duration dependence implies that the probability of remaining unemployed or becoming unemployed depends on the lengths of previous unemployment spells.

[5]They use 5 waves of BHPS data and analyse scarring effects up to 4 years after an unemployment experience

[6]They use different methods to control for heterogeneity

[7]The unemployment-to-vacancy rate is used as a measure for local labour market tightness.

[8]They consider a period of up to 2 years after an interruption.

[9]They use 6 waves of the GSOEP.

[10]Note that this type of study does not strictly belong to the scarring literature

[11]Margolis et al. (2002) use measures of number of employers, occupations, share of time spent in employment and job duration

3 German education system and Data

Some information about the German education system is needed in order to explain the data and the approach used.

3.1 The educational system and the dual apprenticeship scheme in Germany

The German educational system is characterised by a very early and strong sorting of students. Full-time schooling is compulsory until the age of 16, the end of lower secondary education. A helpful figure describing the education system can be found in appendix. After four years of primary school (at age 10), students need to choose between three types of secondary schools. The transition between primary and secondary school implies a very important decision, as the school track chosen determines the number and types of choices available in the future, e.g. it has strong implications for the time of labour market entry. Pupils face three possible tracks: *general* secondary school (Hauptschule), *intermediate* secondary school (Realschule) and *higher* secondary school (Gymnasium). Note that the choice is partly limited by performance in primary school.

Individuals in the *general* secondary school graduate after 5 years (aged 15/16) with general educational skills, which provide the basis for further apprenticeship training. The *intermediate* secondary school lasts 6 years (until age 16) and traditionally provides training for a further apprenticeship in white-collar occupations. It also opens one more possibility: full-time vocational or technical schools. The *higher* secondary school type, the Gymnasium, involves completion of both lower and upper secondary education and leads to the Abitur degree (9 years). It serves as a basis for academic education at universities and other institutions of higher education. Its students usually graduate at age 18-19.

Of the 1.1 mio school leavers in 1997, 7% had not obtained a degree, 25% graduated from the general secondary school, 38% from intermediate school and 22% from high school (with the rest in the 'other' category). (Riphahn, 2002)

The most important type of *post-secondary* training in Germany is provided by the dual apprenticeship system. It is called "dual" because vocational education and occupational training are provided simultaneously, it is a combination of school based and workplace based training (i.e., during a single program of work/study). Theoretical aspects of training are provided in vocational (public) secondary schools while the practical aspects are provided by the firms hiring the apprentices. Apprentices spend 1 to 1.5 days each week in vocational schools, and the remainder in a firm. Approximately 360 occupations are covered by the system (in all sectors of the economy). The curriculum is defined in the Vocational and Training Act. There is a common exam at the end of training and certification is recognized nationwide. During the apprenticeship years, a trainee is covered by social programmes. After a three-month probation period, the trainee cannot be laid off. The period of training lasts between two and three and a half years, depending on the secondary diploma of the apprentice and the occupation in which she is trained. The allowance received by a trainee is only a fraction of the wage of a comparable skilled worker (on average 1/3 of the wage for skilled workers, see Steedman, 1993). Note also that an apprenticeship needs to be taken up between the ages 16 and 25.

Entry into skilled jobs in Germany is almost exclusively through the 'dual' apprenticeship system. About 70 per cent of young Germans start their working life through an apprenticeship. The total share of vocationally trained workers has remained stable in the period 1970-2000, at around 60% of the work force.

3.2 Data

This analysis is based on a sample from the IABS data (Institute for Employment research - Employment Subsample), covering the period 1975-2001. Since 1973 German law requires

that employers supply information to social security agencies about employees covered by social insurance at least once a year. This information is stored by the Federal Employment Service and therefore provides an insurance account for each employee covered by the social insurance system. Note that this file contains all individuals who have been gainfully employed for at least one day in the period considered.

A sample from these register data is provided by the Institute for Employment Research (IAB). The IAB Employment Subsample is a 1 percent random sample of employees in the collected data and provides a continuous employment history for each of the included employees[12]. The subsample covers the years 1975-2001 for Western Germany, while information on Eastern Germany is available over 1992-2001. The dataset is in event history format, which allows recovery of employment and unemployment spells. It also contains some personal and job characteristics. Supplementary information on firms/establishments (industry, size firm,...) and on unemployment periods (with benefit receipt) has been added to the sample.

By construction, the database does not include groups not covered by the mandatory social security system: civil servants and self-employed[13]. Also minor work spells are excluded (marginal workers), which truncates the earnings data from below[14]. In addition, reported earnings are censored from above in the sense that earnings exceeding the threshold are reported as the threshold value[15]. Finally, individuals working in East-Germany (before 1992) or abroad are not observed. This 1% sample contains around 20 million observed spells, for ca. 2.5 million individuals.[16]

The IABS is a unique data source, both in terms of accurateness and sample size. It allows to follow individuals from LM entry over a long period of time. For our analysis, the IAB data provide relevant information on the following: year of birth, gender, nationality, education, date & length of employment spells, gross daily wages, region of workplace, region of residence (1999-2001 only) and unemployment spells (with benefit receipt).

It should be emphasized that, due to the type of data used, 'entry into the LM' is defined as the moment when an individual starts his first job - that is when an individual is first observed.

3.2.1 Local unemployment rate at entry

The local unemployment rate at entry for an individual is the overall (male) unemployment rate in the region of entry. This unemployment rate is chosen to adequately reflect the state of the labour market, as a proxy for overall economic conditions at entry. Yearly unemployment rates for Western Germany are recovered from the IABS data. For more information on the computation of LUR_{1618}, see appendix A. The unemployment rates measure the proportion of males aged 15-64 who are registered as unemployed in an area[17]

The regional level at which unemployment rates are measured is the 'district'. The district is the most detailed level observed in the data and there are 439 of these districts in the whole of Germany. The districts (Kreise) are at an intermediate level of administration between the federal states (Laender) and the municipalities (Gemeinden). Most of the districts are rural districts (Landkreise), but 116 larger cities (usually with more than 100,000 inhabitants) do not belong to a district but are considered as urban districts themselves

[12]For more info on the dataset (the 1975-1995 version), see Bender et al.(2000)

[13]Both civil servants (Beamten) and self-employed (Selbstaendige) each reflect approximately 8-9% of the economically active workforce in Western Germany (Federal Statistical Office Germany)

[14]Marginal work spells are included from 1999 onwards.

[15]Earnings are subject to contributions up to a particular threshold; this threshold changes yearly. Overall, around 1% of earnings observations are censored from above (this is slightly higher for males only (approx. 1.6%).

[16]For 1980, it has been estimated that this dataset contains +/-79% of the labour force in West-Germany (Herberger and Becker, 1983).

[17]The unemployment status involves receipt of any type of unemployment benefit.

(Kreisfreie Stdte or Stadtkreise). Districts can therefore differ substantially in geographical size. Western Germany counts 326 districts. Unemployment rates are therefore measured at a detailed regional level.

We also consider unemployment rates for larger regional measures (zones 1 to 3), to better reflect economic conditions in a larger area. These zones cover areas with an increasing radius around each district, including the district itself: zone 1 includes the districts in an area of +/-60km radius around the (centre of the) district of entry. Zones 2 and 3 include districts within an approximate radius of 80 and 100km. In order to avoid endogeneity in the LUR at entry (timing of the first job), the unemployment rates are averaged over the years in which the individual is aged 16-18. In what follows, this local unemployment rate will be called LUR_{1618}.

Note that, as an alternative, youth unemployment rates could be used. However, these mainly mirror the tightness in the youth labour market segment, while general economic conditions are likely to be reflected better using a broader concept. Moreover, relevant youth unemployment rates cannot be reliably computed from the available data, as the time spent nonemployed before finding a first job is not observed.

Table 1 describes the LUR_{1618} at the different regional levels, for the individuals in our sample. Note that the selected sample includes individuals who enter from 1980 onwards, as the computed local unemployment rates are not very reliable in the first years of the data. The mean LUR at entry is slightly lower than 7% and it ranges between 0.9 and 23.4%. The evolution of the overall unemployment rate in Western Germany in the period considered is shown in figure 1. There has been an increase in unemployment at the start of the 80s, followed by a fall towards the 90s. The first half of the 90s has again seen unemployment rates rising considerably (up to 11%), after which they have fallen again.

Table 1: Descriptive statistics: LUR_{1618} at entry (in %)

	N	mean	sd	min	max
district	69376	6.9	2.88	0.9	23.4
zone 1	69376	6.8	2.46	1.1	18.3
zone 2	69376	6.8	2.39	1.1	16.8
zone 3	69376	6.8	2.34	1.2	16.1

Zones 1-3 imply zones around a district (incl.),
with increasing radius (+/- 60/80/100km radius)

3.2.2 Sample

We focus on men who do not take higher education and enter the LM in Western Germany before age 19, i.e. mainly at age 16-18.[18] This selection is done with a view on exogeneity of the region of LM entry, which will be discussed below. We do not consider individuals who take higher education, as they are highly mobile due to their studies. Given our data, we cannot determine a reliable initial region for them. Females are not considered here because daily earnings for females hide a lot more heterogeneity in (unobserved) hours worked.[19]

Entry at this early age is very common given the education & training system in Germany. Based on the reliability of the local unemployment rates, we consider individuals who enter the LM from 1980 onwards. They are therefore members of the birth cohorts 1962-1977. The observations on outcomes are the spells including end June of each year 1980-2001. Note that these individuals are very similar in terms of schooling. They have all finished lower secondary education - potentially followed by some short programs of full-time vocational education, mainly in preparation for an apprenticeship. Once in the LM, a large proportion of individuals take part in the apprenticeship program.

[18] Note that some of the included individuals enter the LM at age 15.

[19] In addition, females could be more likely to work in the public sector at some point (e.g. with an eye on fertility), when they would be considered as nonemployed. Females might also react more strongly to high unemployment rates by opting to work as civil servants.

The first labour market outcome variable we use are daily wages (gross daily earnings). These are taken directly from the IABS and adjusted to real 1995 prices using the consumer price index for all private households. All earnings observations (or log daily earnings) are transformed into Euros. Earnings recorded in the IABS are top coded at the social security contribution ceiling. However, the sample includes very little censored earnings observations, see table 2. The other outcome of interest is accumulated work experience. Experience is the total number of days observed working since entry into the LM, expressed in years. Note that it also includes time spent in apprenticeship and that time spent in marginal employment is not incorporated[20].

