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# **Unemployment and Social Exclusion**

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# Unemployment and Social Exclusion\*

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## Abstract

This paper analyzes the economic and social consequences of job loss which contribute to exclusion from society based on German linked survey and administrative data. To study the causal relationship between unemployment and multiple dimensions of social marginalization, I combine inverse propensity score weighting with a difference-in-differences approach. The results suggest that job loss has particularly detrimental effects on the subjective perception of social integration, life satisfaction, the access to economic resources and mental health. Moreover, this paper shows that becoming unemployed hinders the fulfillment of psychosocial needs that are typically associated with working, such as social status and higher self-efficacy. The effects of job loss are long-lasting, growing more profound the longer the duration of unemployment and persisting following reemployment. Looking at effect heterogeneity, I find that having a partner and being highly educated reduces the negative effects of job loss.

**Keywords:** job loss, unemployment, social exclusion, inverse probability weighting

**JEL-Code:** I31, J64

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# 1 Introduction

The negative consequences of unemployment are discussed in many empirical studies. Long periods of unemployment reduce the reemployment probability (see e.g. van den Berg and van Ours, 1994 and Kroft et al., 2013) and coincide with lower reemployment wages (see e.g. Addison and Portugal, 1989 and Burda and Mertens, 2001). Beside the classical economic effects of job loss, the literature documents a negative link between unemployment and health (see e.g. Browning and Heinesen, 2012 and Black et al., 2015), between unemployment and physical and mental well-being (see e.g. Clark and Oswald, 1994 and Kassenboehmer and Haisken-DeNew, 2009) and between unemployment and social ties (see e.g. Eliason, 2012 and Kunze and Suppa, 2017).

There is a growing research and policy interest in the link between labor market integration and social integration. The term ‘social exclusion’ has become increasingly prominent in policy debates regarding poverty and social inequality and often refers to disadvantages in core living conditions that reduce the possibilities of participating in society (European Commission, 2010 and Federal Government, 2017). Social exclusion can be viewed as dynamic multidimensional process where various deficits reinforce each other (Room, 1995). In this context unemployment is considered one of the main risk factors for social exclusion. Exclusion from employment might lead to alienation from society and increase the risk of long-term dependency on social welfare benefits (see e.g. Bhuller et al., 2017), committing suicide (see e.g. Sullivan and von Wachter, 2009), becoming a criminal or victim of a crime (see e.g. Freeman, 1999) and to support extreme parties (see e.g. Falk et al., 2011). Furthermore, social exclusion may not only affect the current generation, it may be passed on to the next generation (Machin, 1998).

The aim of this paper is to shed light on the causal impact of job loss on social exclusion by discussing in great detail the driving mechanisms behind this association. From an individual’s point of view, periods of unemployment can affect the economic and social situation in different ways and to varying degrees. The reduction in disposable income due to job loss creates restrictions on the financial side. Consequently, maintaining a minimum standard of living, but also participating in social and cultural activities, could become more challenging (Jenkins and Cappellari, 2007). Beside the economic strain, unemployment may take away non-pecuniary benefits associated with working such as time structure, the chance to demonstrate competences and skills, an individual’s status and social relations (see e.g. Jahoda, 1981). Moreover, sociologists and psychologists emphasize that redundancy could come with stigmatization, the feeling of insecurity and shame. Hence, the loss of a job represents a potential source of

stress and can lead to emotional and physical distress, isolation and alienation.<sup>1</sup> These economic and social consequences of unemployment are expected to contribute to or be accompanied by the subjective feeling of social exclusion.

There are some empirical studies that investigate the relationship between labor market integration and an overall subjective evaluation of social integration with the help of survey data. Based on the first five waves of the survey 'Labour Market and Social Security' (PASS), Gundert and Hohendanner (2014) make use of panel data techniques and find that the risk of feeling socially excluded is higher among the unemployed than among employed workers. Furthermore, their results indicate that the degree to which employment contributes to perceived social affiliation is related to the level of job security. The reports conducted by Gallie and Paugam (2003), Böhnke (2004) and Layte et al. (2010) provide a comparative analysis of social exclusion across European countries and point to a positive relationship between unemployment and average levels of perceived social exclusion in a society.

