Abstract: In Germany debates in the 1960s led to extensive educational reforms. Unquestionable, these quantitative and qualitative changes in educational participation reduced inequalities. However, individual outcomes of an increasing educational participation are on ongoing touchstone for investigation: On the one hand, the driving force for investments in human capital was the demand for labour in high skilled positions. In contrast, assuming a limited number of qualified positions on the labour market, the expansion of high skilled workers should lead to a growing competition for these positions. Thus, I expect a relative devaluation of the economic value of these qualifications (educational inflation).

The results show that younger cohorts continuously lose pension entitlements. Even though, they were generally lower educated, older cohorts benefited of the economic miracle after World War II. In contrast, younger cohorts experienced longer periods of unemployment gaining fewer entitlements for later pension income. Women gained the most profits of human capital investments. However, part-time work limited their return on investment. Later birth cohorts of high skilled workers had shorter periods of unemployment but still lower pension entitlements: This result supports the theory of queuing for higher positions in growing labour competition.

Key words: linked administrative data; longitudinal data analysis; historical data
1. Pension entitlements as returns on educational investments

In Germany, the lament of a “state of emergency in education” (see Picht 1964) and the assumption of a connection between the educational status of the population and economic growth led to extensive educational reforms in the 1960s. One result was a massive increase in educational investment, which is debated under the keywords “educational expansion”. With the study of these quantitative and qualitative changes, educational research experienced its first high. There was scientific and political discussion concerning the changes of the educational investment and the possible reduction of social inequalities in the education system. One of the issues being frequently discussed today is what could be called “educational inflation”. Assuming a constant number of qualified positions on the labour market, educational expansion probably lead to increased competition for these positions and hence to the relative devaluation of the economic value of these educational qualifications (educational inflation). On the other hand, educational investments were driven by the increasing qualification requirements. Furthermore, in the light of demographic change and international competition, an increasing lack of skilled workers is deplored (see Czepek et al. 2015).

When both, the demand for and supply of qualified manpower, increase, the returns on educational investments remain unsettled. These returns then depend on the relative increase in and demand for specific qualifications. It thus becomes important to match qualification profiles, particularly in the career entry phase. As, in turn, the demand for manpower is influenced by the general economic situation; different cohorts are affected by it in various ways: Regarding the high level of unemployment and the increase in precarious employment, uninterrupted and socially secured employment histories of qualified employees gain significance for the individual income. Therefore, one question to follow is how the effects of the returns on educational investments vary across cohorts.

One way of measuring the return on educational investment is by means of the future pension entitlements. The focus of this analysis therefore lies in the consequences
regarding the pension entitlements that are gathered in the career entry phase and are examined as income in old age in a comparison of the observed cohorts.

The aim is to test the following questions empirically:

1. Do any differences in the cohorts emerge with regard to the level of education?
2. Can younger cohorts with a higher level of education overall accumulate more earning points or not?
3. What do the pension credits (referred to as “earning points”) look like in the first five years of the history of the social security contributor?
4. What role does unemployment and interrupted employment biographies play in the phase of career entry?

The paper is organised as follows: First, the human capital theory is introduced to provide important suggestions for the returns on educational investments. For understanding the impact of institutional regulations section two of the theoretical framework gives an overview to the complementaries of the labour market and the German national pension insurance. The state of research on the returns of educational investments leads to the main assumptions. Subsequently, the methodical approach and underlying data base are explained in section 3. The presentations of the empirical results are divided into two parts: in section 4 the development of the pension credits in the career entry phase is analysed across four cohorts and for western and eastern Germany as well as separately for men and women. Furthermore, the focus is on the significance of unemployment in the phase of career entry. Section 5 presents the results of multivariate modelling of the interplay of individual and structural effects on the returns of educational investments. The conclusion (see section 6) sheds light on the individual, economic, and institutional reasons for the differences in the returns on educational investments.

2. The paradox of lower future entitlements despite of higher educational investments

2.1. Human capital theory for understanding the returns of investment in an early career stage

The most significant perspective for explaining education effects with respect to the labour market is supplied by the human capital theory. Based on Becker (1964), the human capital theory approach is used to argue that higher investments in education
yield greater earnings. Thus, first of all, direct investments in education, such as tuition fees, are included in the calculation. Second, a longer period of education or training involves doing without or with less income. Hence, the extent of the investment is the result of the costs of training and the opportunity costs. Opportunity costs are likely measured to be the earned income missed out on during the relatively long training period. As market players are modelled as rational utility maximisers, human capital theories identify clear boundaries for educational investments: educational investments only make sense as long as the expected return is higher than the total costs or the alternative investments. If the returns decline, less is invested in education.

After having made educational investments, employees expect a return, for instance in the form of a higher wage which will at least compensate for the previous investment and previous income deficit. Employers assume that the more high qualified will exhibit greater productivity and will therefore be able to claim privileged positions in the market. In simple market models, the wage is aligned with productivity, so that the human capital investment is worth it – in the view of both the employee and the employer (Abraham/Hinz 2005: 19ff.). As far as high levels of education promote privileged positions on the labour market high qualified employees gain also higher incomes. More elaborate approaches also take time investment and search costs into account, thus emphasising uncertainties and transaction costs in the matching process.

As a supplement to the economic perspective, Hillmert (2007) emphasises that from the educational investor’s view the individual possibilities for making decisions are shaped by institutional frame conditions: on the one hand as direct requirements (educational background, quotas, entrance requirements, etc.), and on the other as indirect influences that affect the differences in preference and resources. One example of this is the dual vocational training:¹ there are no formal entrance requirements, but a contract with a company providing vocational training is required.