Basic descriptive information about the selected sample is shown in table 2. The individuals are observed from the first job onwards, they all start a first job between age 15-18, and are followed up to 21 years after entry (13-14 years on average). Note that more than 85% of our sample obtains an apprenticeship degree. *Adult* outcomes considered include LM observations from the 5th year in the LM (i.e. potential experience>4years).

Table 2: Descriptive statistics: Sample

	N	mean	sd	min	max
# yrs observed	69376	13.3	5.1	2	23
age at LM entry	69376	16.7	0.9	15	18
year of LM entry	69376	1986	4.2	1980	1995
birth cohort	69376	1969	4.12	1962	1977
individuals with appr degree (%)	59208	85.3			
age at last observation	69376	30.4	4.9	16	39
year at last observation	69376	2000	3.3	1981	2001
potexp at last observation	69376	13.7	5.0	1	21
Adult outcomes[a]*:*					
age observed working	544276	27.6	4.2	20	39
daily earnings (in Euro)[b]	541096	72.3	20.7	5.0	136.5
censored earnings (% of obs)	3319	0.63			
potential experience	675189	10.6	4.1	5	21
experience at potexp=5	66090	3.7	0.8	.01	5
experience at potexp=10	53538	7.5	1.8	.01	10
experience at potexp=15	33476	11.8	2.8	.33	15
experience at potexp=20	9353	16.2	3.5	.33	20

[a] for potential experience>4 years (potexp=age-age at entry)

[b] Censored daily earnings included, where reported earnings=limit

The sample is drawn from IABS data (1975-2001)

Figure 2 shows the mean log daily earnings by potential experience, by LUR_{1618}. We see relatively large differences in daily earnings throughout the whole lifecycle. Overall, daily earnings in regions with higher initial LURs are lower than in regions with lower LURs, and the gap widens with time spent in the labour market. Note though that this does not apply if comparing medium and high LURs at entry. The differences in accumulated experience are much less clear, as illustrated in figure 3. Only the very high LURs at entry are associated with slightly lower experience accumulation throughout the life-cycle. There might be various reasons for these differences. In this paper, we want to see whether the economic situation (as reflected in LURs) at entry plays a role in this.

4 Estimation & identification

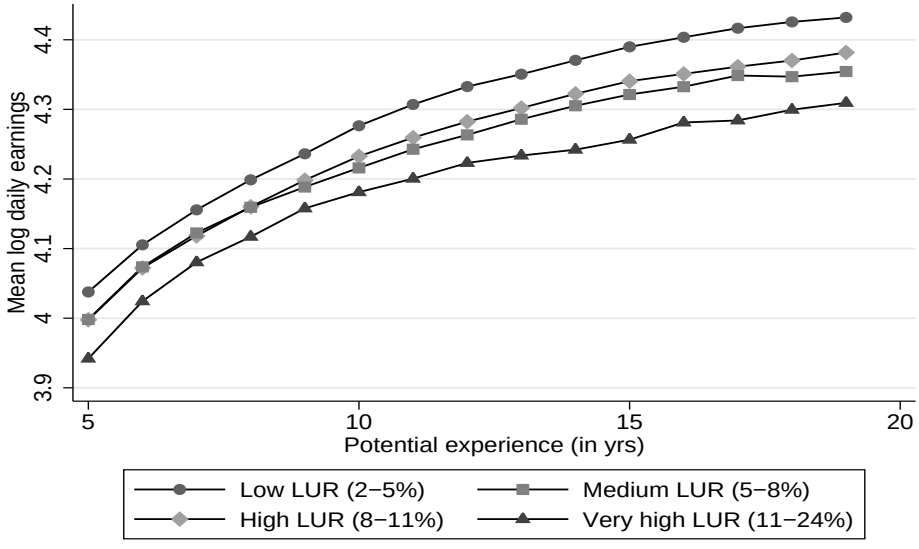
This study investigates the extent to which the state of the local labour market at entry determine career outcomes later on in life. I abstract from any (endogenous) reactions after LM entry, such as migration, and focus instead on measuring an overall effect of initial

[20]Marginal employment is not included in the data until 1999 and is coded as nonemployment in the years 1999-2001

Figure 1: Unemployment rate in Western Germany (1980-2001)

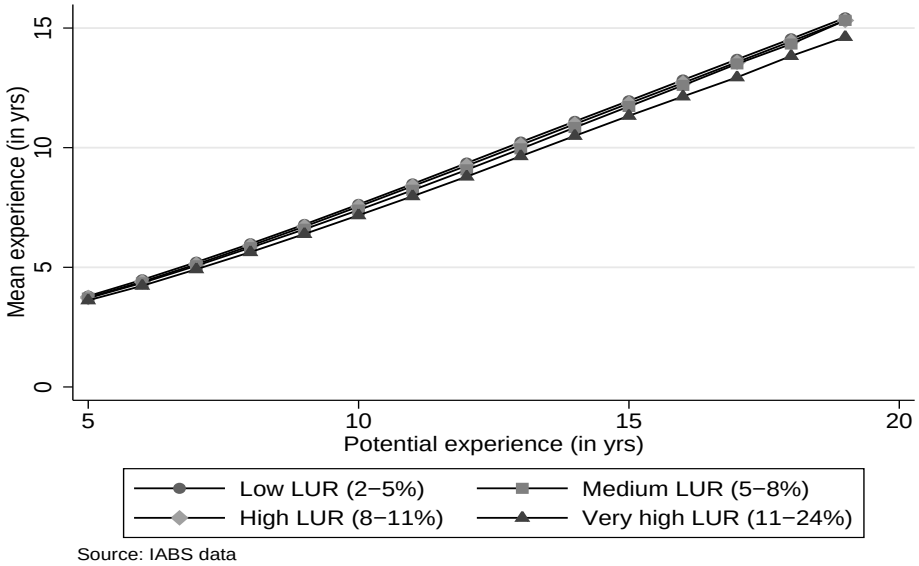
Source: computed from IABS data

Figure 2: Mean daily earnings and potential experience, by LUR at entry



Source: IABS data

Figure 3: True versus potential experience, by LUR at entry



Source: IABS data

economic conditions.[21]

4.1 Statistical Model

We will be looking into different outcomes: earnings and experience accumulation. For each of these outcomes, a simple regression framework will be used, in which the local unemployment rate at entry is a regressor. Reliability of the estimated parameters requires exogeneity of this local unemployment rate (LUR). In section 4.2 the underlying assumptions and supporting evidence for the assumptions will be discussed.

The key variable used is the local unemployment rate in the area (district). However, the timing of entry into the LM might be endogenous[22]: high LURs could induce individuals to take some additional schooling and/or might lengthen the time needed to find a first job (see section 4.2). Therefore, the LUR is averaged over the years in which the individual is aged 16-18 (LUR_{1618})[23]. The generic form of the equation to be estimated, for outcome y of individual i at time t, is the following:

$$y_{it} = \alpha_0 + \alpha_1 LUR_{i,1618} + g(Region0, Cohort, Time) + \epsilon_{it} \tag{1}$$

The estimated parameter α_1 provides us with an overall effect of the local unemployment rate at entry. Dummies for region of entry, time and birth cohort (group) are included. These are needed because there might be permanent unobserved differences between regions or birth cohorts, or there might be shocks at particular moments in time, that are related to both local economic conditions (LUR_{1618}) and LM outcomes[24]. Remark that including the region of LM entry reflects that any effects of changing region of workplace after entry are included in the overall effect of the LUR. High geographical mobility could offset/worsen any LUR effects: if individuals starting in a high unemployment/low wage region get the opportunity to work in higher wage regions, then the measured LUR effect would be weaker than if they had stayed in the initial region. Note that the reference case allows regional effects at federal state level. Regional, time and cohort controls imply a focus on whether individuals are permanently affected by shocks in initial local labour market conditions.

The sample used in the analysis is restricted to low education levels at LM entry. A medium education level corresponds to lower secondary education + vocational training (apprenticeship) which is acquired once in the labour market. Individuals with any form of higher education are excluded. Therefore, the selected sample is rather homogeneous in schooling and an indicator of education is not included.

The data allow to shed some light on the impact of LURs at entry over the career/life-cycle. This is investigated by including a quadratic in potential experience (PE) and a linear interaction of the LUR measure with potential experience[25]. Note that potential experience is the number of years in the LM (=age-age at entry). The coefficient of the interaction reflects whether the LUR effect increases or decreases in strength during the career.

$$y_{it} = \beta_0 + \beta_1 LUR_{i,1618} + \beta_4 (LUR_{i,1618} * PE_{it}) + f(PE_{it}) + g(Region0, Cohort, Time) + \epsilon_{it} \tag{2}$$

[21] The register data used include little background information which could provide exogenous variation in modelling endogenous reactions.

[22] Entry=start of the first job, at age 15-18 in the sample.

[23] Less than 10% of individuals in the sample enter at age 15, 38% starts working at age 17. Note that all individuals from the same birth cohort, entering in a district, have the same LUR_{1618}.

[24] E.g. regions might have different key industries/occupational structure; introduction of, or changes to, LM programs could affect some cohorts and not others; the German unification implied a large shock in some years.

[25] It is impossible to separately identify time and cohort effects in this setting, thus cohorts dummies reflect grouped cohorts.

The outcome variables considered are log daily earnings and the number of years of work experience.

4.2 Model assumptions

For the parameter estimates of the LUR to be consistent, the LUR at entry needs to be exogenous. Endogeneity could be caused by selection on unobservables, related to the LURs: if individuals entering in high unemployment districts are more selected (e.g. ability, motivation, LM attachment) than in lower unemployment areas. Given that the data tell us only about the region of the workplace, there might also be an issue of selection into the region (district) of LM entry if individuals commute at entry or relocate shortly before entry.

Exogeneity of the LUR_{1618} requires a few assumptions:

- The schooling choice is unrelated to the local unemployment rate at age 16-18.
- Individuals enter the LM immediately or shortly after finishing secondary school, before age 19
- Individuals enter the LM in the region of residence
- Individuals live in the region where they spent their early adolescence. This implies that they have not moved shortly before entering the LM.

This section discusses the degree to which these assumptions are plausible. One needs to keep in mind that the analysis is restricted to low and medium education levels[26].

