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The labor market consequences of political imprisonment in the former GDR

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Very preliminary, please do not quote or circulate!!

Abstract

Barely any quantitative research has been devoted yet to the labor market consequences of incarceration for political offenses, which seems particularly unfortunate against the background of Europe's history of state persecution in the 20th century. Drawing on the example of the former German Democratic Republic (GDR), our paper seeks to gain a deeper understanding of how the experience of political imprisonment affected individuals subsequent career outcomes. In our empirical analysis, we exploit a one-percent sample drawn from a unique large-scale administrative data set (BASiD). To the best of our knowledge, our study provides unprecedented evidence on the labor market effects of political imprisonment, by (1) exploiting information on political imprisonment using administrative records; (2) differentiating between possible short and long-run consequences of political imprisonment; and (3) measuring outcomes before and after the transition from a centrally planned towards a market economy, thereby permitting us to distinguish the consequences of incarceration under different political and economic regimes.

Keywords: Imprisonment, transition economies, administrative data, propensity score matching

JEL-Code: J15; K40; P37

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1 Introduction

Employment interruptions, e.g. periods of unemployment or parental leave, have been studied widely with respect to their long-term consequences for individuals labor market outcomes (e.g., Arulampalam et al., 2001; Lalive and Zweimüller, 2009). A further reason for a temporary drop-out from the labor market is incarceration, which has been suggested to be linked to subsequent disadvantages through stigmatization and human capital devaluation (e.g., Western et al., 2001). Previous studies investigating the effects of incarceration on subsequent labor market outcomes (e.g., Alvarez and Loureiro, 2012; Kling, 2006) have almost exclusively dealt with *criminal offenders*, though.

Barely any quantitative research has yet been devoted to the economic consequences of incarceration for *political prisoners*, mostly due to a lack of adequate data (but see Bohacek and Myck, 2011). This appears as an unfortunate research gap, particularly against the background of Europes history of state persecution in the 20th century and the fact that a significant proportion of the hundreds of thousands of dissidents imprisoned under the former communist regimes in Central and Eastern European countries are still alive. Studying the consequences of political imprisonment for subsequent career outcomes is of considerable policy relevance, since it may contribute to creating appropriate rehabilitation policies aiming to compensate political prisoners for past injustice.

The former German Democratic Republic (GDR) is a particularly interesting case, because it is considered as one of the more hardline socialist regimes in Eastern Europe and has experienced a unique pathway of political and economic transformation after 1989 through its unification with the Federal Republic of Germany (FRG). In the GDR about 200,000 people were convicted of political offenses between 1950 and 1989 (Pfaff, 2001: 390). Not only did these people suffer from unfavorable conditions during their prison terms (e.g., Rothenbacher and Vemmer, 1987), but they were also exposed to further repressive measures after their release (cf. Raschka, 2001: Chapter 8). Moreover, political imprisonment in the GDR has

been suggested to result in long-term social and health disadvantages (e.g., Beer and Weißflog, 2011; Plogstedt, 2010).

While the psychological health consequences of politically motivated incarceration in the GDR have already received some attention (e.g., Bauer et al., 1993; Maercker et al., 2013), we are not aware of any quantitative studies addressing its labor market consequences in terms of subsequent employment and wage outcomes (see Myck and Bohacek, 2011, for a related study using survey data from the Czech Republic and Poland). This is surprising, because discrimination in the educational system and in the labor market was an important means of repression in the GDR system (e.g., Borbe, 2010). Moreover, there is some indication that former political prisoners still exhibit an above average risk of poverty (e.g., Arp et al. 2008: Section 3.2; Plogstedt, 2010).

Our study seeks to fill the existing research gap by providing first quantitative evidence on the possible short- and long-run labor market consequences of political imprisonment in the former GDR. Our empirical analysis is based on a one-percent sample drawn from on a unique large-scale administrative data set (BASiD) provided by the German Pension Register and the German Federal Employment Agency. The BASiD data provide an ideal basis for analyzing the impact of GDR political imprisonment on individuals later career outcomes as they allow us, first, to identify former GDR political prisoners and, second, to track individual employment histories both before and after the fall of the Iron Curtain.

In exploring the labor market consequences of political imprisonment, our analysis is related to the existing literature on the labor market effects of incarceration for criminal offenses. This literature acknowledges three main mechanisms to link incarceration with subsequent risks of unemployment or lower earnings (cf. Western et al., 2001): The first one relates to stigmatization in the sense that employers perceive ex-prisoners as less trustworthy and are thus less likely to hire them. A second channel through which incarceration may affect former inmates' labor market prospects may stem from human capital devaluation and the lack of accumulation of further

job experience. Finally, incarceration may weaken social ties that are important for getting legal jobs. Much of the empirical evidence, almost exclusively from the United States, indicates moderately lower employment rates and substantially lower earnings among offenders (e.g., Grogger, 1995; Waldfogel, 1994; Western, 2002); see Alvarez and Loureiro (2012) for a recent study with similar findings from Germany. The evidence on the association between length of incarceration and labor market outcomes is less clear, ranging from substantially negative to insignificant. Kling (2006) even found a positive short-run effect which diminished in the medium-run, though of longer time spent in prison on employment and earnings, which is probably attributable to participation in educational programs in prison. Still, research by Grogger (1995), for example, indicates that not just stigma attached to criminal justice contact - whose effect should be independent of incarceration length - bears a negative relationship with earnings or employment, but that other mechanisms are relevant as well. Distinguishing between arrest, conviction, probation, and incarceration, prison is found to have a particularly large and persistent negative association with earnings, which might be indicative of incarceration leading to an erosion of job skills (also see Waldfogel, 1994). Note, however, that an important issue in all these studies is the potential endogeneity of incarceration to employment. Individuals with few economic opportunities and less self-control may be more likely to turn to crime and are, at the same time, less likely to engage successfully in gainful employment. Even though this selection issue has been widely recognized by researchers, only few studies explicitly address this problem. One exception is the study by Kling (2006), who adopts an instrumental variable approach by exploiting exogenous variation in the incarceration length based on randomly assigned judges with different sentencing propensities.

In addressing the labor market consequences of political imprisonment in the former GDR, our analysis contributes to the small existing literature on the labor market effects of incarceration in several important respects. First, we estimate the labor market effects of political imprisonment, which is likely to considerably reduce the selection problems typically associated with sentences for criminal of-

fenses. Second, our study is the first one, whose database provides information on political imprisonment and subsequent labor market outcomes using data from administrative records. Third, we quantify the possible short and long-run consequences of incarceration for former GDR political prisoners' subsequent labor market outcomes and further aim at distinguishing between pre- and post-unification outcomes. This seems particularly important because the relationship between political imprisonment and subsequent career outcomes may not only vary over an individual's life-course (e.g., Kling, 2006), but is also likely to differ substantially across the different political and economic systems before and after German Unification.