¹ The strongly institutionalised transition in Germany is a result of the dual vocational system: The dual vocational training system in Germany combines training in classes at a vocational school with on-the-job training at a company. A dual vocational degree is recognised as a certificate for professional qualification. Obtaining certificates of education or training plays a pivotal role, because in the transition to the labour market it makes the selection process easier for the employer, on the one hand, and signalises the qualifications of the applicant on the other (for further information see Thelen 2007).
Therefore, employers adopt a key position which may cause strong competition if the number of training posts is limited. As a result, the importance of school results increases. According to Hillmert, school results then only represent an indirect influence (Hillmert 2007: 95). Tuition fees, on the other hand, are direct institutional requirements.

However, the theory of labour queueing or the job competition model (see Thurow 1978) points on employers who can choose from labour supply. Here, employers will rationally select the person best qualified for a job, whereby the formal educational attainment functions as a signal. Apart from certified academic qualifications, further individual features of the applicants come to bear when ranking orders are put together (labour market queue). In the job competition model, the returns on educational investments then depend on the position in the labour market queue: a large labour supply combined with rigid job and career structures which ensure a reduction in wages can therefore result in under-qualified employment. High investments in education can therefore be paradoxical: the more education there is, the more education is invested in. Under the pressure of distinction, educational investments also prove their worth in phases of recession, or specifically do so in these phases. This theoretical orientation goes along with the thesis of “cutthroat competition”, which assumes disadvantages for the lower qualified in the case of the qualification upgrading of the working population, as the more highly qualified switch to under-qualified jobs and displace the lower qualified (see Blossfeld 1985). Subsequently, unemployment can increase in this group.

In the simplest version of the efficiency model of the labour market, those unemployed indicate the extent of the lower supply of jobs, that is, a higher number of labour providers is faced with a lower supply of jobs, and the number of those employed corresponds to this oversupply of manpower (Czepek et al. 2015). Assuming that not enough suitable professional positions are available for the rising number of people who are formally more highly qualified, this either leads to displacement or to more unemployed academics. However, in the case of the more highly qualified, it can also be assumed that the quality of matching can be accorded greater significance than is the case for low-qualified job-seekers or those with no qualifications, and the search costs can thus be evaluated differently. Hence, the
The significance of unemployment in the career entry phase can vary depending on the educational attainment.

In the context of educational expansion the question of (possible) educational inflation (i.e., the depreciation of academic titles in the course of their becoming widespread) has caught the attention of sociological research. For the German case, Blossfeld (1985) deals with the core significance of career entry for the entire course of a person’s career. His cohort analyses prove that relevant qualifications and the separation between internal and external labour markets, rigid entry and career positions, and “closed employment” in internal, firm specific job markets determine productivity more strongly than market mechanisms (Blossfeld 1985: 178f.). Thus, career exits are not only associated with costs and largely stable, but the core significance of entry is proven theoretically and empirically from the development perspective. An employment history will generally not compensate for a disadvantageous career entry. Therefore, Blossfeld tends to concur with the fixation model, which explains the extraordinary shaping power of the occupational placement at entry with the idea that shortfalls in a particular phase cannot be made up for later. A comparison of birth cohorts reveals great differences between the cohorts with regard to the first placement in the context of the change in professional structure (Blossfeld 1985: 184). Blossfeld regards the cohort differentiation as being in line with the historical entry conditions such as higher qualifications and tertiarisation, which increasingly characterise the way the career structure is shaped with regard to the first placement of younger cohorts (Blossfeld 1985: 194).

Handl is more interested in the influence of cohort differences in the potential rewards of higher education on the labour market. Based on the German Microcensus, he proves that the returns on educational investments with regard to dependent employees embarking on a career have fallen since the 1980s. Handl measures the returns via the access to the individual levels of the employee hierarchy, hence according to the professional position. He shows that the opportunities for those with higher academic qualifications entering the medium and higher employee ranks rose until 1970 in comparison to those with lower qualifications, and have fallen continuously since then (Handl 1996: 270).
Schiener arrives at more differentiated results based on his analysis of longitudinal data from the German Socio-Economic Panel: he refers to the fact that male university graduates have to accept a declining return on educational investments, whereas graduates of both genders of universities of applied sciences also profit from educational expansion with regard to their possibilities of r in terms of an increasing number of entries to higher professional positions (see Schiener 2006).

In addition to quantitative criteria concerning the efficiency of the labour market, qualitative aspects are also emphasised. These particularly target the increase in atypical and precarious employment. In a study of the erosion of standard employment relationships (see Mückenberger 1985), Lauterbach and Sacher provide evidence of a corresponding increase in and longer period spent in school and university education for younger cohorts (Lauterbach/Sacher 2001: 271). Here, the gender-specific differences are huge: across all the cohorts, it is rarer for women not to be in employment, but to be increasingly pursuing part-time or full-time employment. For men, on the other hand, full-time employment continues to remain the norm at career entry, but unemployment and part-time employment are rising in this group. Hence, Lauterbach and Sacher arrive at the conclusion of “male destandardisation” and “female standardisation” (Lauterbach/Sacher 2001: 274). Their study of differences in education shows that those leaving Hauptschule (as a basic type of non-selective secondary school until year 9) are particularly at a lifelong disadvantage with respect to full-time employment. The cause of this is seen as lying in downgrading. In contrast, the reason for the shorter duration of full-time employment of the more highly educated is the greater length of time spent in the education system.

In his contribution to university graduates Teichler (2007) shows that the advantages for academics persist. Among the atypical forms of employment, only the frequency of temporary working contracts is above the average compared to other qualification groups. Unemployment is low on the whole. This may either mean that the number of positions on the labour market requiring a sufficient level of education is increasing as much as the number of more highly qualified graduates. Otherwise one can interpret this as a displacement of the low qualified into unemployment, as Blossfeld (1985) suggests.
While the focus of research so far has been on income and professional qualification, there have been few studies on the entry into the labour market with respect to social security. This is surprising since Germany has a strongly earnings-related social security system which is frequently stressed in the literature (see Vobruba 1990).