4.2.1 The schooling choice is unrelated to the local unemployment rate at age 16-18.

If individuals can easily decide to move into higher education (or other forms of additional full-time education) due to high (expected) LURs at the potential time and place of entry, exogeneity of the LUR is questionable.

The educational system in Germany, however, does not allow much scope for this type of reactions. As described more in detail in section 3.1, Germany has a very structured educational system in which the choices are made about whole 'streams' or tracks at a very early stage (age 10) - at the transition of primary to secondary school. The school track chosen determines the number and types of choices available in the future, e.g. it has strong implications for the time of labour market entry.

Individuals in the sample were facing the secondary school choice (period 1972-1987) when the decision was mainly determined by advice from the primary school teacher - i.e. primarily based on ability and skills[27]. There was little room for personal expectations with respect to future economic conditions. In addition, switching secondary school track after the initial choice is in principle possible but uncommon. In 1966, about 7% of pupils who first decided for general or intermediate secondary school switched to high school - most of them within three years of the initial decision (Pischke, 1999).

Hence, the choice of school track and upward changes in the school track in response to future economic conditions is unlikely to cause a strong selection problem.

Nevertheless, if there is persistence (predictability) in local unemployment rates, i.e. a high correlation between the LUR at age 10 and LUR at age 16-18, then the secondary school choice might not be unrelated to LUR_{1618}. Persistent differentials in LURs *between* federal states are accounted for by regional controls, but persistent discrepancies between districts (*within* a federal state) might affect the sample observed entering within each district -

[26] A medium education level corresponds to lower secondary education + vocational training (apprenticeship), which is acquired once in the labour market.

[27] Note though that the teacher's expectations on future economic opportunities/conditions could have mattered in the advice.

which could bias the estimated effect. The unemployment rates over the period 1980-2001 show an overall correlation of 0.41 between LUR_t and LUR_{t-6} , while the correlation falls to only 0.23 if the federal state is conditioned on (as in the analysis). This latter does not imply a high degree of predictability, but the effects of LUR_{1618} will nonetheless also be investigated using within-district variation only (pure business cycle variation) - as this implies a correlation of only -0.02.

Additional supportive evidence for our assumption is that Raaum and Roed (2006) do not find evidence for individuals reacting to LURs by changing educational attainment in Norway[28]. They do, nevertheless, find some indications that somewhat more time is spent to finish a given educational level, in case of high LURs.

4.2.2 Little or no delay in entry into the LM after secondary education

Our sample consists of individuals entering the LM (or starting the first job) between age 15 and 18, i.e. individuals who attended general or intermediate secondary school and do not enter higher education. The assumption is required to prevent selection issues. If individuals started working after age 18, they are not considered in our analysis.

- Additional full-time education

Some individuals could experience a 'delay' in entry into the LM if they take additional full-time education of the vocational type. For more information on opportunities for FT education after lower secondary school, see appendix B. Franz et al. (1997) report that among lower secondary[29] school-leavers in 1990, around 60% started an apprenticeship, 3% became employed, 5% unemployed, 10% started either a 'vocational preparation year' or an ' elementary vocational year' and another 22% started a program at a special vocational school. Nevertheless, most of these vocational programs are restricted in length to 1 year. Given the relatively short length of these programs, it is unlikely that lower secondary school-leavers stay in full-time education beyond age 18 - and hence introducing differential selection between districts (based on LURs).

- Unemployment

Another reason why LM entry is delayed could be difficulties in finding a first job (early 'unemployment'). However, youth unemployment has been relatively low from an international perspective: over the period 1976-1994, unemployment among male 15-19yr olds averaged around 5.5-6% (Gross, 1988). In addition, unemployment *duration* in the age range 15-24 is not likely to exceed one year: Gross (1998) reports that in 1994 (resp. 1985), slightly less than 8.5% (resp. 15%) of unemployment periods are 1 year or longer (for men below age 25). The incidence and duration of unemployment make it rather unlikely that unemployment delays entry into the LM to such an extent that it would cause a serious selection problem.

4.2.3 Individuals enter the LM in the region of residence

If local unemployment rates are high, individuals might consider another or a larger area to find a first job. If a first job is found in another region (district), we would associate the unemployment rate of this new region to the individual. In the sample used, we only observe the region of the workplace. To avoid selection into areas (related to the LURs), we would need to assume that individuals live and work in the same region. Note that this is purely about commuting to the workplace outside the district of residence. The next assumption is about 'migration': a change in the district of residence.

The IABS data for the period 1999-2001 report both on district of residence and district of workplace. This provides an idea of the extent to which the district of residence and

[28] They find that the propensity of leaving school with lower or upper secondary education is not affected by unemployment rates during adolescence.

[29] i.e. general and intermediate track

workplace differ among new LM entrants[30]. It turns out that 74% of entrants work in the district of residence. Enlarging the region of the workplace to an area with a radius of 60, respectively 80 and 100 km (zones 1,2,3)[31] implies that more than 97% work and live in the same area (see table 3). Therefore, accounting for the unemployment rate of a larger area can correct a large part of the potential bias associated with selected individuals entering the LM outside the district of residence. Note that the largest jump in the proportion working and living in the same area is from district level to zone 1. This means that around 90% of the individuals who work outside the district of residence, still work relatively close to home[32].

A potential problem of selection into the region of LM entry (based on home to work commuting) can be avoided by using unemployment rates for different regional measures (district and zones 1-3). The analysis will therefore also be based on LUR_{1618} for the larger zones.

Table 3: Proportion of individuals living and working in the same area (1999-2001)

	%
district	74.17
zone 1	97.54
zone 2	98.08
zone 3	98.40
N	11098

IABS data (1999-2001): sample of new LM entrants

This sample of young LM entrants (1999-2001) also tells us that individuals in regions with high unemployment rates (relative to the surrounding districts) are slightly more likely to enter the LM outside the district of residence (see appendix C).

4.2.4 Individuals live in the region where they spend their early adolescence

An additional assumption is required to rule out selection into the district of entry. If a selected group of individuals close to LM entry was to move to another district as a reaction to the initial LUR, selection into regions might be a problem. Note, however, that any migration after LM entry is endogenous and is considered as a potential reaction to the initial LUR. Nevertheless, migration or residential relocation in the period before LM entry (as opposed to cross-district commuting discussed above) seems a rather unlikely event, for the following reasons.

First, the LM entrants considered are very young (age 15-18) and thus not inclined to move away from home before LM entry. Moreover, it is common for this type of individuals to enter the LM by starting an apprenticeship. Apprentices usually continue living in the parental house, as pay in this type of training is very low (on average 1/3 of the wage for skilled workers, see Steedman (1993)). Note that more than 85% of LM entrants in our sample obtains an apprenticeship degree (see Table 2).

Second, remark that individuals might have migrated to another district in the few years before entry - with their families. This can be based on parental or individual decisions, and potentially as a reaction to the local unemployment rate. It is nevertheless plausible that these young individuals have had little say (or their characteristics have had little influence) on the area in which they reside. However, we can not rule out that there is any type of selection happening through this channel. Data from the German Socio-Economic Panel (GSOEP) can help in understanding the degree to which young individuals moved away

[30]This is informative if this does not change much over time, for a sample satisfying our main sample requirements

[31]For a bit more info on these zones, see appendix A.

[32]Zone 1 reflects a zone up to ca. 60km around the (center of the) district of residence

from the location of childhood. The first column of table 4 shows that, for individuals not obtaining a higher education degree, 84% of 18yr olds still reside in the childhood location. Also more than 80% have been living in the current dwelling for more than 4 years. Among the 18yr olds who are not living in the location of childhood anymore (last two columns[33]), another 50% of have lived in the dwelling for more than 4 years. The issue of residential relocation before LM entry does not seem of considerable importance.

Table 4: Migration of adolescents

age	#	% in location of childhood	lived in dwelling for ≥4 yrs	age	# not in location of childhood	lived in dwelling for ≥4yrs
15	2,228		82.4	15		
16	2,399		83.8	16		
17	2,428	87.8	82.5	17	95	48.4
18	2,575	83.9	80.6	18	33	51.5
19	2,696	80.7	76.7	19	41	46.3
20	2,556	72.5	71.1	20	68	38.2
21	2,457	64.1	64.7	21	37	21.6
22	2,281	59.2	56.2	22	53	17.0
23	2,197	51.7	48.7	23	72	16.7

GSOEP data (1984-2003); males and females who do not obtain higher education degrees
no discernable differences by gender; location=city or area

Third, in case selective residential relocation occurred, we could argue that geographical mobility is limited in distance by aspects as family history, employment history (of parents) and cultural ties, in line with Dustmann and Preston (2001). Therefore, accounting for unemployment rates for larger regional measures (zone 1 - zone 3) would account for a large part of the bias. The larger the area around the initial place of entry, the more 'migrants' will be included and the lower the potential bias.

Finally, although it cannot be generally argued that residential location at entry is fully exogenous[34], the regional dummies included in the analysis do take some account of (permanent) selection into regions.

4.3 Sample selection and sources of potential bias

The assumptions discussed above raise a few issues in terms of sample selection and biases. A first issue is that the possibility of additional full-time vocational education and/or the impossibility of finding a job might delay LM entry beyond age 18.

The event in which young individuals enter beyond age 18 due to nonemployment (not finding a first job/apprenticeship) is judged rather unlikely, as this would involve long-term non/unemployment (as argued above). If the sample is affected by a delay in entering the LM due to high LURs, then we expect this mainly to be due to individuals who take (substantially) more vocational education (i.e. mainly longer programs at special vocational schools or advanced vocational schools) - as opposed to short vocational programs which might rather compensate for not finding an apprenticeship. If the former individuals have rather high ability, then the measured effect of LUR on earnings would be stronger due to the selected sample in high LUR regions. Note that once an individual is in the sample (i.e. entry before age 19), delaying entry would not have an impact on the LUR_{1618} measured. This is because, due to averaging the LUR over the period in which the person is aged 16-18, all individuals of a birth cohort entering in a particular district have the same LUR_{1618}. Remark though that their potential experience levels would be different at each point in time.

[33]The number of observations is very low though.

[34]It might be related to parental characteristics, such as education and income, which also affect children's career outcomes such as earnings

The bias with respect to cross-district commuting and residential relocation before entry should largely be accounted for by using different regional measures. Nevertheless, it is interesting to consider the expected bias based on the district results versus the results based on the LUR in larger zones.