The remainder of the paper is laid out as follows: Section 2 starts by providing historical and institutional background information on political imprisonment in the former GDR as well as the Eastern German labor market prior to and after German unification. Section 3 gives a description of the administrative data set, the identification of political imprisonment and the variables used in the empirical analysis. Section 4 Section 5 sets out the empirical strategy. Section 6 presents the estimation results and the final Section 7 concludes.

2 Background

2.1 Persecution, political imprisonment and its consequences in the GDR

The most intense period of persecution under the Soviet-style regimes in the East Central European countries occurred in the Stalinist era until 1956, "with several hundred thousand persons affected by murder, labor camps, imprisonment, political trials, forced collectivization, resettlement and other acts of violence. In the later periods, the forms of persecution were less severe but continued in the form of restricted access to education or persecution at work [$\cdots$], psychiatric confinement, and other restriction of civic freedoms" (Bohacek and Myck, 2011: 273).

In the GDR, "the regime eliminated its harshest opponents through incarcera-

tion, execution, or flight early in its history, and then gradually shifted its repressive strategy away from terror to increased surveillance, selective imprisonment and the expulsion of tens of thousands of political suspects." (Pfaff, 2001: 390; see Raschka, 2001, for a detailed account of the latter period). Although this change in the regime's strategy of social control did not fully develop until 1971, a significant decline in the number of political prisoners could already be observed after the 1950s. In the period 1950-55, there were, on average, about 14,000 sentences for political offenses per year, falling to 7,570 by 1965-68 and to 3,862 in 1985-88 (see Pfaff, 2001: Figure 1). In total, throughout the history of the GDR, estimates suggest that about 200,000 people were convicted of political offenses (with numbers ranging from a minimum of 170,000 to a maximum of 280,000 political prisoners; see Schröder and Wilke, 1998).

Reliable statistics on the number and characteristics of political prisoners in the GDR are difficult to obtain. Apart from the fact that there are various definitions of the term, 'political prisoners' did not formally exist in the GDR and thus do not appear as such in official statistics (cf. Schröder and Wilke, 1998: Section 2). Moreover, there is evidence indicating that the regime aimed at criminalizing political suspects and therefore charged them with criminal offenses. Still, so called 'state crimes' (Staatsverbrechen) did exist and the majority of political convictions were based on paragraphs such as anti-government breach of trust (§99), agitation (§106), illegal crossing of the border (§213), libel of state (§20), or particularly antisocial behavior (§249). Sentences based on these paragraphs typically resulted in prison terms of not more than two years (the maximum penalty for illegal crossing of the border); cf. Fricke (1986: Chapter II).

We are not aware of any statistics providing representative information on the socio-demographic structure of these former political prisoners. This is unfortunate, as Myck and Bohacek (2011) showed that in the Czech Republic the highly educated were the focus of oppression, whereas in Poland the main wave of opposition at least in the 1970s and 1980s came from workers. However, a statistic on preliminary

investigations carried out by the Ministry for State Security between January 1969 and April 1971 provides us with tentative information on East German dissidents socio-demographic characteristics (cf. Schröder and Wilke, 1998: Table 23): among the 1,212 persons suspected of having committed state crimes, almost one third was under the age of 21, slightly more than half were between 21 and 40, and less than one fifth were older than that. Regarding their educational/occupational status, one third were blue collar workers, about one eighth were white collar workers, another one eighth students or apprentices, and only five percent were academics (Intelligenz). These findings are consistent with results of a survey among applicants for rehabilitation in Thuringia, suggesting that medium-skilled blue collar workers (Facharbeiter) and adolescents were disproportionately affected by state repression (Arp et al. 2008: Section 3.1; also see Fricke, 1986: Chapter I.5).

The conditions in GDR prisons have been described as generally unfavorable, that is, inmates complained about overcrowded cells, lack of hygiene, insufficient medical care, or 'special treatments', such as solitary confinement (see Rothenbacher and Vemmer, 1987, for detailed examples). While physical maltreatment was more common in the 1950s and 1960s, psychological torture became more prevalent from the early 1970s onwards. Accordingly, anxiety and depression have been diagnosed in 20-50 percent of former political prisoners, about one third suffer from post-traumatic stress disorders, and almost one fifth report somatic complaints (e.g., Bauer et al., 1993; Weißflog et al., 2012; also see Bohacek and Myck, 2011: Figure 24.8). Although these numbers are based on rather small, non-representative samples, they altogether suggest that the health-related quality of life in former political prisoners is significantly lower than in the general population (Weißflog et al., 2011; also see Arp et al. 2008: Section 3.3), fairly independent of the length of incarceration. Moreover, some of the health disadvantages observed today only evolved over the course of time (e.g., Maercker et al., 2013), stressing the importance of considering the short- and long-term consequences of incarceration.

While several studies show that persecution often had direct work-related im-

plications, like job loss, harassment at work, or denied promotion (e.g., Bohacek and Myck, 2011: Figure 24.7; Kneipp, 2009)[1], no quantitative evidence exists about the labor market consequences of incarceration for political offenses neither in the short-run (i.e., before Unification), nor in the long-run (i.e., after Unification). Qualitative evidence suggests, however, that getting a new job in the GDR was difficult for political offenders and accompanied by the fear of being charged with 'antisocial behavior' if one failed to find work (see Kneipp, 2007). Moreover, while German Unification offered new labor market perspectives for some of the former dissidents (especially those attached to church-related oppositional groups; Kneipp 2009), many remain economically disadvantaged until today: almost 40 percent of former political prisoners live with a below average household income (Borbe, 2010: Table 26; also see Arp et al. 2008: Section 3.2).

3 The East German labor market before and after Unification

The East German labor market *before Unification* just as the entire GDR economy was characterized by tight central economic planning along with subordination of firms to the state administration (see Grünert, 1997a, for a detailed overview). However, although enterprises were effectively controlled through centralized redistribution of investment capital, salary funds, and other financial means, they were fairly free in planning and using the labor forces they had at their disposal. Under given general institutional constraints, enterprises could influence, for example, employment policies, regulations pertaining to job transfers, salary ranges, and promotion regimes. At the same time, all citizens of the GDR had the constitutional right and duty to work (where the 'right' included an unlimited guarantee of employment and the 'duty' brought along the threat to be sentenced for antisocial behavior if one was suspected of remaining voluntarily jobless). Individuals were in principle

[1]That is, professional exclusion as described by Kneipp (2007; 2009), for example, may not only have been a result of persecution, but the actual means of persecution.

free to choose their workplace. Once employed, they agreed upon a personal labor contract with their firm, which included far-reaching employment rights (such as the right on employment appropriate to acquired skills or the right to be paid according to the quantity and quality of the work done). While employees who were not satisfied with their job could easily change their employer, enterprises faced rigid employment protection regulations. De facto, however, firms had many possibilities to force unwanted employees, such as individuals engaged in opposition groups, to quit their jobs (see Kneipp, 2007, for examples).