2.2. The complementaries between the career entry on the labour market and later pension entitlements

The fundamental idea of complementarity is based on the close, structurally designed relationship between the labour market and the public pension scheme. In Germany, the pension scheme consists of three pillars with the first pillar being the most essential one. The mandatory national pay-as-you-go system includes the largest part of the German labour force. The second pillar, occupational pensions have also a long tradition in the German pension system, but they are far less relevant with regard to pension payments. Voluntary, private pensions have been the smallest pillar.

Latest reforms transformed the previous pension system with a pre-defined level of benefits to a “notionally defined contributions” system (see Disney 1999). Until fundamental reforms in 2001, Germany’s national pension insurance was aiming to safeguard the earlier standard of living to retirement: the pay-as-you-go system depends on the payment of the statutory pension insurance contributions based on the income earned. The contributions are distributed between employers and employees. The contributions and benefits are limited through a contribution assessment ceiling that determines the maximum contributed income. The system is strongly earnings-related and conditioned by the length of the insurance biography. Additional contributions are granted for instance for child care or care giving as well as in some periods of unemployment or illness. However, pension entitlements are proportional to one’s lifetime income position: The individual pension benefits not only depend on the contributed income but the relative income position compared to the average wage of all employees in the same year. The relative income position of the social security contributor is reflected by the earning points on which the calculation of the gross monthly pension (see section 3.2.) is based.

The increasing differentiation of employment histories has factual effects on the existing system of statutory pension insurance, which is designed to only maintain
the standard of living at an (above-) average level for those who accordingly have a long, full-time employment history. According to the principle of structural equivalence, atypical employment relationships, erratic employment histories, late career entries and early exits, on the other hand, later result in below-average pension income (Czepek, forthcoming).

The idea of the equivalence principle can also be applied to the returns on educational investments: the higher the educational investment, the higher the professional position, earned income, and later pension income. However, since long social security contribution histories are rewarded extended educational investments (time) may reduce the profitability of later pension income.

2.3. Educational disaster and educational investments

The educational expansion of the 1960s originated from the lament of the “educational disaster” (see Picht 1964). The core argument was the connection between the level of educational and economic growth in a society. Two primary political goals were derived from this: first, the higher level of education among the population, and second, the democratisation and reduction of inequalities in education. This involved the expansion of the tertiary education sector with greater numbers of school-leavers with Realschule (comparable to school-leaving certificate at the age of 16) and Abitur (comparable to A-Levels), a greater number of students and a longer period spent in education (see Müller et al. 1997). Sacher’s analyses show that contrary to popular opinion, the age at career entry has only been pushed up by two years, and the average age among the younger cohorts is 20 (Sacher 1998: 171). This is astonishing, as higher levels of education and hence even longer periods of education are anticipated for younger cohorts due to the effects of educational expansion.

In Germany, educational expansion is understood as the “increased participation in education, the longer period spent in the education system and the rapid increase in higher educational qualifications after the educational reforms of the 1960s and 1970s” (Hadjar/Becker 2006: 12, author’s translation).

While the research results for the quantitative goals, such as an increase in the share of higher education, are clear-cut, the effects of educational expansion with regard to
the reduction in or structuring of social inequalities remains ambivalent (see Hadjar/Becker 2006 and Handl 1996). Geißler presents a succinct analysis describing the metamorphosis of the Catholic worker’s daughter from the country to the migrant son (see Geißler 2008). The analysis of the educational returns is primarily about the quantitative effects of educational expansion. Thus, there is a concentration here on the expansion of qualifications from higher education with respect to their consequences for the returns on educational investments.

2.4. Assumptions on compensation effects of higher education

The core question is how the returns on educational investments in the career entry phase have changed for different qualification groups across the cohorts. Two hypotheses can be derived from this and are tested against each other:

**Hypothesis I:** People who are born later profit from the educational expansion and can compensate for later entry into professional life by higher earning points in the career entry phase.

**Hypothesis II:** People who are born later do not profit from the educational expansion and cannot compensate for later entry into professional life by higher earning points in the career entry phase.

The hypotheses are based on the following model (see Figure 1), which represents the ideal typical development of the accumulated earning points during a person’s working life. The earning points gained up to a specific age are given as constant, so that the model allows conclusions to be drawn regarding the social security contribution period and the income development. The area below the lines corresponds to the sum of the earning points gained during the working life.

The model is based on the following assumptions:

1. Corresponding to the state of research (Himmelreicher et al. 2009: 450), a difference in the total earning points is assumed for three levels of education given (a-b-c). Here, the following applies: the higher the level of education the more earning points are accumulated during the life course.

2. Since long and stable social security contribution histories are rewarded, the ideal typical curves of working life course and earning points are assumed to be linear.
3. Because a longer period spent in the education system is a prerequisite for a higher, formal educational attainment, a shift in career entry occurs accordingly.

4. For the sake of simplicity\(^2\) it is also assumed that all social security contributors retire at the same age.

Figure 1: Ideal typical course of earning points accumulated during working life

![Earning Points Accumulation Graph](Image)

Source: Author’s representation

Two possible explanations for the phenomenon of differences in income due to qualification and hence in the accumulated earning points ensue from the model: first, the high qualified can start their career with a higher wage and can therefore already compensate for the longer period spent in the educational system in the career entry phase (light grey spots/dotted line). Second, the earning points curves of the high qualified could rise more steeply. Even if the entry occurs at the same level, the longer period spent in the educational system could be compensated for throughout the entire working life of the social security contributor (dark grey spots/solid line).

Before showing the results the methods and data with its restrictions are discussed. In the following, the differences in the accumulation of earning points due to

---

\(^2\) Although Radl, for example, refers to the differences at the age of entry to retirement due to qualification (see Radl 2007).
qualification are examined in a cohort comparison in order to analyse the change in the returns on educational investments.