The fact that individuals relocate before LM entry ('migrants') or commute to another area at LM entry is in itself not a problem. They are affected by the LM situation in that area, once they start working there. If these individuals are a selected group in terms of unobserved ability with respect to the outcome variable considered (earnings, work experience),then there could be a problem of bias in the estimated coefficients. If e.g. mainly individuals with high earnings ability migrate before entry or commute to areas with lower (higher) LUR at LM entry, then the coefficient of the LUR (at district level) in the earnings regression would be downward (upward) biased - i.e. more (less) negative. However, if the commuters/migrants before entry are mainly individuals with lower earnings ability, who enter in areas with lower (higher) LURs, then the implied bias would be upward (downward) - i.e. less (more) negative. The bias at district level compared to larger regional measures cannot be determined a priori. Note though that it is more likely that individuals commute to an area with a lower unemployment rate. The same type of reasoning can be made for the accumulation of work experience.

Note that the relevant LUR for individuals, migrating or entering the LM in another district, is the LUR in the (unobserved) original region. If the *deviation* between the assigned LUR and the true (unobserved) LUR was to be unrelated to the true LUR itself, then this could potentially be considered as classic measurement error, implying an attentuation bias. As we have shown, a higher relative unemployment rate in the region versus the larger zone increases the probability of entering the LM in another region (see table 14). That implies that measurement error is higher for individuals in regions with truly high LURs. Moreover, the overall expectation of the measurement error might be negative, as the 'new' region is probably more likely to have a lower LUR.

5 Results

This section presents the results of the analysis in terms of daily earnings and experience accumulation over the 1st half of the career: from the 5th to the 21st year in the LM. For both outcomes, we investigate both average effects and the evolution of any effects over the life-cycle. The first part of the analysis explores average effects of the LUR at entry on later LM outcomes. The regressors include the local unemployment rate in the area of LM entry (averaged over the years in which the individual is aged 16-18; LUR_{1618}), regional, time and grouped birth cohort dummies.

Second, we investigate how the LUR affects outcomes at different moments in the life-cycle. The long time period covered by the panel and the accurateness of the information allow this type of analysis. The regressors include the local unemployment rate in the district of LM entry, a quadratic in potential experience (PE and PE^2) and the linear interaction between the LUR and potential experience. A few robustness checks will be looked into, among them an interaction with the squared (potential) experience term.

5.1 Variation in LUR_{1618} used in the analysis

Remember that the analysis includes controls for federal state and cohort group (3 consecutive birth cohorts: e.g. A,B,C). Hence, we make use of a few sources of variation in LURs: between-district variation for a particular birth cohort (i.e. cross-sectional or regional variation), business-cycle variation (i.e. different birth cohorts within a district) and variation in LURs due to different birth cohorts (within a group) entering in different districts[35]. Note that sensitivity of the results with respect to cohort grouping will be tested[36]. Ta-

[35]The latter compares initial LURs of an individual of birth cohort A entering in district X with an individual of birth cohort B (or C) entering in district Y, where X and Y are in the same federal state.

[36]There is a trade-off between more variation using larger cohort groups and more heterogeneous entry cohorts, in terms of e.g. potential experience

ble 5 reports the standard deviation in LUR_{1618} for the first two of these sources. Mean standard deviations by federal state are displayed. Column (1) shows that large states as Niedersachsen and Bayern have large between-district variation in LURs, while the state Hamburg has no variation at all - it consists of one district only. Note also that, given the size of the state, there is little between-variation in Baden-Wuerttemberg. The mean total variation (between & within standard deviation) used ranges from .64 to 2.62 for the 3yr cohort groups.

Table 5: Variation in LUR_{1618}: total, within&between districts - mean sd by state of entry

		(1)	(2)	(3)
State/region of entry	N	sd betw dist[a]	within dist[b]	total
Schleswig-Holstein	2,976	1.76	.90	2.05
Hamburg	1,567	0[c]	.64	.64
Niedersachsen	8,632	2.33	.95	2.62
Bremen	795	1.68	.90	1.95
Nordrhein-Westfalen	18,926	1.54	.69	1.72
Hessen	5,965	1.28	.64	1.50
Rheinland-Pfalz	4,339	1.94	.71	2.14
Baden-Wuerttemberg	11,282	.76	.53	1.01
Bayern	13,663	2.14	.58	2.29
Saarland	1,231	1.42	.92	1.73
All regions	69,376	1.48	.69	1.77
cohort group		1yr	3yrs	3yrs

[a]: mean of sd within the federal state, i.e. between the districts, for given birth cohort

[b]: mean of sd within a district, i.e. between different birth cohorts

[c]: The federal state of Hamburg consists of 1 district only

5.2 Daily earnings

The dependent variable is log daily (gross) earnings. Since the earnings variable is censored from above, a censored regression method is applied[37].

Table 6 shows the average effects on of the LUR at entry on log daily earnings. Controlling for unobserved elements at federal state level, a 1 unit increase in LURs (e.g. from 5 to 6%) decreases daily earnings with about 1.2-1.6%. The effect increases if the initial LUR for the larger zones are considered (columns 2-3: zones 1 and 3). It seems that commuters and migrants (before entry) weaken the relation between initial LUR and outcomes: accounting for LURs in larger zones yields stronger negative coefficients. This suggests that migrants/commuters are most likely lower-ability individuals who enter the LM in regions with lower LURs.

Table 7 shows results based on cross-sectional variation (between-district) and longitudinal (business-cycle) variation separately. Columns 1-3 indicate that differences in LURs between districts (in a federal state) are more detrimental for earnings than within district differences over time[38]. Columns 4-6 report the effect on earnings is about a third smaller but nonetheless significantly negative. Notice again the larger impact on earnings for the zone-level regressions.

The results of some robustness checks are shown in appendix (table 15). Results shown there suggest that the effect of LUR_{1618} on earnings might be increasing over the career. A more flexible specification allowing for state-specific effects of LUR_{1618} (table 16) indicates that there are substantial differences between federal states, with stronger adverse effects in the southern states (except Bayern).

[37]The proportion of censored observations is nevertheless very low.

[38]The results based on within-variation only could be interesting in another respect, as there might still be unobserved elements within a federal state that drive both LUR and the outcome: e.g. within a federal state, districts with higher LURs might also have lower average daily wages. A less extreme version of this type of robustness check is considered further down.

Table 6: Average effects of LUR1618 on log daily earnings

	(1) district	(2) zone 1	(3) zone 3
LUR_{1618}	-0.0116**	-0.0149**	-0.0156**
	[54.49]	[49.25]	[44.64]
N	541096	541096	541096
Pseudo R^2	0.19	0.19	0.19
controls for:			
region	FS	FS	FS
cohort (grouped)	3yr	3yr	3yr
year	yes	yes	yes

Censored regression; dependent variable: log (gross) daily earnings; LUR_{1618}=local unemployment rate in region of entry, average over age 16-18; for district and zones 1-3: zones 1-3 imply zones around the initial district (incl.), with increasing radius. Work spells at potexp>4. FS=Federal State; t-stats between brackets, *(**): significance at 5%(1%)

Table 7: Average effects on log daily earnings: by source of variation in LUR_{1618}

	(1) district	(2) zone 1	(3) zone 3	(4) district	(5) zone 1	(6) zone 3
LUR_{1618}	-0.0113**	-0.0144**	-0.0152**	-0.0072**	-0.0098**	-0.0100**
	[50.39]	[43.43]	[38.01]	[19.57]	[21.24]	[20.56]
N	541096	541096	541096	541096	541096	541096
Pseudo R^2	0.2	0.2	0.2	0.22	0.22	0.22
controls for:						
region	FS	FS	FS	district	district	district
cohort (grouped)	1yr	1yr	1yr	3yr	3yr	3yr
year	yes	yes	yes	yes	yes	yes

Censored regression: daily earnings are censored from above; Dependent variable: log (gross) daily earnings; LUR_{1618}=local unemployment rate in region of entry, average over age 16-18; for district and zones1-3: zones 1-3 imply zones around the initial district (incl.), with increasing radius; Work spells at potexp>4; FS=Federal State t-statistics between brackets, *(**): significance at 5%(1%)

Once we want to look into differential effects over the life-cycle, the censoring is of slightly more importance as 5-6% of earnings observations at potential experience levels above 18 years are censored. Table 8 reports the basic results. The LUR at entry harms earnings considerably throughout the career: the effect is present at low levels of potential experience and rises in magnitude over the life-cycle[39]. A one unit increase in the LUR at entry (e.g. from 6 to 7%) causes daily earnings at 10 years in the LM to fall by more than 1%. When the LUR in larger areas is accounted for, both the intercept and the interaction effect increase slightly in value (columns 1-2). This reflects that individuals who enter the LM outside the district of residence weaken the relation over the whole life-cycle.

Both sources of variation (between and within district) give rise to negative effects on earnings throughout the career (table 9). Nevertheless, within-district variation involves a less strong negative impact[40]. This reflects that mainly differences between districts (as opposed to pure business cycle variation) give rise to lower earnings both at the start and throughout the career. Considering the LUR in larger zones even enhances this negative effect (columns 2-3), whereas the marginal effect remains more or less constant when only within-zone variation in LURs is considered[41].

Some robustness checks have been carried out: results are provided and briefly discussed

[39]Note that the coefficient of LUR_{1618} itself is not very meaningful as that reflects the effect at potexp=0, even though only outcomes after 5 years in the LM are included.