Instead of concentrating on one overall measure of social exclusion as in the studies mentioned above, I define a set of multiple interdependent factors which characterize marginalization from society and might be affected by periods of unemployment. Social exclusion describes an objectively precarious financial situation, but also refers to the feeling of being part of society. This subjective feeling might depend on the individual's emotional stability, social network, relative position in society but also on personality traits which could help to cope with multiple deprivation (Popp and Schels, 2008). In this paper I study the effects of job loss on several dimensions of social exclusion: the individual perception of social integration, life satisfaction, mental health status, economic resources, social participation, social status and self-efficacy. Gundert and Hohendanner (2014) discuss how different mechanisms mediate the relationship between employment status and social integration. However, the identification of mediation effects relies on strong assumptions that are likely to be violated in my setting (see e.g. Gelman and Hill, 2007 and Imai et al., 2010). For instance, it is not possible to identify effects mitigated by so-called mediators and direct effects of job loss as long as further unobserved mediators are existent. Moreover, it is difficult to distinguish between mediators and outcome variables as the social and economic effects of unemployment can mutually reinforce each other. That is the reason why my study concentrates on the total effects of job loss on the different dimensions defined above. In addition, I provide new insights into the consequences of unemployment by studying heterogeneous effects for subgroups defined by sociodemographic characteristics and

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<sup>1</sup>See e.g. Brand (2015) who provides a literature review on the economic and non-economic impacts of job loss for the United States.

by the type of job loss and the duration of the unemployment spell.

I contribute to the literature by analyzing the effects of becoming unemployed based on a combination of survey and administrative data and a method that allows me to account for selection effects due to time-constant unobserved characteristics and reversed causality. This study makes use of the panel data set PASS-ADIAB 7515 which covers about 10,000 households per wave and includes individual information on the areas of employment, education, income, health, social life and housing. Additionally, the rich administrative data set of the Federal Employment Agency provides detailed information on job and firm characteristics and employment histories. In a first step, I estimate the probability of job loss given a large set of control variables reflecting individual and household characteristics as well as the labor market history. In a second step, I apply inverse propensity score weighting combined with a difference-in-differences approach to control for observed and permanent unobserved differences between individuals who become unemployed and those who do not.

My results are in line with previous findings and point in the expected direction. Unemployment has particularly detrimental effects on the subjective perception of social integration, life satisfaction, the access to economic resources as well as on mental health. Looking at psychosocial needs that are typically met by an employment relationship, I find that social participation is not affected by job loss while the social status and the self-efficacy level become lower. Furthermore, I find some evidence for effect heterogeneity across subgroups. Individuals with a partner and high-skilled workers suffer less from unemployment. I also study the effects of job loss depending on the type and the time that passed by since the employment relationship has ended. The main finding is that the effects become more profound the longer the duration of unemployment. The negative consequences of previous unemployment are still present even if the individual finds a job again.

The rest of the paper is structured as follows. Section 2 discusses theories regarding the concept of social exclusion and the consequences of job loss. Section 3 describes the data source and the measurement of the outcome variables. Section 4 presents the empirical identification strategy. Section 5 describes the sample and shows model diagnostics. Section 6 presents the results of the empirical analysis and Section 7 concludes.

## 2 Theoretical Considerations

### 2.1 The Concept of Social Exclusion

The term ‘social exclusion’ has its origins in France in the 1970s and referred to persons who were unprotected by social insurance and at risk of permanent detachment from society. A widespread adoption of the term in Europe started in the 1980s, when unemployment rates were high and threatened national modes of social integration (Kronauer, 1998). More recently, the European Union declared 2010 as the European Year for Combating Poverty and Social Exclusion.

Thus far no operationalization of the concept of social exclusion has been established as a standard in the literature. However, sociologists have emphasized some key characteristics of the concept on which the theoretical framework of my analysis is based (see e.g. Room, 1995; Rodgers et al., 1995; Atkinson, 1998 and Sen, 2000). Social exclusion is viewed as a dynamic process, involving deprivation across a range of dimensions which affect individual opportunities to be connected to mainstream society.<sup>2</sup> Exclusion from society can be described as disadvantages in core living conditions, such as housing, income, education, employment and well-being (Andreß, 2003), which reduce the possibility of maintaining an ‘appropriate’ standard of living and social participation. However, social exclusion is not only determined by an objectively precarious financial situation but also by the individual perception of belonging to society. Criteria and standards that define social integration are to a large degree subjective and are weighted differently by individuals. In order for an individual to feel part of society and take part in social activities it is of great importance that the individual is able to shape his or her life according to subjective perceptions and aims. Hence, social integration depends on both an individual’s capacity to act and an individual’s actual actions (Sen, 1985). The subjective feeling of social integration might be influenced by general life satisfaction, mental health status, an individual’s close social surrounding, the relative position in society but also on personality traits such as self-efficacy which could help to cope with multiple deprivation (Popp and Schels, 2008).