3. A cohort study for investigating the returns on educational investments

3.1. Cohort differences in West and East Germany

The cohort comparison forms the core of the research design. The data contain the birth cohorts for 1940 to 1977, which are grouped into five-year cohorts (1940-1945, 1950-1955, 1960-1965, 1970-1975). One important prerequisite for the analyses is that the time the data were collected, in 2007, records the entire career entry phase for the youngest cohort. In this design, gradual differences between the cohorts become even more distinct, but in return it is not possible to use the whole sample.

The career entry is defined as a 60 months period starting with job seeking or the first employment or unemployment. One of the main conditions of all cohorts is the continually rising tertiarisation. Other conditions on the labour market occur in a particular period and the cohorts are affected by them in different ways according to their age (Figure 2):

Figure 2: Structure of the cohort study

Source: Author’s representation

The divided and later reunified country is an excellent touchstone of investigation: While in West Germany a social market economy raised after World War II, East Germans experienced a restricted labour market since the German Democratic Republic introduced a socialist regime. The different economic and labour market conditions also frame the educational investments.
In West Germany, for the 1940s cohort, the education phase occurs before the educational expansion, and the career entry comes at the end of the period of the economic miracle in the late 1950s and early 1960s. Those born in the 1950s are in education or training at the end of the 1960s and are then in the labour market. Although they should profit from the strong expansion of the welfare state until the beginning of the 1970s, they do not profit from the effects of educational expansion. The start of mass unemployment from the mid-1970s hits these career entrants in their first five years of social security contribution, and also those from the 1960s birth cohort, who enter professional life in the 1980s. The latter, however, should already have profited significantly from the educational expansion.

The youngest cohort in West Germany experiences the full effects of educational expansion in their education or training and their career entry in the 1990s. Here, the consequences of employers’ efforts to achieve more flexibility and the deregulation of the labour laws (Lauterbach/Sacher 2001: 260) should already be visible. Thus, they fall not only in the period after the first upheavals on the labour market but also in the consolidation phase, where there were fewer jobs in public service, for instance. Lauterbach and Sacher therefore assume that a significant change has taken place in the employment structure, statutory insurance coverage and job stability since the mid-1980s (Lauterbach/Sacher 2001: 258).

In East Germany, the educational reforms were driven by the adjustment to soviet standards during the 1950s and 1960s. Especially, the two reforms of the polytechnic schools in 1959 and 1965 had positive effects on higher education. Labour market participation in a planned economy was also driven by political decision-making: In East Germany war reparations to the Soviet union and escapes from the east to the west create a need for workers (Trappe et al. 2015: 232). Activating women for work was firstly institutionalised in 1949 in a granted right for own employment decisions. To push women to work the devaluation of home caring was implemented on a cultural as well as on a legal level with incentives for female employment and better perspectives for higher positions. But still, the division of labour focused on women carrying for children (Trappe et al. 2015). A double burden of work and motherhood in the East was the result. In the 1960s, family policies aimed to improve the compatibility of family and labour only for women. That included free state-funded child care, save re-entry on the former job, and reductions of working hours for
mothers. There was no equality, but the female employment rates rose and women in the east still have a higher attachment to work.

In contrast, the economic miracle in the west after World War II allowed a male-breadwinner/female home-carer model. Migrants were invited as “Guest workers” to enforce the West German labour market. Institutional regulations regarding the division of labour and gender issues were a result of conservative family policies. Additionally, a lack of child care infrastructure led to long periods of labour market absence among western women. Later cohorts of western women re-enter into the labour market only as part-time workers.

While unemployment was low in the former German Democratic Republic, it quickly rose after Reunification: In the 1990s, moving from a state-trading system to a market economy had high costs and resulted in high rates of unemployment for eastern Germans during the process of transformation – with ongoing consequences on the labour market, due to wage levels, and with respect to later pension income (see Czepek 2016).

3.2. Earning points as monetary and positional aspects of the returns on educational investments

The focus of interest is on the accumulated earning points in the career entry phase. The total number of credited earning points from the histories of social security contributors for the first 60 months is defined as a dependent variable. Here, all earning points are included that are relevant to the calculation of individual pension income.

Handl suggests differentiating between monetary, positional levels and qualitative aspects with respect to the returns on educational investments (Handl 1996: 271). The earning points satisfy both, the monetary and the positional aspect, as on the one hand they indicate the individually earned entitlements, and, on the other, they are determined in relation to the average income of all social security contributors. Thus, the earning points reflect the relative income position of the social security contributor: if an employee earns the average wage set annually by the German Federal government, he/she receives one earning point for that year. Accordingly, earning half the average wage means 0.5 earning points.
To calculate the gross monthly income, the sum of the personal earning points is multiplied by the current pension value, the factor for type of pension\(^3\) and the age factor.\(^4\)

\[
\text{Gross monthly pension} = \text{earning points} \times \text{factor for type of pension} \times \text{age factor} \times \text{current pension value}
\]

So, individual pension income depends on lifetime earnings, timing of entrance (age factor), general pension level, and actual value of pension (set by government following the development of incomes according to the act on pension adjustments).

The earning points throughout the entire social security contribution period can only be evaluated as an indicator of income to a limited extent: The limitations are that the earning points already depend on the average incomes for the respective year and the maximum income ceiling limits the maximum number of earning points.

Even after 25 years after the German Re-unification ongoing economic and labour market differences need to be balanced for calculating individual pension incomes. Therefore, revalued earning points and a distinct current pension value for East Germany ensures a slight adjustment of the (lower) eastern income to western level (see Czepek 2016). The overrated value of earning points poses a problem if an assignment to income should be made. For East Germans the progression of the curve is artificial with respect to the income or the economic situation. The transfer of the West German pension insurance system followed political guidelines and does not reflect the actual economic conditions in a comparison of the Federal Republic of Germany and the German Democratic Republic (see Czepek 2016). Earning points of East German social security contributors can nevertheless be included in the analysis – despite their higher valuation –, particularly in comparison with West Germany, since data allows for a correction indicator.