[40]A 1 unit higher LUR causes earnings to be 1% lower only after 30 years in the LM

[41]Note the somewhat more positive LUR-coefficient versus the slightly stronger slope coefficient

Table 8: Log daily earnings and life-cycle effects

	(1) district	(2) zone 1	(3) zone 3
LUR_{1618}	-0.00586**	-0.00725**	-0.00723**
	[12.49]	[12.38]	[11.36]
PE*LUR_{1618}	-0.00043**	-0.00047**	-0.00046**
	[11.13]	[10.03]	[9.15]
PE	0.06137**	0.06122**	0.06107**
	[72.76]	[69.02]	[67.59]
PE^2	-0.00139**	-0.0014**	-0.0014**
	[50.47]	[50.13]	[49.81]
[16.97] N	541096	541096	541096
Pseudo R^2	0.21	0.21	0.21
controls for:			
region	FS	FS	FS
cohort	3yr	3yr	3yr
year	yes	yes	yes

Table 9: Effects on log daily earnings over the lifecycle, by source of variation in LUR_{1618}

	(1) district	(2) zone 1	(3) zone 3	(4) district	(5) zone 1	(6) zone 3
LUR_{1618}	-0.00647**	-0.00896**	-0.00968**	0.00073	0.00157*	0.00211**
	[13.57]	[14.77]	[14.47]	[1.34]	[2.35]	[2.98]
PE*LUR_{1618}	-0.00045**	-0.00050**	-0.00050**	-0.00032**	-0.00037**	-0.00035**
	[11.49]	[10.53]	[9.75]	[8.42]	[7.86]	[7.12]
PE	0.06153**	0.06172**	0.06155**	0.06271**	0.06319**	0.06318**
	[67.32]	[64.71]	[63.49]	[74.88]	[71.80]	[70.50]
PE^2	-0.00139**	-0.0014**	-0.0014**	-0.00138**	-0.00139**	-0.00139**
	[50.15]	[49.90]	[49.64]	[50.58]	[50.25]	[49.95]
N	541096	541096	541096	541096	541096	541096
Pseudo R^2	0.21	0.21	0.21	0.24	0.24	0.24
controls for:						
region	FS	FS	FS	district	district	district
cohort	1yr	1yr	1yr	3yr	3yr	3yr
year	yes	yes	yes	yes	yes	yes

Censored regression: daily earnings are censored from above; Dependent variable: log (gross) daily earnings;
LUR_{1618}: unemployment rate in region of entry, average over ages 16-18, for district and zones1-3:
zones 1-3 imply zones around the initial district (incl.), with increasing radius; PE=potential experience
Work spells at potexp>4yrs; FS=Federal State; t-statistics between brackets, *(**): significance at 5%(1%)

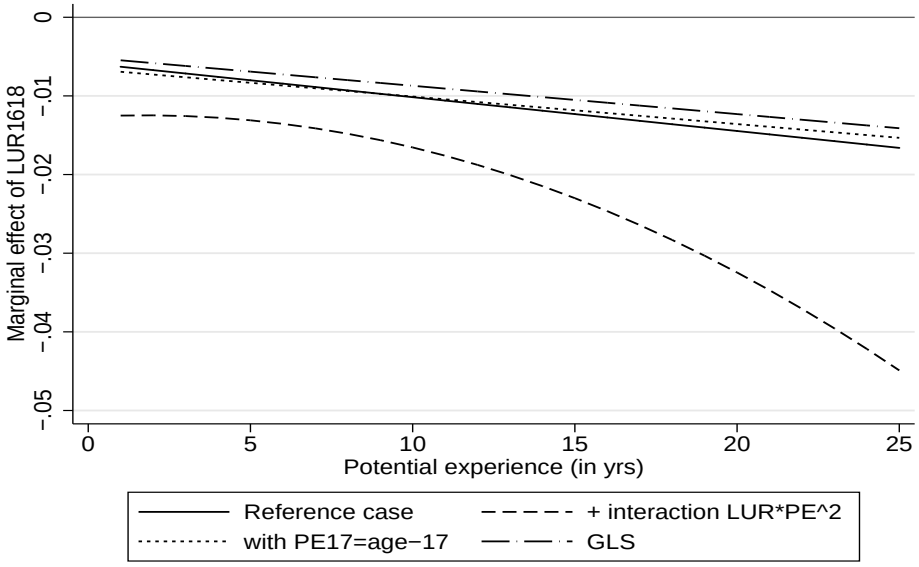
in appendix (table 17). In addition, note that individuals from the same birth cohort can enter the LM at different moments (between age 15-18) and this timing can be related to unobserved individual characteristics. Hence potential experience might be endogenous. With a view on this problem, table 18 in appendix also reports results based on an alternative (exogenous) measure for potential experience (=age-17). The results do not differ much: the coefficient on LUR_1618 is slightly more negative (-0.00658), but the magnitude does not increase as fast with potential experience (-0.00035)[42]. However, it is difficult to compare the results based on the reported parameters. Figure 4 compares the marginal effects of LUR_{1618} over the life-cycle using different specifications. It shows the reference case of the censored regresion results (as in table 8), a specification using the exogenous PE17 measure, one allowing for an additional interaction: LUR*PE^2 and a final one allowing for individual random effects (GLS)[43] The estimated parameters are also presented in

[42]In this case, birth cohort is equivalent to PE17 (age-17), the effect results from between-district variation only and should in principle be compared with column 1 in table 9

[43]The presence of unobserved individual effects might be a concern in both the earnings and experience equations as our dataset is in panel format. Note though that GLS should only affect the efficiency of the

table 18. The marginal effects are not very different, except for the case with the additional interaction. The figure makes nevertheless clear that initial LURs have negative effects on earnings which intensify throughout the career.

Figure 4: Marginal effects of LUR_{1618} on earnings, using different specifications



5.3 Experience accumulation

Table 10 shows the average effects of the LUR at entry on work experience (in years). The effects are negative, but rather small. Controlling for federal state effects, a 1 unit increase in LURs decreases experience by about .04-.12 years (0.5 months-1.4 months). Note, however, that for a difference of 6 units, that amounts to 3-9 months less work experience. The stronger negative effects for zones 1 and 3 imply that migration before - or commuting at - entry into the LM introduces an upward bias: this appears to suggest that individuals with lower LM attachment - lower tendency to accumulate work experience - move towards districts with lower employment rates.

As described above, LUR_{1618} includes a few sources of variation. Table 11 shows that both between-district variation (for a particular birth cohort) and within-district variation (between different birth cohorts) affect experience negatively, even though the effect based on within-district (business cycle) variation is much stronger (1.2-2.4months for a 1%-point difference in LURs). Note that for the earnings results, between-district variation implied stronger results. This could imply that experience is more reactive to the business cycle than earnings, which could make sense in a country where the wage setting process is highly centralised and unionised. The table also shows that considering LURs in larger zones again yields negative effects almost double in magnitude - for both types of variation.

Table 19 in appendix shows the results from some robustness tests (and provides a brief discussion of the results). The effect remains negative but small throughout. Table 20 in appendix illustrates the results allowing for state-specific effects of LUR_{1618}. There is quite some heterogeneity between federal states: Bremen, Nordrhein-Westfalen and Baden-Wuerttemberg see larger adverse impacts of a higher initial LUR, while the impact appears very small or nonexistent in Schleswig-Holstein, Bavaria and Saarland.

We now allow the effect of LUR_{1618} to differ throughout the career (table 12). At low levels of potential experience, a high LUR at entry is associated with slightly more

estimation.

Table 10: Average effects of LUR1618 on experience accumulation

	(1) district	(2) zone 1	(3) zone 3
LUR_{1618}	-0.0525**	-0.1010**	-0.1191**
	[38.54]	[52.26]	[53.00]
N	652748	652748	652748
R^2	0.65	0.65	0.65
controls for:			
region	FS	FS	FS
cohort group	3yr	3yr	3yr
year	yes	yes	yes

Table 11: Average effects on experience accumulation: by source of variation in LUR_{1618}

	(1) district	(2) zone 1	(3) zone 3	(4) district	(5) zone 1	(6) zone 3
LUR_{1618}	-0.0249**	-0.0420**	-0.0402**	-0.0967**	-0.1747**	-0.1942**
	[18.22]	[20.54]	[16.35]	[41.06]	[58.35]	[61.43]
N	652748	652748	652748	652748	652748	652748
R^2	0.68	0.68	0.68	0.65	0.65	0.65
controls for:						
region	FS	FS	FS	district	district	district
birth cohort (grouped)	1yr	1yr	1yr	3yr	3yr	3yr
year	yes	yes	yes	yes	yes	yes

Dependent variable: #years of work experience; LUR_{1618}: local unemployment rate in region of entry, average age 16-18; for district and zones1-3: zones 1-3 imply zones around the initial district, with increasing radius, including the initial district itself; FS=federal state; Work spells at potexp>4; t-statistics between brackets, *(**): significance at 5%(1%)

accumulated experience, while later on in the career, the marginal effect is negative. In the reference case (column 1), after 5 years in the LM, a 1 unit higher LUR increases accumulated experience with a negligible 0.0128 (5 days)[44]. The marginal effect switches sign at 7.2 years in the LM and after 15 years, the effect amounts to -0.044 (-16 days). When larger zones are considered for the initial LUR, the initial positive effect of LUR is larger, but also the negative interaction term is stronger. In zone 3, the marginal effect of LURs turns negative after 10 years in the LM; after 15 years the marginal effect is -0.0327 (-12 days). Overall, the effects on accumulated work experience are very small. Note that the life-cycle effects look small relative to the average effect measured above.

Table 13 shows that the negative effect later in the life-cycle mainly comes from variation in LURs between districts. Using variation between larger zones (columns 2-3) produces a steeper decrease over the life-cycle. Within-district (or business cycle) variation basically does not find any negative effect on accumulated work experience: it mainly causes work experience to be higher in the first 20 years in the LM, though the effects are again very small. This is in contradiction to the above average effects, using within-district variation only. It suggest there might be a negative correlation between the initial LUR and potential experience, which could introduce a downward bias into the estimated average effect of LUR_{1618} on experience.

In appendix, the results from some robustness tests are shown and discussed (table 21). There are no surprising changes. Again, marginal effects of LUR_{1618} for different specifications are presented in figure 5. Estimated parameters are reported in table 22. The reference case reflects the findings of column 1 in table 12. Remark that all effects are very small, given that -/+0.05 reflects a difference of -/+18 days. Using an exogenouse measure of potential experience (PE17) implies even smaller marginal effects. The same applies to

[44]Note that the LUR-coefficient itself is not very informative as only observations after 5 years in the LM are considered in the outcome regressions.