There were clear limits to employer and occupational mobility, though. By the late 1970s, careers had become heavily affected by an increasing influence of the "state-governed labor force allocation", a system that restricted younger cohorts in the choice of occupational training and their subsequent job (Huinink and Solga, 1994: 240). Since the 1960s, quotas were set for occupations into which individuals were allocated after leaving secondary education, with the consequence that many young people could not get the occupation they actually desired. Very often, changing ones work was then only possible within ones occupational career via adult education (cf. Zühlke and Goedicke, 2000). Another restriction to mobility was a general tendency among GDR enterprises to keep the fluctuation of their labor force low and to maintain a high level of permanent staff (Grünert, 1997b: Section 1). In addition to offering firm-specific fringe benefits like free childcare, holiday arrangements, etc., an important means of achieving this were bonuses such as loyalty premiums ('Treueprämie') for long-term employees. Enterprises had more discretion over bonuses than over the base wage and bonuses have been estimated to account for, on average, six percent of compensation in the GDR, thereby explaining a significant share of the variation within wage groups (Krueger and Pischke, 1995: 407; see Stephan and Wiedemann, 1990, for a more detailed account of the wage structure and wage differentiation in the GDR). Overall, age-earnings and seniority earnings profiles have been shown to be much flatter as compared to Western Germany (Bird et al., 1994; Krueger and Pischke, 1995). Yet, one may doubt that the established positive, albeit low, returns to age and seniority reflect a genuine accumulation of

human capital. Bird et al. (1994) suspect that "because the human capital model was obviously not relevant under socialism, the observed correlation between wage income and schooling and experience in the GDR must simply exist because the socialist wage regime took factors like these into account in assigning wages".

It is important to note that although unemployment was basically absent in the GDR and the constitution guaranteed the right to work, those who did not confirm to the rules and norms of the leading socialist party often found that such rights were easily lost. While formal occupational bars (Berufsverbote) were relatively uncommon in the later years of the GDR, professional exclusion, denied promotion, etc., were common means of repression (cf. Kneipp, 2009; also see Raschka, 2001: Chapter 2.4). In East Germany as well as under communist regimes elsewhere, the "workplace was often the place where the power of the state over the individual presented itself most clearly, with the ability to affect peoples lives in the short and in the long term." (Myck and Bohacek, 2011: 2).

After unification, the eastern German labor market underwent a period of dramatic structural change. Monetary Union between Eastern and Western Germany took place on June 30, 1990. With monetary union, Eastern Germany adopted the legal and economic system from Western Germany, including also its labor market institutions. This included labor market institutions such as the system of collective bargaining, which gave rise to large wage increases, particularly within the first year following the monetary union in 1990. According to Hunt (2001), monthly real wages rose on average by 20 log points between 1990 and 1991 (also see Krueger and Pischke, 1995). For the subsequent period 1991 to 1996, Hunt (2001) reports an annual monthly wage growth of about nine log points, yielding a cumulative average real monthly wage growth of 78 percent. In the mid-1990s, however, real wage growth in Eastern Germany came to a halt and even started to decline post-2000 (e.g., Aretz, 2013; Franz and Steiner, 2000).

The massive structural change brought about by the privatization process, during which many Eastern German technologies became obsolete, has led some researchers

to inquire the extent to which human capital accumulated during the GDR was devaluated on the post-Unification labor market. Gathmann (2004), for example, finds that returns to pre-unification accumulated work experience drop to zero after Unification. She interprets her results as evidence of a full obsolescence of socialist work experience, suggesting a full depreciation of job-specific human capital. Contrary to that finding, Fuchs-Schündeln and Izem (2012) demonstrate that the low labor productivity in Eastern Germany can mainly be attributed to less favorable job attributes rather than to individual skills. The authors conclude that a large share of Eastern Germans human capital accumulated during the socialist regime was transferable to the post-Unification labor market and thus appears to be of general nature.

3.1 Hypotheses

Based on the above considerations, we aim at testing empirically the following hypotheses:

1. Pre-unification labor market outcomes due to human capital devaluation: The question as to whether incarceration (and the related job loss) results in lower earnings and reemployment probabilities due to human capital devaluation largely depends on the returns to work experience. Given the relatively flat age-earnings profiles in Eastern Germany (Bird et al., 1994; Krueger and Pischke, 1995), we do not expect any large effect of the length of incarceration resulting from a loss of work experience during the pre-unification period (Hypothesis 1).

2. Pre-unification labor market outcomes due to stigmatization: Stigmatization (or: discrimination), in contrast, should result in negative consequences of incarceration (independent of its duration) for pre-unification earnings (Hypothesis 2a). While we also expect this to be an issue for employment outcomes (measured as spells of non-employment), we hypothesize that due to the constitutional right and duty to work former prisoners are unlikely to experience

sizeable negative employment consequences (Hypothesis 2b).

3. Post-unification labor market outcomes: With regard to post-unification earnings and employment outcomes, we expect to find either a zero effect of incarceration (assuming full recovery from previous disadvantages under the new regime of the FRG; Hypothesis 3a), or negative consequences resulting from human capital devaluation which we do not expect to be an issue pre-unification and/or prison-related health disadvantages (Hypothesis 3b). If health were the relevant mechanism here, the literature suggests that the length of incarceration might be of less relevance. If, in contrast, human capital devaluation were the relevant mechanism, we would expect to find a significant impact of the duration of the individual's stay in prison.

4 Data and variable Description

Our empirical analysis is based on longitudinal German register data (*BASiD*). The data combine information from the German Pension Register with data from the German Federal Employment Agency. The *BASiD* data set is a stratified random one-percent sample of all birth cohorts from the early 1940s to the early 1990s, who have at least one entry in their social security records and who have not retired yet. The data provide longitudinal information on individuals' entire pension-relevant biographies up to the year 2007. Individual work histories cover the period from the year individuals were aged 14 until the age of 67. In Germany, statutory pension insurance is mandatory for all employees in the private and public sector, thus only excluding civil servants and self-employed individuals. As a consequence, the insurance covers more than 90 per cent of the entire population for whom all past pension-relevant periods have been recorded.