If retirement does not occur early, the average earning points in the sample corresponds to a gross monthly pension of \(27.82 \times 1 \times 1 \times 26.27 = 730.83\) EUR in western

\(^3\) The type of pension distinguishes between national pensions having a wage replacement function as old age pensions and those who do not have.

\(^4\) The age factor allows discounts for earlier and awards for postponed entrances.
Germany. With average earning points of 32.79 multiplied by the current pension
total value in eastern Germany in 2007, a corresponding pension in the east lies at 755.15
EUR.

3.3. Historical data of selected social insurance agencies in Germany

The BASiD data set (Biographical data of selected social insurance agencies in
Germany) is available as a Scientific Use File and consists mainly of three linked
administrative data sets: the first part is provided by the German national pension
insurance with a sample of social security contributor accounts in 2007, the second
part is the Integrated Employment Histories and the third part is the Establishment
History Panel. All notifications of the receipt of unemployment benefit, unemployment
assistance or maintenance benefit between 1975 and 2005 are added as well. The
first part of the data set is provided by the German National Pension Insurance and
the other parts were sourced from the German Federal Employment Agency and the
Institute for Employment Research (IAB). It is possible to combine the data sets
because of the common legal basis in the form of the German Social Security Code.

BASiD contains of a 1% sample of the population of the German national pension
insurance related to the sample of insured persons and their insurance accounts
2007. It is a data set of individual biographies containing demographic, socio-
economic and regional characteristics, as well as information relevant to pensions.
Furthermore, the IAB data makes establishment information available, such as
association to a sector of the economy, establishment characteristics, and
professions and further classifications regarding professional status. All presented
results are weighted by a specific factor correcting for the disproportional sampling in
references to the population of social contributors between the ages of 30 and 67 in

Demographic information on cohort affiliation, the data on the educational attainment
and the earning points in the first years of social security contribution are decisive for
the question of cohort differences in the returns on educational investments. The

---

5 The data basis of this article is the weakly anonymised version of the "Biographical data of selected social insurance
agencies in Germany" (Version 1951-2009). The data access was guaranteed by the Research data centre (FDZ) of the
German Federal Employment Agency at the Institute for Employment Research (IAB). For further information please visit:
incidental data generated by the administrative process is accompanied by certain restrictions. One core restriction lies in the fact that in principle only those who were formerly in employment subject to social security can be in the sample (see Lange et al. 2012). Thus, only social security contributors with statutory pension insurance are included, but no civil servants or self-employed. However, the public pension covers over 80% of the employed population and approximately 90% of Germans are getting some pension income from the German national insurance (see Bäcker et al. 2010).

The original sample consists of biographical data of 568,468 individuals. For the sample used in the study, only persons born in 1940 to 1945, 1950 to 1955, 1960 to 1965 and 1970 to 1975 were retained for the subsample. For a consistent definition of job entry phase, individuals with a job entry before the age of 15 and not later than 35 years were removed. For the same reason, those cases without any period of employment or already retired persons were also excluded. From the remaining individuals, additionally, those with a lack of information on place of residence were excluded. Hence, the total number of social security contributors in the used sample amounted to 186,326.

The sample contains 86,123 men and 92,167 women. Female social contributors become slightly overrepresented in the sample (52 per cent). With 78 per cent of the social security contributors falling to West and 22 per cent to East Germany eastern Germany are overrepresented. The same is true for migrants.

The BASiD data includes information on education from both data sources. But the administrative nature of the variable is particularly challenging since data on education is often missing. The education is included in a time variant format that makes imputations by taking biographical information into consideration possible: So, first, a common variable was designed to combine both data sources to fill the lacks originated in only one source. Imputations from nearby spells were used to fill gaps under the assumption of consistency per person. That reduced the missing values significantly. But still, for about 5 per cent the educational level is unknown. Therefore, no information is added as an additional category. This allows controlling for a systemic bias in the pension entitlements of those who did not report the education. In the end, the level of education is indicated in four categories: Persons
without vocational education, persons with vocational training and those graduated at a university or university of applied sciences.

4. Human capital investments in a cohorts perspective

4.1. Earning points in the career entry phase

Table 1, which concerns the average earning points in the first five years period after job seeking or first employment shows clear differences specific to gender, cohort, and location (Table 1): A comparison of the cohorts shows that the younger cohorts continuously gained fewer earning points than the 1940s cohort. The 1970s cohort achieves only a mere two third of the average pension credits of the oldest cohort.

In West Germany, women had fewer earning points than men. That is true for all cohorts, even though, later born women had increasing participation rates in the educational system and a higher participation on the labour market. Additionally, women of older cohorts were not compensated for child rearing. But later cohorts of women had lower future pension entitlements due to part-time work (see Tophoven/Tisch 2016).

Table 1: Average earning points by gender, cohort, and location

<table>
<thead>
<tr>
<th></th>
<th>West Germany</th>
<th>East Germany</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men</td>
<td>Women</td>
</tr>
<tr>
<td>1940s</td>
<td>4.247612</td>
<td>3.728771</td>
</tr>
<tr>
<td>1950s</td>
<td>3.629478</td>
<td>3.275758</td>
</tr>
<tr>
<td>1960s</td>
<td>3.520807</td>
<td>2.830018</td>
</tr>
<tr>
<td>1970s</td>
<td>2.724395</td>
<td>2.343195</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3.287379</strong></td>
<td><strong>2.789688</strong></td>
</tr>
</tbody>
</table>

Source: Author’s calculations (BASID v1, 1951-2009)

The lower gender difference in East Germany can be traced back to the greater participation of East German women in employment. Women in East Germany gained even more earning points than their male counterparts since the 1950s cohort. One reason may be that mothers in the East are fully employed and are granted for child rearing, too. But still, the later born cohorts only had a mere fraction of the pension entitlements the oldest cohort accumulated in the phase of job start.