Table 12: Effect of LUR_{1618} on experience accumulation over the life-cycle

	(1) district	(2) zone 1	(3) zone 3
LUR_{1618}	0.0413**	0.0576**	0.0693**
	[15.54]	[17.37]	[19.21]
PE*LUR_{1618}	-0.0057**	-0.0070**	-0.0068**
	[24.56]	[24.94]	[22.89]
PE	0.7483**	0.7606**	0.7622**
	[149.02]	[145.56]	[143.62]
PE^2	0.0086**	0.0085**	0.0084**
	[47.66]	[46.36]	[46.04]
N	652748	652748	652748
R^2	0.73	0.73	0.73
controls for:			
region	FS	FS	FS
cohort group	3yr	3yr	3yr
year	yes	yes	yes

Table 13: Effects on experience accumulation over the lifecycle, by source of variation in LUR_{1618}

	(1) district	(2) zone 1	(3) zone 3	(4) district	(5) zone 1	(6) zone 3
LUR_{1618}	0.0294**	0.0331**	0.0386**	0.0965**	0.1300**	0.1358**
	[10.84]	[9.55]	[10.06]	[31.14]	[33.91]	[33.45]
PE*LUR_{1618}	-0.0057**	-0.0071**	-0.0070**	-0.0055**	-0.0065**	-0.0063**
	[24.46]	[24.95]	[23.16]	[24.04]	[23.47]	[21.27]
PE	0.8392**	0.8504**	0.8498**	0.7578**	0.7732**	0.7731**
	[154.65]	[151.73]	[149.65]	[151.35]	[148.32]	[146.09]
PE^2	0.0083**	0.0081**	0.0081**	0.0085**	0.0083**	0.0082**
	[45.47]	[44.27]	[44.11]	[47.03]	[45.59]	[45.43]
N	652748	652748	652748	652748	652748	652748
R^2	0.73	0.73	0.73	0.73	0.73	0.73
controls for:						
region	FS	FS	FS	district	district	district
birth cohort (grouped)	1yr	1yr	1yr	3yr	3yr	3yr
year	yes	yes	yes	yes	yes	yes

Dependent variable: #years of work experience; LUR_{1618}: local unemployment rate in region of entry, average at age 16-18; for district and zones1-3: zones 1-3 imply zones around the initial district (incl.), with increasing radius; FS=federal state; PE=potential experience; Spells with potexp>4; t-stats in brackets, *(**): significance at 5%(1%)

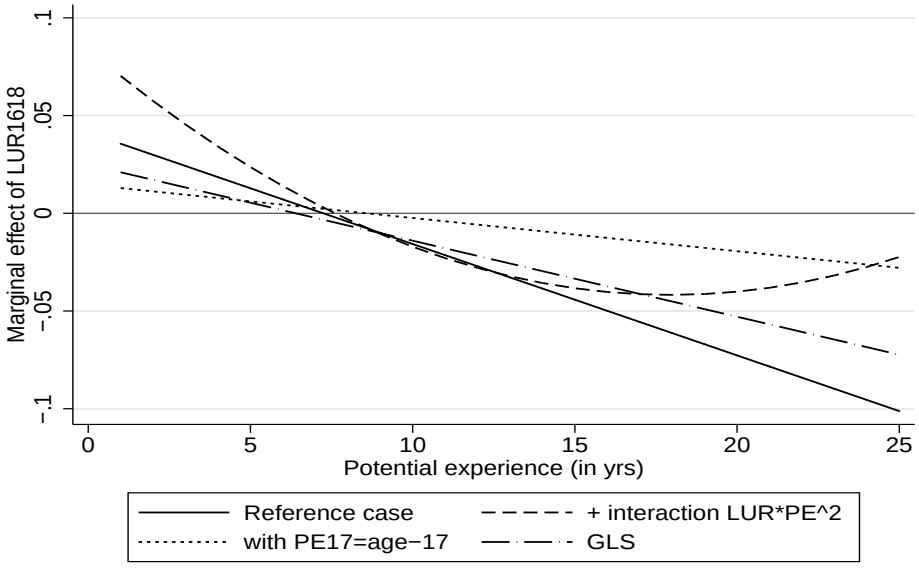
the GLS specification, though to a smaller extent. An additional interaction term with PE^2 indicates that the negative effect of the initial LUR smoothes out later in the career and might even become less negative.

5.4 Summary of the results

To summarise the results, there seem to be persistent negative effects of the initial LUR on daily earnings throughout the career. At the start of the career its effects are rather small, but they gain in strength throughout. For example, after 10 years in the LM, an initial LUR which is 1 unit higher (e.g. 5 vs 6%) causes daily earnings to be around 1% lower. These effects are sizeable. Note though that they seem to be caused mainly by variation between districts inside a federal state. Earnings do not seem to react as strongly to within-district (or business cycle) variation in the LUR at entry.

The accumulation of work experience also seems adversely affected by a higher initial LUR. However, the magnitude of the marginal effect is negligible, both on average and over

Figure 5: Marginal effects of LUR_{1618} on experience, using different specifications



the life-cycle. If anything, the LUR at entry somewhat positively influences work experience in the very early career, while it reverses sign afterwards. The negative effect mainly stems from between-district variation (cross-sectional variation). Longitudinal (or business cycle) variation implies a larger positive effect initially, falling at a similar rate throughout the career, and approaching zero only after 20 years in the LM. The latter is surprising.

6 Conclusion

This study investigates whether local economic conditions at entry into the labour market affect adult career outcomes. If the stage of the business cycle determines later outcomes, then there are long-term costs associated with entering the labour market in a recession. The focus is on the local unemployment rate (LUR) at entry - at detailed regional level - and its overall effects on earnings and experience accumulation.These outcomes are investigated throughout the adult life-cycle, using detailed German register data (IABS). Results draw upon variation in LURs related to both the moment and place of entry.

The findings indicate that, on average, a local unemployment rate which is 1 unit higher implies 1% lower earnings. The effect of the initial LUR is a bit smaller at the start of the career and seems to gain in strenght throughout. Work experience does not seem to be affected much. It involves only very small adverse effects later on in the life-cycle.

APPENDIX

A Computation of local unemployment rates

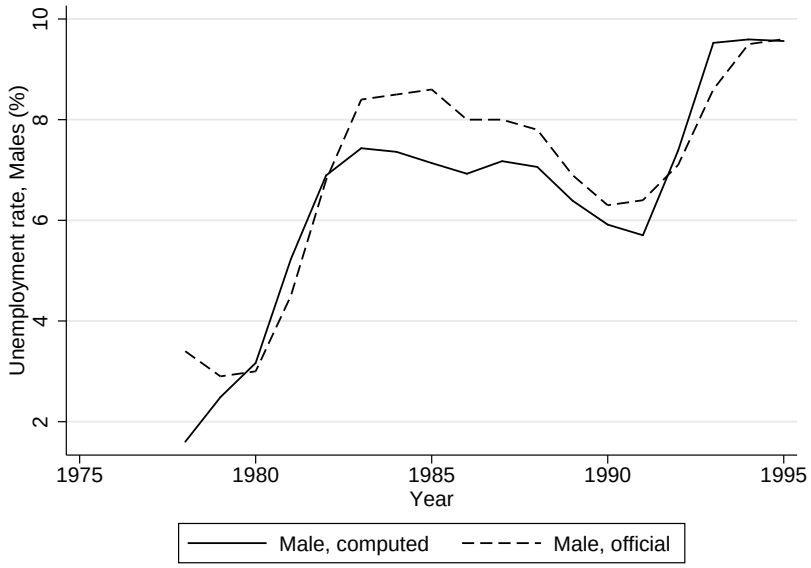
The local unemployment rates have been computed on a detailed regional level, based on the IABS data. In the data, we observe employees subject to social security contributions and unemployed individuals who receive unemployment benefits[45]. The rate of unemployment that can be derived using the IABS is the number of registered unemployed over the total number of employees plus unemployed.

The computed unemployment rates measure the proportion of males aged 15-64 who are registered as unemployed in a region. Yearly unemployment rates have been computed as an average of end June and end December unemployment observations. They have been constructed for different regional levels: 1. district level (Kreis) and 2. LURs have been computed for the region surrounding -and including- the initial district, to better represent the opportunities in a larger area around the district of entry. The zones considered include the districts within a radius of +/- 60/80/100km around the centre of the district (workplace). These zones (zone1-zone3) include on average 12,16 and 21 additional districts. The minimum number of additional districts included in each zone is respectively 2,3 and 3, while the maximum is 28,34 and 41 (for zones 1,2 and 3 respectively).

Note also that endogeneity of the LUR is avoided by averaging the LUR over the years in which the individual is aged 16-18.

Figure 6 compares official and computed unemployment rates by year, for Western Germany. For the mid80s, the computed rates are lower than the official ones, while the in the other years they are very close. Nevertheless, the evolution is very similar over the whole time period.

Figure 6: Comparison of official versus computed unemployment rates by year (Western Germany)



[45]There are 3 types of unemployment compensation: 1. unemployment insurance (Arbeitslosengelt), 2. unemployment assistance (Arbeitslosenhilfe) and 3. a form of welfare benefits (Unterhaltsgelt). An unemployed individual receives a type of income support depending on aspects such as age and employment history.

B Opportunities for FT vocational schooling after lower secondary education

Vocational schools offer (1) full-time general schooling for those not previously qualified for apprenticeship in a one-year 'vocational preparation year' (Berufsvorbereitungsjahr) program. Here individuals can complete their basic school degree (Hauptschulabschluss). In (2) the 'elementary vocational year' (Berufsgrundbildungsjahr), students learn occupation-specific skills which - if successfully completed - allows them to shorten a later apprenticeship. The third type labelled 'special vocational school' (Berufsfachschule) offers a variety of training opportunities. Training usually takes one year, though the latter has some programs that can take slightly longer (up to 2 years). More than fifty percent of the students graduating from these three vocational schools continue their education with an apprenticeship.

There is also an option to take a 3 year program at an 'advanced vocational school'. Parallel to the Abitur, this gives access to institutes of higher education, but outside university (Fachhochschule).

C Commuting at LM entry: a reaction to LUR?

This IABS subsample with new entrants in 1999-2001 can help in understanding to what extent starting work outside the district of residence ("cross-district commuting", CDC) is a reaction to the local unemployment rate. Table 14 shows the results of a probit analysis[46]. The relative unemployment rate is defined as the *ratio* of the unemployment rate in the home district (urdistrict) to the unemployment rate of a larger zone including the district (urzone1 - urzone3)[47]. Note that cross-district commuting mainly takes place within zone 1 (see table 3), but we also report the results for the larger zones. The relevant period is the year of LM entry (1999-2001).