The *BASiD* data provide an ideal basis for analyzing the impact of former GDR citizens political imprisonment on their later career outcomes for several reasons: First, it is the only German administrative data source that encompasses full em-

ployment biographies. In particular, the data contain information on all periods for which contributions were paid (employment, long-term illness, unemployment) as well as periods for which no contributions were paid, but which are nevertheless creditable for the pension insurance. The latter refers to activities for which an individual receives pension credits, such as periods of school or university attendance after the age of 15, periods of training and apprenticeship and periods of caring.

Second, the *BASiD* data is the only individual level data set that contains employment biographies of former GDR citizens before German Unification. After Unification, former GDR citizens became entitled to transfer their pension relevant activities to the Federal Republic of Germany's (FRG) pension insurance system. For this purpose, the FRG Pension Insurance recorded all periods prior to Unification which were creditable for the pension insurance (see above) as well as earnings up to the GDR social security cap. The pension data therefore allow us to track former GDR workers entire pre- and post-unification employment histories up to the year 2007. Apart from the information on pension relevant activities, the Pension Register provides information on age, gender as well as monthly labor earnings. Starting from 1975 in western and from 1991 in eastern Germany, employment spells from the Pension Register can be merged with data from the German Federal Employment Agency. These data provide further time varying (post-unification) individual and employer information on blue or white-collar status, occupational status, educational status, tenure, the employers workforce composition, the employers size as well as sector affiliation. The structure of the data implies that for former GDR citizens the data lack explicit information on education prior to 1992. We therefore impute the educational status by using information from the Pension Register on individuals' creditable schooling and apprenticeship periods (for a more detailed description see Guertzgen and Nolte 2014).

Labor earnings can be calculated by exploiting information on monthly pension credit points gained from social security employment. Credit points derived from earnings in Eastern Germany before and after Unification are scaled-up to meet the

Western pension level according to a factor stipulated in the German Social Act (SGB VI). To obtain the original credit points, Eastern German credit points reported in the data have to be divided by this factor. One credit point corresponds to the average of annual earnings of all gainfully employed workers in Germany. This implies that monthly earnings can be obtained by multiplying monthly credit points with the average of earnings as documented in the German Social Act (SGB VI - see Table A1). Earnings are top-coded at the social security contribution limit. Compared with the FRG, where the earnings cap increases over time, the GDR threshold remained constant at 600 Mark throughout the entire GDR period. Due to this unchanged earnings cap, the fraction of GDR workers with top-coded earnings increased substantially over time and was much larger than the corresponding fraction in the FRG. Given the restrictive earnings information, we exploit the pre-unification earnings information by dichotomizing the GDR earnings distribution into a low- and high-wage sector. Table A1 and A2 in the appendix provide more detailed descriptions on the variables gained from the Pension Register and Employment Statistics Register.

4.1 Identification of episodes of political imprisonment

Key to our analysis is the identification of individual episodes of imprisonment for political offenses in the former GDR. We measure these episodes by using information on so called "*Ersatzzeiten*" ("substitution periods" according to §250 Sixth Book of the Social Code). These are periods during which the individual was inhibited to pay contributions to the pension insurance, but which are still creditable for the pension insurance. Substitution periods were initially introduced to the German pension system to cope with the immediate consequences of World War II, compensating individuals persecuted by the Nazi regime, former servicemen and prisoners of war, as well as refugees and expellees. Most of these periods refer to the 1940s, quickly fading out thereafter (the very last German prisoners of war, for example, returned from Russia in 1955). "*Ersatzzeiten*" referring to later time periods thus result from another legal fact, namely to episodes of political imprisonment in the

GDR of those ex-convicts who were granted rehabilitation by an FRG court.[2] Since our window of observation starts in 1954 (with cohorts born in 1940), this allows us to identify the number of episodes of political imprisonment an individual experienced in the GDR. Since periods of work disability and unemployment immediately following imprisonment may also be considered in the pension insurance's calculation of "*Ersatzzeiten*", the length of these substitution periods does not necessarily match with the exact duration of former prisoners' incarceration. To address this issue, we exclude from the substitution periods all those episodes recording a parallel unemployment or illness spell (for a more detailed definition of these states see Table A2 in the Appendix).

A potential concern is that observing substitution periods in the data requires former political prisoners to have filed a petition for 'penal rehabilitation' ("strafrechtliche Rehabilitierung"; see German Federal Ministry of Justice, 2014), which had to be granted by the responsible legal authorities after Unification. By the end of 2007, former GDR citizens had filed 184,428 petitions for penal rehabilitation (Borbe 2010: 19; note that the number of individuals is smaller than the number of cases, because one individual may have filed petitions for more than one sentence). The need to file a petition for penal rehabilitation might potentially lead to measurement error for two reasons: First, not all former prisoners might have filed a petition. Unfortunately, there is no quantitative evidence on which former prisoners were more likely to seek penal rehabilitation. However, filing a petition for rehabilitation is an unbureaucratic and cost-free act (German Federal Ministry of Justice, 2014: Section I), which minimizes the risk of bias. Second, rehabilitation might not have been granted. However, according to evidence from Thuringia, nearly all petitions for penal rehabilitation were accepted (Gröschner and Lembcke, 2008: 21).

Under certain circumstances, periods of political imprisonment can be considered

[2]In addition, former political prisoners' might also be eligible to so called "Kapitalentschädigung" ('capital compensation') or "Opferpension" ('victim's pension'); see German Federal Ministry of Justice (2014: Section III). Capital compensation is a tax-free one-time payment of 307 Euro per month spent in prison; low-income political prisoners with a sentence of 180 days or more are eligible for a victim's pension, a monthly payment of up to 250 Euro. Unfortunately, our data source does not provide information on capital compensation or victim's pension payments.

for the calculation of substitution periods even without penal rehabilitation, namely if the former prisoner's persecution has already been acknowledged according to §10(4) of the "Häftlingshilfegesetz" ('prisoners' support law'). This law supports German citizens who were sentenced abroad for political reasons, including East German political prisoners who fled to West Germany or were bought out of prison by the West German government before Unification (see Wölbern, 2014, for a detailed account of these manumission payments).

4.2 Employment history variables

The pension data allow us to track former GDR workers' entire employment histories up to 2007. While the GDR histories are subject to some limitations, this permits us to retrieve information on pre- as well as post-unification histories. We use this information to construct a variety of employment history variables, such as the duration and number of spells of employment (subject to social security contributions), unemployment, long-term illness and non-employment (see Table A2 in the Appendix). Alongside constructing these variables as pre-unification controls by cumulating the respective labor market state up to the year prior to political imprisonment, we also calculate them as post-imprisonment outcome variables. To do so, we cumulate the respective states starting from the year after having been released from prison (1) either up to the year 1990 or (2) up to the year 2007. The first variant will be referred to as the GDR-post-imprisonment outcome, whereas the second one will be referred to as the full post-imprisonment outcome, comprising the entire GDR and FRG period after having been released from prison. In a similar vein, we exploit information on pension credit points gained from social security employment to calculate pre and post-imprisonment cumulative labor earnings.