4.2. The effect of educational expansion on the earning points in the career entry phase
According to educational attainment and cohort, it crystallises that the younger cohorts of all educational levels collect fewer earning points than the older ones in the first five years of career entry (Figure 3). In the oldest cohort those who have not completed any vocational training had the same earning points on average in the phase of career entry as persons with vocational training. This unique constellation can be traced back to the labour market conditions, which were also good for those with low qualifications or none at all due to the favourable economic situation in the period of the economic miracle in West Germany and during the transition to the soviet system in East Germany (Figure 4).

Figure 3: Average of accumulated earning points in the first five years by cohort and education in West Germany

![Average of accumulated earning points in the first five years by cohort and education in West Germany](image)

Source: Author’s calculations (BASID v1, 1951-2009)

In the West, the university graduates had the highest amount of earning points in all cohorts, but the highest loses in the youngest group compared to those born in the 1960s. This result indicates for a devaluation of educational investment since this cohort had the highest share of university graduates. One additional argument might be that more and more women with lower earning points from the very beginning of career entered the labour market with higher qualifications.

In all birth cohorts, those who completed vocational training after leaving the school achieved the also high values of pension credits. They began their career early on and thus already started generating pension entitlements during their vocational
training. From the potential rewards viewpoint, university degrees are to be regarded as quite a consistent human capital investment for later cohorts as well. Although university graduates had great loses, their return on educational investments was still high.

Figure 5: Accumulated earning points in the first five years by cohort and education in East Germany

In East Germany, results show smaller differences between the educational levels. Compared to the other groups, similar to West Germany, relatively high loses are found for those without a vocational degree.

In a cohort comparison, those who particularly lose out are the ones without vocational training. Here, one could speak of an increasingly problematical dequalification. This may explain the low opportunities for application for this group due to occupational segregation (see Trappe 2004). The consequences of the dequalification of the lower educated are reflected in the opportunities on the labour market which become steadily worse and the accordingly low amount of pension credits. These are indications of the lower qualification group probably being displaced by the more highly qualified. The most highly qualified, on the other hand, had greater losses than earlier cohorts of job starters. To go into more detail concerning the question of labour market opportunities, the next section contains an analysis of unemployment according to level of qualification, comparing the four birth cohorts in this regard.
4.3. The role of unemployment in the career entry phase

The increase in qualifications gained by vocational training resulted in few losses regarding pension credits and represents a stable investment. This also applies to university graduates. Does unemployment at the beginning of an individual’s employment history occur more frequently among those without vocational training who had been “displaced”, and whose dequalification led to poor labour market opportunities?

The periods of unemployment during the first five years of career increased from cohort to cohort. This may indicate for a decline in the opportunities for labour market entry. At the same time, the risk of unemployment appeared to be strongly dependent on the level of qualification (Table 2). Table 2 shows the average duration of unemployment in the first 60 months by qualification level, cohort, and location.

Unemployment played little role at all in the oldest cohorts in West and East Germany. As with the earning points, the massive need for manpower during the period of the “economic miracle” makes itself felt here. This already ended to apply to the 1950s cohort in West as well as in East Germany (8 per cent in East, 13 per cent in West Germany). In both parts of Germany, persons holding a certificate, independently if a vocational or university degree, only spend 3 to 6 per cent of their career entry phase in unemployment.

Table 2: Share of unemployment by cohort and location in the first five years (in %)

<table>
<thead>
<tr>
<th>Birth cohort</th>
<th>Location</th>
<th>No information</th>
<th>Without vocational training</th>
<th>With vocational training</th>
<th>University/ University of applied sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>1940s</td>
<td>West Germany</td>
<td>0,11</td>
<td>0,60</td>
<td>0,32</td>
<td>0,47</td>
</tr>
<tr>
<td></td>
<td>East Germany</td>
<td>1,14</td>
<td>2,29</td>
<td>1,47</td>
<td>4,33</td>
</tr>
<tr>
<td>1950s</td>
<td>West Germany</td>
<td>1,79</td>
<td>8,11</td>
<td>6,14</td>
<td>5,40</td>
</tr>
<tr>
<td></td>
<td>East Germany</td>
<td>3,53</td>
<td>12,85</td>
<td>6,22</td>
<td>3,15</td>
</tr>
<tr>
<td>1960s</td>
<td>West Germany</td>
<td>0,00</td>
<td>0,10</td>
<td>0,01</td>
<td>0,02</td>
</tr>
<tr>
<td></td>
<td>East Germany</td>
<td>0,04</td>
<td>0,96</td>
<td>0,14</td>
<td>0,94</td>
</tr>
<tr>
<td>1970s</td>
<td>West Germany</td>
<td>1,67</td>
<td>9,96</td>
<td>3,16</td>
<td>4,76</td>
</tr>
<tr>
<td></td>
<td>East Germany</td>
<td>4,54</td>
<td>24,13</td>
<td>16,14</td>
<td>5,84</td>
</tr>
</tbody>
</table>

Source: Author’s calculations (BASiD v1, 1951-2009)
The later cohorts of the 1960s experienced educational expansion and a high demand for higher qualification before mass unemployment and Reunification:

This situation became reversed within the youngest cohort, as this generation entered the labour market just after Reunification. This implied not only higher rates of unemployment for eastern but also more competition for the western youth. For those without vocational training, the average share of unemployment was at 10 per cent in the West and more the double share in the East. Even educated eastern job starter had difficulties to enter the labour market without complications.