The positive coefficients in table 14 do indicate that the higher the relative unemployment rate in the district versus a larger zone (1-3), the higher the probability of entering the LM in another district (CDC). Given that the size of a district might be related to both LUR and the commuting propensity, I have included dummies controlling for the size of the district[48]. Note, however, that only a small part of the 'decision' to work in another district is explained by our regression.

Table 14: Probit analysis of cross-district commuting at LM entry (1999-2001): marginal effects

	district vs zone 1	district vs zone 2	district vs zone 3
drelurML (>0.75 & <1)	0.025*	0.017	0.017
	[1.97]	[1.37]	[1.37]
drelurMH (≤ 1 & <1.25)	0.062**	0.054**	0.061**
	[4.42]	[3.86]	[4.45]
drelurH (>1.25)	0.130**	0.127**	0.158**
	[6.63]	[6.12]	[7.23]
N	11097	11097	11097
Pseudo R^2	0.01	0.01	0.02
size of district dummies	yes	yes	yes

IABS data 1999-2001: sample of new LM entrants, drelur=dummy for relative unemployment rate drelurML=medium-low LURdistrict/LURzoneX, MH=medium-high, H=high; t-stat in brackets

[46]The dependent variable reflects whether or not an individual lives and works in a different district (1 if different districts, 0 otherwise)

[47]For district versus zone 1, the *ratio* ranges between 0.31 & 1.74, with mean 0.94 and standard deviation 0.20; the difference in *absolute terms* has a mean of -0.48 and standard deviation of 1.69 (varying between -7.6 & 8.2%-points).

[48]The size of a district is approximated by the number of districts which are in zone 1 around each district, i.e. within +/- 60km around the midpoint of a district. Size (group) dummies have then been generated.

D Robustness of the results

Robustness of the earnings results The above results are mainly based on grouped birth cohorts (3yrs). Note that older birth cohorts (within a group) can enter earlier and therefore have higher potential experience at any moment in time. If LUR_{1618} were to increase over time, the difference in potential experience could magnify the negative relation between LUR and true experience. I considered grouping the cohorts differently by grouping 4 and 5 birth cohorts together. Columns 1-2 of table 15 illustrate that the effect remains negative. Nevertheless, using 4year groups, the results are smaller, while using variation in 5year cohorts enhances the negative effect.

One might believe that there are (unobserved) differences between the districts within a federal state, which could be related to both LUR and LM outcomes, such as differences in industrial or occupational structure. The results in column 3 include a smaller region (Raumordnungsregion (ROR)=Regional Planning Unit) as a conditioning variable[49]. This results in a slightly smaller negative effect (-0.0095). The effect of the LUR might be changing for different birth cohorts. Therefore we do the analysis dropping the first 6 birth cohorts (column 4, only birth cohorts 1968-1977). The negative relation also weakens slightly. This could imply that the negative effect gains strength throughout the career - the cohorts with the largest potential experience are dropped. Alternatively, the effect might be constant over the career, but is less strong for later cohorts. Column 6 supports the former idea as the effect is smaller if we only consider earnings in the first 10 years in the LM. The effects over the life-cycle support the former idea. Also dropping extreme values of LUR does not change the results much (column 5).

Table 15: Robustness of earnings results

	(1)	(2)	(3)	(4)	(5)	(6)
	district	district	district	district	district	district
LUR_{1618}	-0.0105**	-0.0120**	-0.0095**	-0.0104**	-0.0129**	-0.0099**
	[51.73]	[61.36]	[34.69]	[30.70]	[59.93]	[28.57]
N	541096	541096	541096	240821	531817	230923
Pseudo R^2	0.19	0.19	0.21	0.11	0.28	0.07
controls for:						
region	FS	FS	**ROR**	FS	FS	FS
cohort (grouped)	**4yr**	**5yr**	3yr	3yr	3yr	3yr
year	yes	yes	yes	yes	yes	yes
				coh 68-77	$LUR \in [1.5, 16]$	**potexp<10**

Censored regression: daily earnings are censored from above; Dependent variable: log (gross) daily earnings;
LUR_{1618}=local unemployment rate in region of entry, average over age 16-18, for district and
zones1-3: zones 1-3 imply zones around the initial district (incl.), with increasing radius;
ROR=Regional Planning Unit; Work spells at potexp>4; t-statistics between brackets, *(**): significance at 5%(1%)

Table 16 shows results when state-specific effects of the LUR are allowed. It turns out that the adverse effect on earnings is stronger in the southern states (except Bavaria), and in particular Rheinland-Pfalz (-0.0223).

Robustness of the life-cycle earnings results Table 17 shows results from some robustness tests. Using different cohort groupings does not affect the findings much, though earnings decrease less strongly over the life-cycle (columns 1-2). Also conditioning on a smaller region (ROR=Regional Planning Unit) reduces the magnitude of the effect somewhat. Dropping the first 6 cohorts or ignoring extreme values in LUR and earnings basically leaves the results unaltered. It is interesting to see that the negative effect on earnings seems rather constant (at 1%) if only the first 10 years in the LM are considered.

Robustness of the experience results As in the earnings analysis, it might be useful to investigate the robustness of the results with respect to the cohort grouping.

[49]There are 74 regional planning units in Western Germany (excl. Berlin), or on average 7-8 of these units in a federal state. Therefore, these regions are much smaller.

Table 16: State-specific effects of LUR1618 on log daily earnings

	district state-spec.
LUR_{1618}	-.0107**
	[14.04]
LUR_{1618}*Hb	.0014
	[0.83]
LUR_{1618}*NS	.0004
	[0.46]
LUR_{1618}*B	.0024
	[1.37]
LUR_{1618}*NW	.0028**
	[3.25]
LUR_{1618}*Hn	-.0090**
	[7.86]
LUR_{1618}*RP	-.0116**
	[11.03]
LUR_{1618}*BW	-.0086**
	[7.45]
LUR_{1618}*Ba	-.0008
	[0.95]
LUR_{1618}*S	.0037**
	[2.47]
N	541096
Pseudo R^2	0.195
controls for:	
region	FS
cohort (grouped)	3yr
year	yes

dependent variable: log (gross) daily earnings;
censored regression; LUR_{1618}=local unemployment
rate in district of entry, average over age 16-18;
Work spells at potexp>4; FS=Federal State; Hb:Hamburg,
NS:Niedersachsen, B:Bremen, NW:Nordrhein-Westfalen,
Hn:Hessen, RP:Rheinland-Pfalz, BW:Baden-
Wuerttemberg, Ba:Bavaria, S:Saarland
t-stats between brackets, *(**): significance at 5%(1%)

Table 17: Robustness of log earnings over the lifecycle (1)

	(1) district	(2) district	(3) district	(4) district	(5) district	(6) district
LUR_{1618}	-0.0054**	-0.00553**	-0.00313**	-0.00532**	-0.00597**	-0.01009**
	[11.53]	[11.85]	[6.33]	[6.83]	[12.84]	[7.74]
PE*LUR_{1618}	-0.00037**	-0.00030**	-0.00037**	-0.00044**	-0.00054**	0.00027
	[9.52]	[7.80]	[9.70]	[6.05]	[14.05]	[1.50]
PE	0.06149**	0.06027**	0.06211**	0.07704**	0.05563**	0.11168**
	[74.64]	[74.66]	[73.88]	[46.50]	[71.13]	[18.14]
PE^2	-0.00139**	-0.0014**	-0.00139**	-0.00192**	-0.00122**	-0.0049**
	[50.50]	[50.65]	[50.46]	[26.92]	[48.28]	[11.66]
N	541096	541096	541096	240821	531817	230923
Pseudo R^2	0.21	0.21	0.23	0.14	0.31	0.10
controls for:						
region	FS	FS	**ROR**	FS	FS	FS
birth cohort (grouped)	**4yr**	**5yr**	3yr	3yr	3yr	3yr
year	yes	yes	yes	yes	yes	yes
				cohorts 68-77	**LUR**$\in \{1.5, 16\}$	**potexp<10**

Dependent variable: log (gross) daily earnings; censored regression; LUR_{1618}: unemployment rate in district of entry, average when aged 16-18; PE=potential experience; FS=federal state; work spells at potexp>4yrs; robustness: (1)-(2): cohort groups, (3): regional effects for regional planning unit (ROR), (4): 6 birth cohorts dropped, (5): outliers in LUR_{1618} dropped, (6): for PE<10 years; t-stats in brackets, *(**): significance at 5%(1%)

Table 18: Robustness of log earnings over the lifecycle (2)

	(1) district PE17	(2) district GLS	(3) district LUR*exp^2
LUR_{1618}	-0.00658**	-0.00511**	-0.01265**
	[14.35]	[7.76]	[10.90]
PE*LUR_{1618}	-0.00035**	-0.00036**	0.00021**
	[8.95]	[13.42]	[4.24]
PE^2*LUR_{1618}			-0.00006**
			[6.39]
PE	0.04739**	0.06541**	0.05311**
	[53.08]	[58.25]	[34.41]
PE^2	-0.00097**	-0.00150**	-0.00104**
	[36.55]	[83.91]	[16.97]
N	541096	536986	541096
# individuals		63474	
R^2 overall	0.20	0.13	0.21
R^2 within		0.21	
R^2 between		0.09	
controls for:			
region	FS	FS	FS
cohort group	3yr	3yr	3yr
year	yes	yes	yes

Dependent variable: log daily earnings; columns (1) & (3): censored regression; column (2): GLS, censored observations dropped; LUR_{1618}: unemployment rate in district of entry, average ages 16-18 PE17=potential experience (=age-17); Work spells at potexp>4yrs; FS=Federal State; t-stats in brackets, *(**): significance at 5%(1%)

Columns 1-2 of table 19 illustrate that the effect remains negative. Nevertheless, using 4year groups, the results are smaller, while using variation in 5year cohorts augments the negative effect. Again, the stronger results based on 5yr-cohort groups need not be surprising, if LURs mainly increase over time and more diverse levels of potential experience are 'pooled'. The results in column 3 include a smaller region (ROR=Regional Planning Unit) as a conditioning variable. This results in a slightly larger negative effect (-0.0608) - this indicates that there are differences within a federal state that weaken the effect of LUR on experience (slight upward bias). Dropping the first 6 birth cohorts yields a coefficient with a smaller magnitude (column 4). This could imply that the negative effect gains strength throughout the career (the cohorts with the largest potential experience are dropped). Alternatively, the effect might be constant over the career, but is less strong for later cohorts. Column 6 supports the former idea as the effect is smaller if we only consider the first 10 years in the LM. Also the analysis of effects over the life-cycle confirms the former idea. Finally, dropping extreme values of LUR does not change the results much (column 5).