5 Sample selection and descriptive statistics

To identify former GDR citizens, we first select all individuals who prior to the monetary union (i.e., the 30th of June 1990) had exhibited pension-relevant activities in

the GDR, i.e. those individuals who had gained Eastern German credit points prior to unification. As spelled out in Section 4.1, episodes of political imprisonment are identified by so called substitution periods prior to the fall of the Berlin wall, i.e. the 9th of November 1989. To avoid measuring periods of work disability and unemployment following imprisonment, we replace all substitution spells with a parallel unemployment or illness spell by the recorded labor market state unemployment or illness, respectively. As the data do not permit us to infer whether substitution periods have been obtained in the GDR or FRG, we further exclude individuals with substitution periods which were preceded by a pension relevant episode in Western Germany. Note that this is possible since we observe east-west migrants, who may have been granted substitution periods for adverse employment consequences after they had migrated to Western Germany. This procedure leads to an exclusion of 45 individuals with substitution spells. In order to be able to retrieve information on prisoners' employment histories prior to imprisonment, we confine our sample to those imprisonment spells that started in 1961 or later, leading to an exclusion of further 57 continuous spells. Out of 51,963 individuals in our sample, we observe 386 individuals with 432 continuous imprisonment episodes prior to unification, implying that 37 out of 386 prisoners had more than one imprisonment period.

Table 1 displays some descriptive statistics for the observed imprisonment episodes. Panel A shows the distribution of years when the imprisonment periods started. Over 40 per cent of all spells started within the last ten years of the GDR regime, consistent with former evidence suggesting that Western German bought outs connected with manumission payments had reached their peak in the 1980s. Panel B tabulates the distribution of the duration of imprisonment spells. The majority of the spells lasted between three months and three years, with about 25 percent out of these spells having a duration between three months and one year and a further 29 per cent lasting one to two years. Only, 7 per cent of all spells were more than two years long. The median value of the imprisonment episodes in our sample amounts to 244 days.

Table 1: Observable Characteristics of Imprisonment Episodes

Variable	Share in %	Frequency
A. Start of Imprisonment		
1961 <= Year <= 1969	26.9	116
1970 <= Year <= 1979	27.1	117
1980 < Year <= 1989	46.0	199
B. Duration t in Days		
Days <= 10	19.0	82
11 <= t <= 100	19.7	85
101 <= t <= 365	25.2	109
365 <= t <= 730	28.9	125
731 < t	7.2	31
$\sum$	100	432

Source: BASiD 2007. To measure the exact length of imprisonment episodes, only substitution spells without any parallel unemployment or illness spell are accounted for in calculating the duration of imprisonment spells. To obtain continuous spells, gaps between two subsequent imprisonment periods up to four weeks are closed, otherwise any subsequent imprisonment episode is counted as a new spell.

In what follows, we will define individuals who experienced at least one imprisonment spell in a particular calendar year as the treatment group (prisoners). The control group shall be constructed from the sample of individuals who never experienced such a spell prior to unification. Overall, we observe 51,577 non-prisoners in our sample. Table 2 displays descriptive statistics for prisoners and non-prisoners. The figures reveal that compared with non-prisoners, men were with 63 per cent over-represented among those imprisoned. Moreover, a considerable fraction of political prisoners has migrated to Western Germany prior to unification (57 per cent). Compared to the incidence of east-west migration in the comparison sample, east-west migrants were thus disproportionately represented among political prisoners. Out of this migrating group, about 50 per cent migrated directly after the end of their imprisonment episode, suggesting that the release of this group very likely resulted from having been "bought out" by the Western German government. For comparison purposes, Figure A.1 in the Appendix shows the evolution of the fraction of east-west migrants in the overall sample prior to unification. Even though these figures are not representative due to the cohort structure of the data, the figure

suggests that migration peaked around the time of the rise of the Berlin wall and decreased afterwards until stagnating between 1.5 and two per cent before 1989.

A comparison of the age distribution between prisoners and non-prisoners reveals that the age group 20 to 24 was disproportionately affected by political imprisonment. The same is true for the group of low-skilled with a share of about 35 per cent and those with missing educational information with a share of 19 per cent (as compared to 29 and 13 per cent among non-prisoners, respectively). Overall, the figures therefore confirm previous tentative evidence suggesting that younger and less skilled workers were mores likely to be affected by political oppression (Schröder and Wilke, 1998).

To obtain a first descriptive picture on the differences in individuals' labor market histories after unification, Figure 1 and Figure 2 illustrate the evolution of post-unification labor market outcomes for prisoners and non-prisoners. As a considerable fraction of formerly imprisoned individuals has migrated to Western Germany prior to unification, the figures distinguish between individuals' pre-unification migration status (in what follows referred to as "stayers" and "migrants"). Turning first to stayers, Figure 1 shows the evolution of the cumulative number of months worked, the cumulative number of months of non- and unemployment as well as cumulated labor earnings by year t after unification. In terms of unemployment outcomes, Figure 1 (c) illustrates that both groups exhibit quite similar developments during the first six years after unification. After 1995, the evolution tends to diverge, with formerly imprisoned individuals exhibiting higher cumulated experiences of unemployment. Theses differences become significant at the five percent level for the last five years of our observation period. Figure 1 (b) shows that these adverse unemployment consequences are partly compensated for, as formerly imprisoned individuals were experiencing less cumulated months of non-employment until 2004

Table 2: Observable Characteristics of Prisoners and Non-Prisoners

Variable	Prisoners		Non-Prisoners	
	Mean	Std.-Dev.	Mean	Std.-Dev.
INDIVIDUAL CHARACTERISTICS[a)]				
Female	0.37	0.48	0.59	0.49
Migrants	0.57	–	0.10	–
Low-Skilled	0.35	0.48	0.29	0.46
Medium Skilled	0.35	0.48	0.38	0.48
High-Skilled	0.11	0.32	0.10	0.30
Education Missing	0.19	0.39	0.13	0.34
14 <= Age <= 19	0.18	0.39	0.18	0.38
20 <= Age <= 24	0.30	0.46	0.25	0.43
25 <= Age <= 29	0.15	0.36	0.20	0.40
30 <= Age <= 34	0.15	0.36	0.16	0.37
35 <= Age <= 39	0.11	0.32	0.11	0.32
40 < Age	0.10	0.30	0.10	0.30
EMPLOYMENT HISTORY VARIABLES[b)]				
Employment Duration	81.44	81.46	89.35	85.20
Illness Duration	3.58	7.32	3.51	6.96
Cum. Wages in 1000 M	22.03	24	25.98	33.2
#Illness Spells	1.33	2.33	1.27	2.17
#Employment Spells	3.30	3.26	3.03	3.01
#Low-Wage Spells	0.56	1.71	0.37	1.30
# Individuals	386		51,577	

Source: BASiD 2007. Prisoners are defined as those who experienced at least one imprisonment spell in a particular calendar year. The comparison group of non-prisoners in each calendar year consists of all individuals who never experienced an imprisonment spell throughout the entire time period prior to unification.