According to Matthes, this high youth unemployment rate in East Germany can be traced back not so much to the training opportunities as to the low capacity of the East German labour market to absorb those entering the labour market for the first time (Matthes 2004: 197f.). Concurrently with the job competition model by Thurow (1979), Diewald et al. (2006) stated the increasing significance of educational attainments after Reunification, despite the uncertainty about the equivalence of educational attainments from the German Democratic Republic. Eastern employees in more often accept jobs below their skill level because higher positions were reduced after Reunification. Especially for younger cohorts the risk of unemployment becomes greater at the lower end of the labour market queue (Diewald et al. 2006: 88).

Concerning the question of the risk of being affected by unemployment it crystallises that unemployment particularly has risen in the youngest cohort and in East Germany. In West Germany, the situation has deteriorated step by step through all four cohorts. The problematic consequences of dequalification do not crop up in East Germany until the border opened, while the transition in West Germany is more a continuous process. Unemployment has also in fact increased among the most highly qualified, but it generally does not last long. Additionally, it is also to be assumed that there are considerable differences according to occupation and economic sector among the group of the high qualified.
5. Results

The linear regression model estimating the dependence of the accumulated earning points during the phase of career entry from diverse factors already discussed in section 4 is presented in table 3.

Results in model 1 on the socio-demographic characteristics confirm the disadvantages of women gaining fewer earning points than men.

Educational gender differences are low, especially in the younger cohorts. Therefore educational level does not explain the gender pension gap. Income differences do: The gender pay gap is one driver for the lower pension entitlements of women. Part-time work and cohort affiliation are further reasons for women gaining nearly one earning point fewer than men.

In Germany, institutional regulations compensate for child rearing with – at the relevant time for the observed cohorts – granted for earning points for children born later than 1992. Regarding the significant and slightly positive effect of maternity leave in the early stage of career compensation seem to avoid disadvantages of non-employment because of child care.

Considering the overrated eastern earning points with a control for eastern income, results document that eastern job starters gain fewer earning points than their western counterparts. The effect lost its significance in model 3 and turns even positive in model 4: So, the lower pension credits are result of the later cohorts earning lower wages and having longer periods of unemployment after Reunification. Under control of income and cohort differences eastern contributors would even gained higher pension entitlements than western ones. Germans have advantages in comparison to persons with another nationality.

The impact of human capital investments follows the assumption of increasing earning points with ascending educational level: compared to those without vocational training those with a vocational or university degree achieved higher entitlements for future pension income.

For the group without qualification lower incomes and longer periods of unemployment were main reasons for fewer pension credits. In contrast, university and university of applied sciences graduates achieved higher entitlements because of the reward of human capital investment (model 3), because of shorter periods of unemployment, and because of minor losses in cohort sequence.
The yearly income is measured in quintiles: For an affiliation to the next higher 20 per cent 0.87 earning points more are achieved in average. The profits of a higher yearly income were even higher under cohort control.

Table 3: Linear regression analysis on earning points

<table>
<thead>
<tr>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Socio-demographic characteristics</strong></td>
<td><strong>Reference</strong></td>
<td><strong>Reference</strong></td>
<td><strong>Reference</strong></td>
<td><strong>Reference</strong></td>
</tr>
<tr>
<td>Men</td>
<td>Women</td>
<td>-0.851 ***</td>
<td>-0.788 ***</td>
<td>-0.482 ***</td>
</tr>
<tr>
<td>Duration of maternity leave (in days)</td>
<td>0.002 ***</td>
<td>0.002 ***</td>
<td>0.002 ***</td>
<td>0.002 ***</td>
</tr>
<tr>
<td>West Germany</td>
<td>East Germany</td>
<td>-0.049 ***</td>
<td>-0.237 ***</td>
<td>-0.006</td>
</tr>
<tr>
<td>West German income</td>
<td>East German income</td>
<td>0.928 ***</td>
<td>0.715 ***</td>
<td>1.170 ***</td>
</tr>
<tr>
<td>German nationality</td>
<td>Non-German nationality</td>
<td>-0.379 ***</td>
<td>-0.243 ***</td>
<td>-0.460 ***</td>
</tr>
<tr>
<td><strong>Educational level</strong></td>
<td><strong>Reference</strong></td>
<td><strong>Reference</strong></td>
<td><strong>Reference</strong></td>
<td><strong>Reference</strong></td>
</tr>
<tr>
<td>No information</td>
<td>Without vocational training</td>
<td>-0.168 ***</td>
<td>0.310 ***</td>
<td>0.131 ***</td>
</tr>
<tr>
<td>With vocational training</td>
<td>University/University of applied sciences</td>
<td>0.991 ***</td>
<td>0.812 ***</td>
<td>0.674 ***</td>
</tr>
<tr>
<td>Income</td>
<td>Quintil of yearly income</td>
<td>1.731 ***</td>
<td>1.227 ***</td>
<td>1.136 ***</td>
</tr>
<tr>
<td><strong>Biography</strong></td>
<td><strong>Reference</strong></td>
<td><strong>Reference</strong></td>
<td><strong>Reference</strong></td>
<td><strong>Reference</strong></td>
</tr>
<tr>
<td>Duration of unemployment (in days)</td>
<td>Duration of part-time work (in days)</td>
<td>-0.001 ***</td>
<td>-0.001 ***</td>
<td>-0.001 ***</td>
</tr>
<tr>
<td><strong>Birth cohort</strong></td>
<td><strong>Reference</strong></td>
<td><strong>Reference</strong></td>
<td><strong>Reference</strong></td>
<td><strong>Reference</strong></td>
</tr>
<tr>
<td>1940s</td>
<td>1950s</td>
<td>1960s</td>
<td>1970s</td>
<td>Constant</td>
</tr>
<tr>
<td>3.381</td>
<td>2.863</td>
<td>0.087</td>
<td>0.281</td>
<td>1.255</td>
</tr>
</tbody>
</table>

Level of significance: ***<.001 **<.01 *<.05

Source: Author’s calculations (BASiD v1, 1951-2009)

For each day in unemployment or part-time work in average losses amount -0.001 earning points have to be stated: Compensations for unemployed persons limit the losses.
In line with the previous descriptive results, ascending birth cohort affiliation means fewer entitlements for future pension: Compared to the oldest cohort born between 1940 and 1945 those born in the 1970s in average accumulated more than 2 earning points less.