Table 20 shows results allowing for state-specific effects. There is quite some heterogeneity between federal states: Bremen, Nordrhein-Westfalen and Baden-Wuerttemberg see larger adverse impacts of a higher initial LUR, while the impact appears very small in Schleswig-Holstein, Bavaria and Saarland.

Robustness of the life-cycle experience results The results seem rather robust to the cohort groups considered, the region-fixed effect and a selection of subsamples (table 21). Regional effects at a less aggregated regional level (regional planning unit) results in a less negative marginal effect of LUR_{1618}, as the LUR-coefficient is larger (positive). This is not surprising given the similar change in results using within-district variation only (table 13). Ignoring the oldest birth cohorts gives rise to a lower (positive) LUR-coefficient, while the interaction coefficient is not much affected. This implies an overall more negative marginal effect for the younger cohorts. Note that considering only the early career is associated with a more negative interaction term (column 6), which implies that the marginal effect becomes negative after 5.7 years in the LM[50].

[50]Remember though that we only consider outcomes from 5 years in the LM onwards

Table 19: Robustness of experience results

	(1) district	(2) district	(3) district	(4) district	(5) district	(6) district
LUR_{1618}	-0.0389**	-0.1000**	-0.0608**	-0.0368**	-0.0590**	-0.0398**
	[29.23]	[76.18]	[34.83]	[20.53]	[39.09]	[31.22]
N	652748	652748	652748	307646	645546	312554
R^2	0.63	0.61	0.65	0.58	0.65	0.22
controls for:						
region	FS	FS	**ROR**	FS	FS	FS
birth cohort (grouped)	**4yr**	**5yr**	3yr	3yr	3yr	3yr
year	yes	yes	yes	yes	yes	yes
				cohorts 68-77	**LUR**$\in \{1.5, 16\}$	**potexp<10**

Dependent variable: #years of work experience; LUR_{1618}: local unemployment rate in region of entry, average over age 16-18; for district and zones1-3: zones 1-3 imply zones around the initial district (incl.), with increasing radius; FS=federal state; ROR=Raumordungsregion; Spells with potexp>4 & age<36; t-statistics between brackets, *(**): significance at 5%(1%)

Table 20: State-specific effects of LUR1618 on experience

	district state-spec.
LUR_{1618}	-.0180**
	[3.81]
LUR_{1618}*Hb	-.0665**
	[6.09]
LUR_{1618}*NS	-.0253**
	[4.85]
LUR_{1618}*B	-.0996**
	[9.53]
LUR_{1618}*NW	-.1003**
	[18.93]
LUR_{1618}*Hn	-.0772**
	[10.65]
LUR_{1618}*RP	-.0751**
	[11.27]
LUR_{1618}*BW	-.1347**
	[18.30]
LUR_{1618}*Ba	.0143**
	[2.70]
LUR_{1618}*S	.0320**
	[3.37]
N	675189
R^2	0.67
controls for:	
region	FS
cohort (grouped)	3yr
year	yes

Dependent variable: #years of work experience; LUR_{1618}=local unemployment rate in district of entry, average over age 16-18; Work spells at potexp>4; FS=Federal State; Hb:Hamburg; NS:Niedersachsen, B:Bremen, NW:Nordrhein-Westfalen, Hn:Hessen, RP:Rheinland-Pfalz, BW:Baden-Wuerttemberg, Ba:Bavaria, S:Saarland t-stats between brackets, *(**): signif at 5%(1%)

Table 21: Robustness of experience over the life-cycle

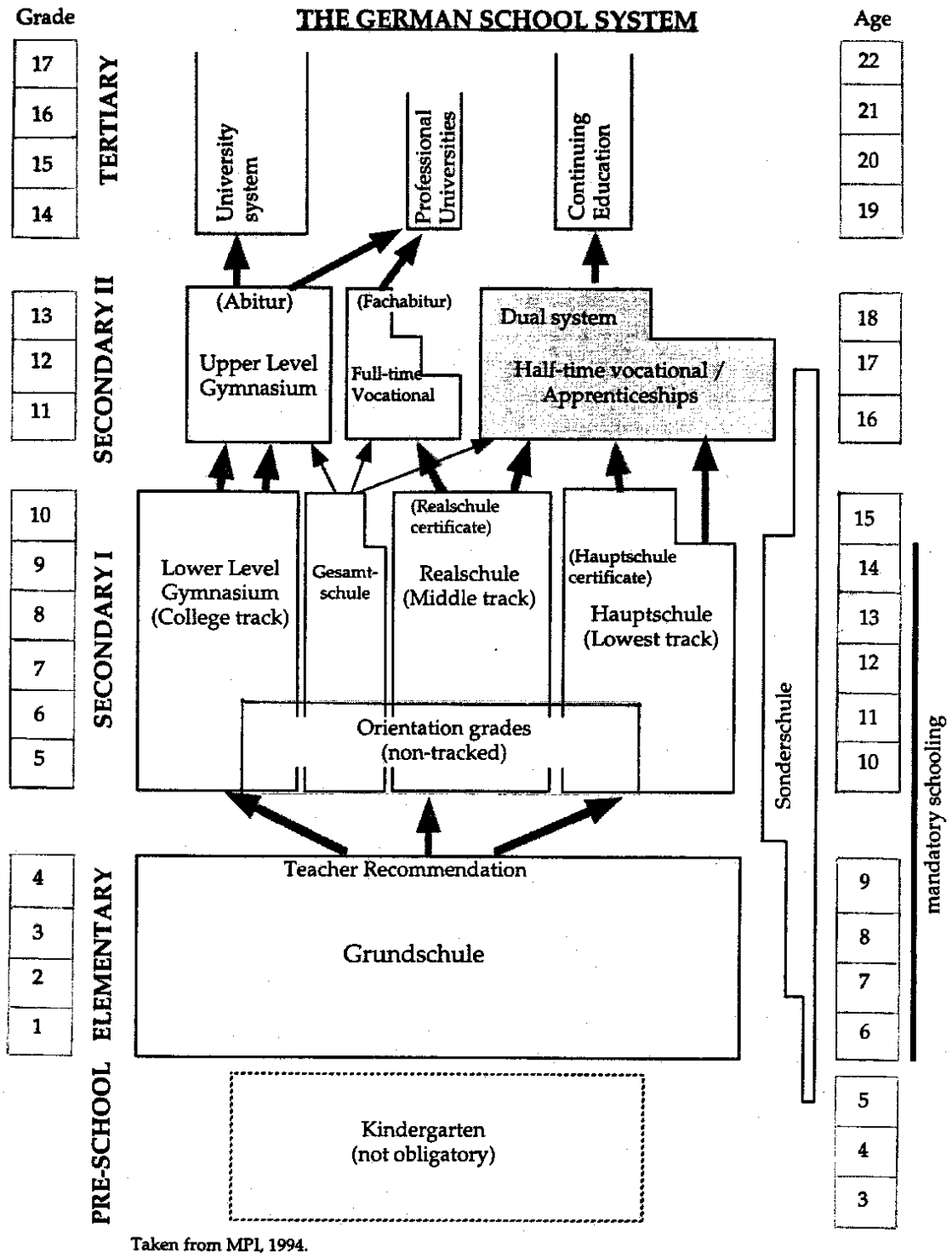
	(1) district	(2) district	(3) district	(4) district	(5) district	(6) district
LUR_{1618}	0.0460**	0.0471**	0.0697**	0.0304**	0.0455**	.0479**
	[17.37]	[17.84]	[24.82]	[8.91]	[15.82]	[11.76]
PE*LUR_{1618}	-0.0054**	-0.0047**	-0.0057**	-0.0053**	-0.0062**	-0.0084**
	[23.26]	[20.53]	[24.68]	[16.19]	[24.78]	[14.74]
PE	0.7285**	0.6937**	0.7545**	0.7138**	0.7518**	0.5813**
	[147.66]	[144.39]	[150.44]	[97.07]	[147.66]	[29.73]
PE^2	0.0088**	0.0092**	0.0086**	0.0119**	0.0086**	0.0201**
	[48.51]	[50.84]	[47.28]	[37.24]	[47.33]	[14.94]
N	652748	652748	652748	307646	645546	312554
R^2	0.73	0.72	0.73	0.71	0.73	0.43
controls for:						
region	FS	FS	**ROR**	FS	FS	FS
birth cohort (grouped)	**4yr**	**5yr**	3yr	3yr	3yr	3yr
year	yes	yes	yes	yes	yes	yes
				cohorts 68-77	**LUR**$\in \{1.5, 16\}$	**potexp<10**

Dependent variable: #years of work experience; LUR_{1618}: local unemployment rate in district of entry, average over age 16-18; FS=federal state; ROR=Regional planning unit (Raumordungsregion); Spells with potexp>4 t-stats in brackets, *(**): significance at 5%(1%)

Table 22: Robustness of experience over the lifecycle (2)

	(1) district PE17	(2) district GLS	(3) district LUR*exp^2
LUR_{1618}	0.0146**	0.0249**	0.0839**
	[5.25]	[7.25]	[12.92]
PE*LUR_{1618}	-0.0017**	-0.0039**	-0.01400**
	[7.16]	[33.01]	[11.61]
PE^2*LUR_{1618}			0.00039**
			[7.49]
PE	0.4865**	0.7715**	0.83980**
	[88.40]	[132.44]	[94.73]
PE^2	0.0119**	0.0069**	0.00430**
	[72.46]	[88.25]	[12.01]
N	675189	675189	541096
# individuals		66090	
R^2 overall	0.70	0.74	0.74
R^2 within		0.91	
R^2 between		0.57	
controls for:			
region	FS	FS	FS
cohort group	3yr	3yr	3yr
year	yes	yes	yes

Dependent variable: #years of work experience; column (2): GLS; LUR_{1618}: unemployment rate in district of entry, average ages 16-18 PE17=potential experience (=age-17); Work spells at potexp>4yrs; FS=Federal State; t-stats in brackets, *(**): significance at 5%(1%)



Taken from MPI, 1994.

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