[a)] For prisoners, all observable attributes are measured at the beginning of their imprisonment spell. For each imprisonment year's comparison group of non-prisoners, the attributes are measured at the beginning of the respective calendar year.

[b)] For both groups, cumulative employment history variables are cumulated up to one calendar year prior to the year when the imprisonment started. Descriptives are pooled over all years prior to unification. All durations are measured in months.

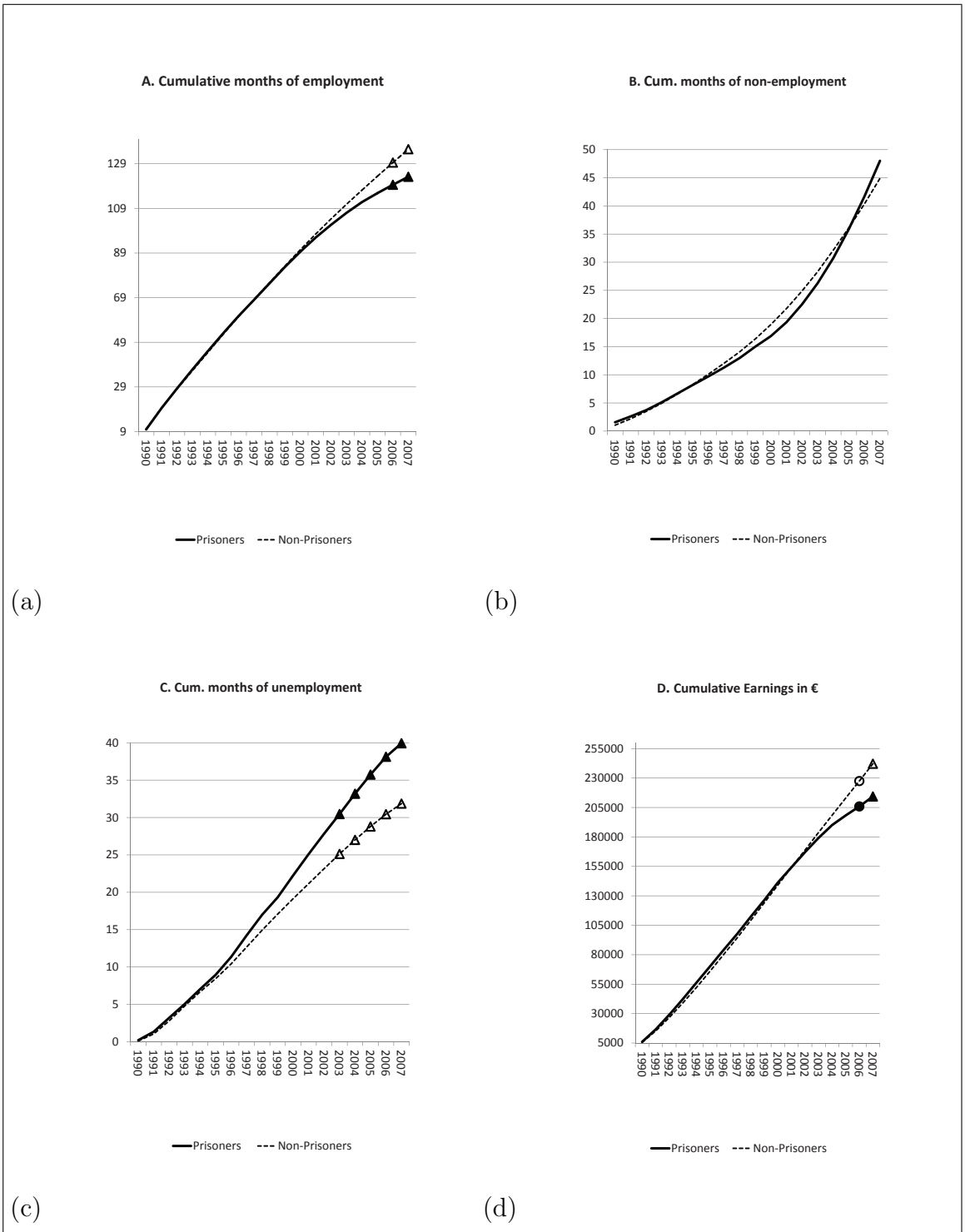

Figure 1: Labour Market Outcomes after Unification - Stayers

Source: BASiD 2007. *Notes:* Triangles (circles) denote differences in outcomes that are significant at the 5 (10) per cent level.