The model fits well since the adjusted $r^2$ is in the latest model quite high. Even despite of including income as the main driver other characteristics are identified influencing the entitlements for future pension income.

Social stratification is strong: Gender differences, varying job opportunities due to place of resistance, and biographical decision-making sharp future entitlements. The effects of cohort affiliation are high and indicate for consequences in intergenerational justice.

6. Conclusion: Human capital revolution or educational inflation?

On the one hand, the results point to the effects of the educational expansion, which was brought about politically in both parts of the country, and on the other, the analyses document a reservoir of individuals without higher educational attainments that is still evident: Longer periods of unemployment, rough entries on the labour market, and fragmented histories of those with low qualifications in later cohorts are reflected in very low amounts of earning points.

The ideal typical curves with regard to the accumulation of earning points in working life (see Figure 1) have to be modified based on the empirical findings in that the most highly qualified do not necessarily experience higher entry (1970s), and hence the slopes of the curves vary considerably depending on the level of education, especially in the West (Figure 4). Educational differences with regard to future pension income were much smaller in the East.

For individuals with completed vocational training, the curve starts at a comparatively high level, but will remain flatter in relation to the most highly qualified. Blossfeld’s fixation model (Blossfeld 1985) plays a crucial role in the case of school-leavers with vocational training, as these individuals have advantages due to the career entry suited to their training, they already generate pension entitlements during their training, and they still maintain their initial advantage years later. The question of the
position suited to their training is therefore most clearly solved for individuals with vocational training. The highly institutionalised transition together with increasing qualification requirements on employers side in Germany is reflected in the advantage of this group with regard to earning points as compared to the low qualified.

The displacement thesis, which is derived from the theory of labour queuing, seems plausible for those with low qualifications in the younger cohorts: poor labour market opportunities with an increased average unemployment duration resulted in low earning points for those who entered the labour market in the late 1970s, the 1980s and after Reunification. At the same time university graduates had shorter periods of unemployment and a better start into working life from the very beginning. That is mainly true for men since women even in younger cohorts struggle with lower incomes and part-time work and vice versa a lack of rewards for earlier human capital investments.

In line with the increase in atypical employment confirmed by Teichler (2007) for example, one explanation for the graduates’ low earning points in the youngest cohort are the higher prevalence of non-permanent contracts, interrupted starting working biographies, and part-time work.

In the case of university graduates, search and transaction costs are vital, as they exhibit by far the shortest average periods of unemployment. The remuneration curve is obviously steeper. This means that the 1970s cohort can still compensate for the entry deficits, but this does not necessarily apply to later generations: on the one side, higher losses regarding the most highly educated suggest that educational investments potentially are devaluated. On the other side, it eventually could be assumed that the competitive situation due to the demographic change will involve advantages for future cohorts.

While higher returns on educational investments are possible on the free labour market in the case of relatively steep career paths, the institutional design of the statutory pension insurance system (particularly because of the upper earnings limit) leads to a flattening of the earning points curve. Thus, educational investments are only profitable as long as either the slope of the wage or remuneration curve lies
slightly below the upper earnings limit and thus implies a maximum pension, or superior alternatives outside the statutory pension insurance system present themselves as a supplement, such as company or private insurance, for example.

The utility calculus for high educational investments is thus influenced by the architecture of the welfare state so that the rationality of education or training decisions in the two complementary systems of the labour market and the pension scheme may diverge: apart from human capital investments and opportunity costs, labour market conditions and other restrictions as the contribution assessment ceiling in the national pension insurance limit the return of educational investments.

The assumption of the strong complementarity and orientation of the two subsystems is confirmed in that the labour market conditions are as decisive as the institutional regulations of the national pension system. This particularly applies to the potential rewards of higher qualifications on the labour market, which is also expressed by the accumulated earning points. This is a consequence to be taken from the findings on the differences in the West and East with regard to the duration of unemployment. This disadvantage emerged to the youngest cohort that entered the labour market after Reunification. Here, the structural change on the labour market could mean newly created jobs requiring a higher qualification, on the one hand, so that the more highly qualified nevertheless reach a position suited to their education. On the other hand, jobs for unskilled or semi-skilled employees may be dispensed with, so that the low qualified are confronted with a high risk of unemployment in both parts of the country. However, as far as the displacement thesis is concurred with, this means that the more highly qualified must accept lower positions, and it was clearly shown that, at least for career entry, university graduates of the youngest cohort had great losses.

In addition to the returns on educational investments regarding the pension credits, this study permits a look at the systematic connections between educational institutions, labour market and social security in the career entry phase. However, the question of whether it is indeed a false start for the more highly qualified and what exactly the catching-up process by the more highly qualified looks like later remains unsettled. Apart from quantitative aspects and the role of unemployment in the race for sufficient pension entitlements, it would also be useful to study the consequences
of the increase in atypical forms of employment, and the occupational differences that exist more in detail.

References


Hochfellner, Daniela, Müller, Dana, and Anja Wurdack (2011), BASiD – Biografiedaten ausgewählter Sozialversicherungsträger in Deutschland. FDZ Datenreport. Number 02/2011.


Thelen, Kathleen (2007), Contemporary Challenges to the German Vocational Training System. Regulation and Governance 1, issue 3, pp. 247-260.


Tophoven, Silke and Anita Tisch (2016), Employment trajectories of German baby boomers and their effect on statutory pension entitlements. Advances in life course research.