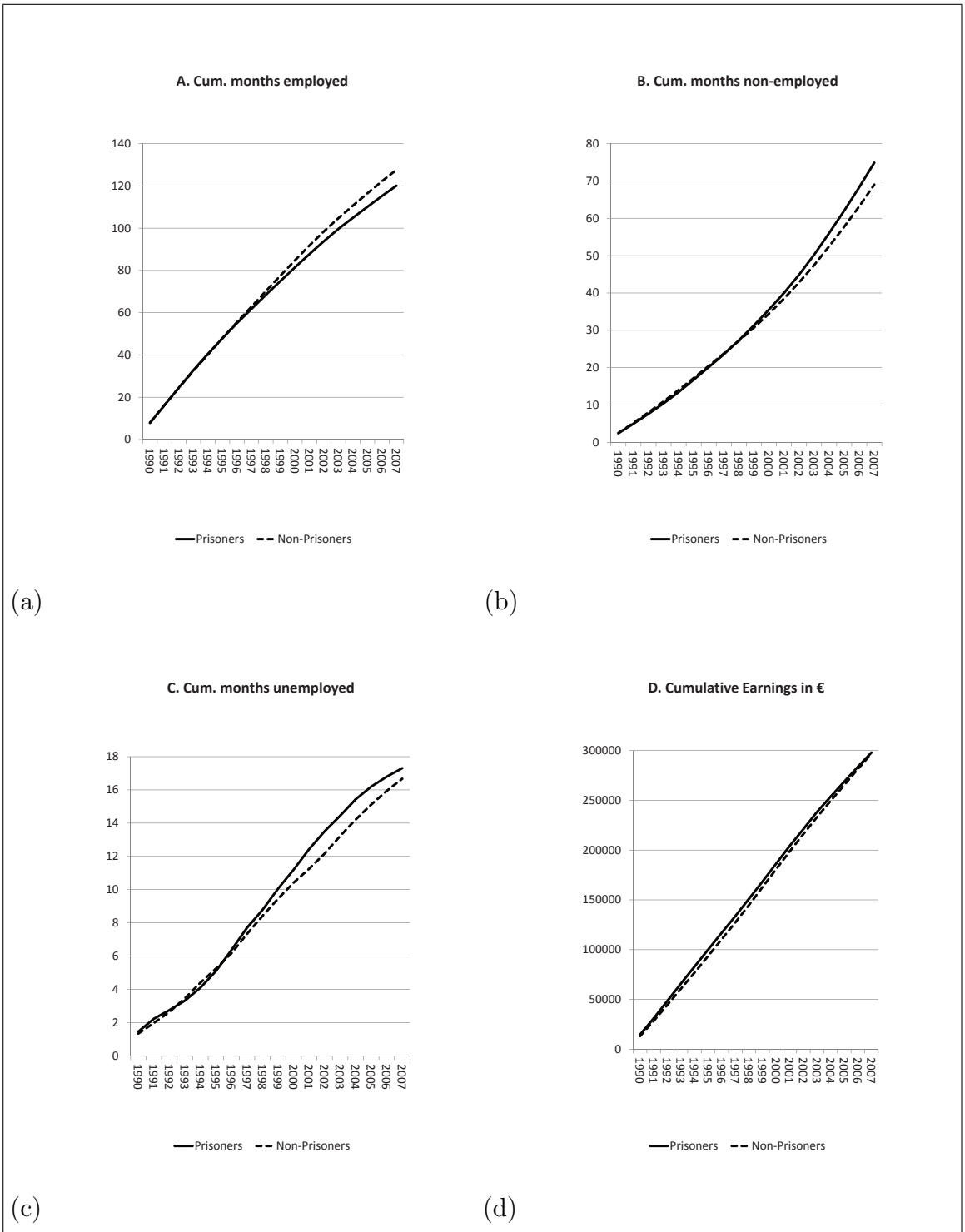

Figure 2: Labour Market Outcomes after Unification - Migrants

Source: BASiD 2007. *Notes:* Triangles (circles) denote differences in outcomes that are significant at the 5 (10) per cent level.

(albeit not significantly so). As a result, the net employment effect, as shown in Figure 1 (a), becomes negative only for the last seven years of our observation period, with the differences being significant in 2006 and 2007. Finally, Figure 1 (d) illustrates that this translates into an earnings disadvantage from year 2002 on, with the differences again being significant in 2006 and 2007.

Figure 2 illustrates that a different picture emerges for migrants. While among this group formerly imprisoned individuals appear to experience more cumulated months of unemployment starting in 1996, the differences in outcomes are much smaller as compared with stayers and not significant at conventional levels (see (c)). The same is true for cumulated employment and non-employment outcomes, which show a slightly diverging development starting in the second half of the observation period (see (a) and (b)). Again the differences in outcomes are found to be small and not significant at conventional levels either. Interestingly, despite the slight differences in employment outcomes, formerly imprisoned individuals who have migrated to Western Germany do not exhibit any earnings disadvantage compared with their non-imprisoned counterparts (see (d)). Note that this might hint to formerly imprisoned individuals constituting a positively selected group in terms of their earnings potential.

6 Empirical strategy

Our empirical strategy is to compare our outcomes of interest (see above) of individuals who had been imprisoned for political offenses with those of an appropriate comparison group. The above considerations suggest that the need to file a petition for penal rehabilitation might cause the misclassification of treated as control individuals. Note that this kind of measurement error will generally provide us with a lower bound of the true imprisonment effect on our outcomes of interest as long as the effect for the "misclassified treated" (i.e. those political prisoners who were not granted rehabilitation) is non-zero and exhibits the same sign.

To sort human capital from stigma-based explanations for potential adverse career consequences, we distinguish between the mere incidence (i.e. the binary treatment) and length of an imprisonment spell (i.e. the treatment intensity). If, for example, only the incidence were relevant for post-imprisonment labor market outcomes, this would argue against the importance of human capital depreciation and rather point to a stigma-based explanation.

A credible assessment of the effects on subsequent labor market and health outcomes needs to address the problem that treated and non-treated individuals may not be comparable in all relevant aspects. As set out earlier, an important issue in the incarceration literature is the large extent of endogeneity of incarceration to employment and health. People with low self-control, for example are at a high risk of committing crime and are, at the same time, more likely to have difficulties engaging successfully in gainful employment or healthy behaviors. This should be less of a problem in the context of our analysis, though, where incarceration rather is a function of the socialist regime's arbitrary imprisonment decisions than of offender characteristics. Even though political imprisonment may be considered less endogenous as compared with imprisonment arising from genuine criminal behavior, there may be still some sort of selection into treatment. Age seems to be particularly relevant here, as our descriptives suggest that political incarceration was more likely to occur earlier in the life-course (see also Schröder and Wilke, 1998). A further concern is that periods of political imprisonment are likely to be preceded by periods of on-the-job or occupational discrimination, which could potentially confound the effects of incarceration with effects from pre-imprisonment persecution.

The above considerations make clear that any comparison of outcomes between imprisoned (treated) and non-imprisoned (non-treated) individuals requires that both groups should be comparable except for the experience of an imprisonment spell. To ensure this comparability we will employ (propensity score) matching, which basically aims at reproducing the treatment group among the non-treated (Blundell and Costa Dias 2009). In our context, we construct a suitable sample

counterpart for the missing information on the outcomes of former prisoners had they not been imprisoned by pairing each prisoner with sufficiently similar members of the non-treated group. To address the potential systematic differences spelled out above, we will exploit the available information on the treatment and control group's employment biographies up to the year where the imprisonment of the treated started. These histories allow us to match prisoners with non-prisoners based upon observables, such as age, sex, education as well as earnings, employment and health histories prior to incarceration.

To implement the matching procedure, we combine one-to-one matching with propensity score matching. More specifically, one-to-one matching is performed with respect to the different age categories from Table 2, the low-skill versus the remaining skill categories, gender as well the calendar year. This procedure accounts for the established importance of age, gender, skill and possible cohort effects for the probability of becoming imprisoned (see Section 2.1, suggesting that the socialist regime's imprisonment practices considerably varied over time). Within the resulting age-gender-skill-year cells, we then apply propensity score matching based on logit regressions containing the employment history covariates from the lower panel of Table 2 as explanatory variables. We estimate these regressions separately by gender and calendar year, in order to account for the fact the importance of the explanatory factors may vary across time and gender.

7 Results

To be completed

8 Conclusions

To be completed

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9 Appendix

Appendix A: Data Description

Variable	Definition/Categories
Educational Status	*Low skilled*: No degree or highschool degree (Reference category) *Medium skilled*: Completed vocational training *High skilled*: Technical college degree or university degree
Missing Education (>= 1992)	Missing and inconsistent data on education from the Employment Statistics Register (>= 1992) are corrected according to the imputation procedure described in Fitzenberger et al. (2006). This procedure relies, roughly speaking, on the assumption that individuals cannot lose their educational degrees.
Occupation (>= 1992)	*White-collar*: White-collar worker, Reference: Blue-collar worker
Seniority (>= 1992)	*Tenure*: Number of previous months at current employer. Employment interruptions a the same employer may not exceed 6 months - otherwise tenure is reset to zero after the employment interruption.
Earnings	Gross monthly earnings are retrieved from credit points to the German Pension Insurance. GDR credit points are divided by a factor as specified in Appendix 10 German Social Act (SGB VI). One credit point corresponds to the average of yearly earnings of all gainfully employed workers in (Western)Germany. For each spell observed in the data, earnings are thus obtained by multiplying the recorded credit points per spell with the average of earnings as documented in the Appendix 1 to the German Social Act *SGB VI*. Credit points are reported up the contribution limit of the German social security system.

Table A1: Description of individual characteristics

Labor Market States

Employment: Employment spells include continuous periods of employment (allowing for gaps of up to four weeks) subject to social security contributions.

Unemployment Unemployment spells include periods of unemployment with transfer receipt. A spell of unemployment in the *Pension Register* requires individuals to be registered as unemployed *and* to obtain public transfers. The latter include benefits such as unemployment insurance, and - prior to 2005 - the means-tested social assistance and unemployment assistance benefits. After 2004, unemployment and social assistance were merged into one unified benefit, also known as 'unemployment benefit II' (ALG II). As the latter targets only employable individuals, a spell involving the receipt of ALG II automatically fulfills the requirements to be recorded as unemployed in the *Pension Register*. Prior to 2005, spells with social assistance benefits fulfill the above requirements only if individuals were registered as unemployed. Otherwise they are recorded as non-employment spells. As a consequence, the *Pension Register* does not permit a consistent definition of un- and non-employment prior to and after 2005.

Distinction between Un- and Non-Employment According to the procedure proposed by Lee and Wilke (2009), involuntary unemployment is defined as comprising all continuous periods of transfer receipt. Gaps between such unemployment periods or gaps between transfer receipt and a new employment spell may not exceed four weeks, otherwise these periods are considered as non-employment spells (involving voluntary unemployment or an exit out of the social security labor force). Similarly, gaps between periods of employment and transfer receipt or job search are treated as involuntary unemployment as long as the gap does not exceed six weeks, otherwise the gap is treated as non-employment. Periods of child raising, care giving, incapacities to work ("*Erwerbsminderung*"), military service as well as episodes without any pension relevant activities are also defined as as non-employment spells.

Illness spells Periods of illness recorded by the BASiD data generally refer to spells of long-term illness. For the FRG these spells refer to employees who have been absent for more than six weeks. In contrast, GDR illness spells prior to 1984 are creditable for illness episodes that lasted at least 4 weeks (SGB VI §252a), whereas afterwards no minimum duration was required.

Note: The recorded pre-unification pension activity histories are less precise than the post-unification histories. The reason is that the transfer of the activities was mainly based on former GDR citizens' social security cards. These cards record the number of months of employment and non-employment due to illness and maternity leave during a particular year, but do not allow for tracking these spells on a daily basis. As a result, compared to the pension spells after Unification, which provide exact daily information on all pension relevant activities, information on the incidence of pre-unification employment, illness and maternity leave spells is available only on an annual basis.

Table A1: Description of labor market states
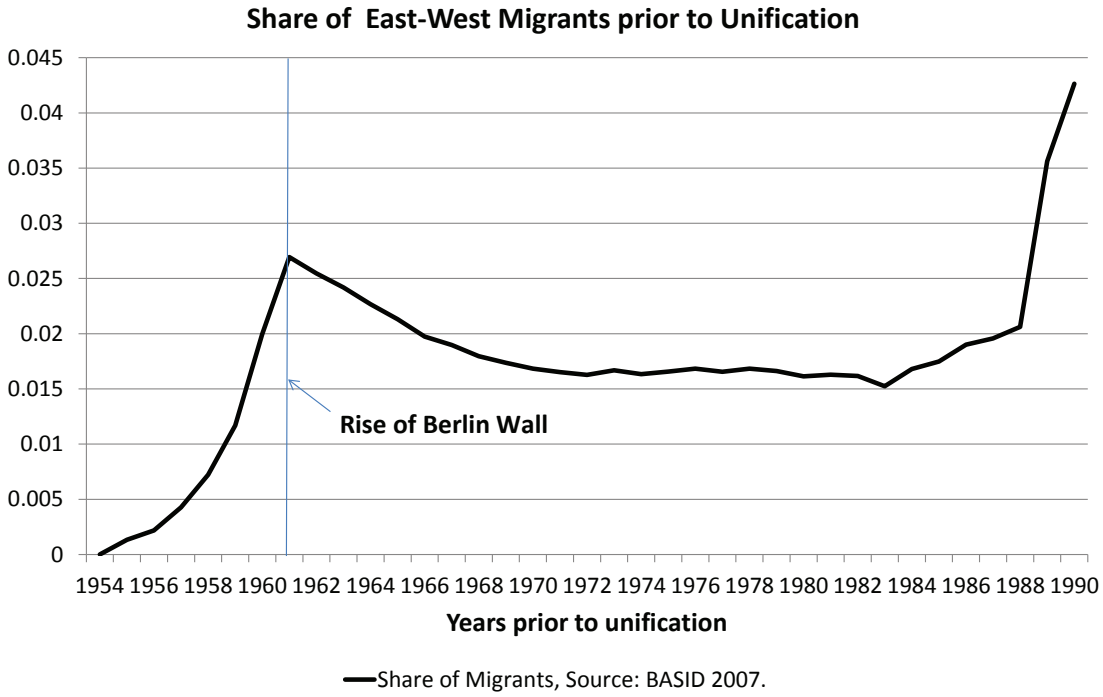
Figure A.1: Share of East-West Migrants prior to Unification