The above reasoning shows that social exclusion has multiple interdependent dimensions which can reinforce each other. Exclusion from society can also impact, for instance, on social participation or mental health through the lack of perceived integration

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<sup>2</sup>Social exclusion might depend on several interdependent dimensions of society such as the labor market, economic resources, social participation, educational, health care and social welfare institutions or civic and human rights. As the institutional and political system of western social welfare states like Germany or the Scandinavian states should in principle be accessible for every citizen I do not consider these dimensions in this study.

as well as alienation. Higher perceived alienation is associated with lower well-being and a higher risk of depression (Layte et al., 2010). As it is not clear which variables act as mediators and which ones as outcomes, I concentrate on the total effects of job loss on the following outcome variables which might lead to social exclusion: **perceived social integration, well-being and mental health, economic resources** and the **psychosocial needs** *social participation, social status* and higher *self-efficacy*.

From an economic point of view, social exclusion is strongly related to exclusion from the labor market. Obsolete skills, living in deprived neighborhoods and discouragement effects (see e.g. Atkinson and Kintrea, 2001; Murie and Musterd, 2004 and Clark et al., 2010) might in turn considerably reduce the individual employment prospects and hence lead to long-term dependency on social welfare benefits. However, these channels should be highly related to the outcomes I am looking at, as social capital, emotional stability and personality traits such as self-efficacy are important determinants of reemployment probabilities (see e.g. Darity and Goldsmith, 1996 and Helliwell and Putnam, 2004). In the following I will provide more detailed explanations for potential effects of job loss on the outcome variables under consideration. The empirical identification of the causal effects is discussed in Section 4.

## 2.2 The Consequences of Job Loss

**Economic resources.** Job loss leads to exclusion from the labor market and needs that are associated with an employment relationship. Two main functions of paid employment can be emphasized: the first function is the provision of financial resources, which allow individuals to maintain a minimum standard of living and to shape life according to subjective perceptions and aims. Job loss coincides with earnings losses and hence might constrain the access to economic resources. As a consequence unemployed individuals might have to adjust their lifestyle, for instance by changing their diet, their place of residence or their general spending behavior. Financial constraints could also affect their participation in social and cultural activities (Jenkins and Cappellari, 2007). Poverty researchers usually distinguish two approaches of measuring poverty, a resource-based poverty measure and a measure of deprivation. While the former defines poverty primarily in financial terms (lack of income and consumption), the latter measure concentrates on a direct measure of what individuals are able to be or to do. This approach was suggested by Sen (1992) who defines poverty as the inability of individuals to achieve a minimal level of capabilities to function (such as the inability to be healthy, clothed, sheltered, etc.). The advantage of this approach is that it takes



into account the inherent ability of individuals to translate consumption into welfare as well as the impact of public goods on welfare (e.g. public health, education, etc.). In this paper I will concentrate on economic deprivation due to job loss which is reflected by the non-availability of basic goods and the non-participation in activities satisfying basic needs.

**Psychosocial needs.** The second function of employment refers to psychosocial needs that go beyond the need for financial resources. Jahoda (1981) proposed a latent deprivation theory which states that unemployment causes deprivation not only of manifest economic resources, but also of five latent psychosocial needs that are usually met through an employment relationship: the need for a time structure to one's day, the need for social contacts outside of the immediate family, the need to be a part of a collective purpose, the need for status and personal identity and the need for regular activity. According to Jahoda (1981) and others (e.g. Creed and Muller, 2006; Paul and Batinic, 2010 and Gundert and Hohendanner, 2014) the absence of those functions, together with economic strain, might explain why an individual's perception of social integration as well as subjective well-being declines when becoming unemployed. In this paper I focus on the following psychosocial needs that can be met more easily through working: *social participation*, *social status* and higher *self-efficacy*.

*Social participation.* On the one hand, when individuals become unemployed they typically lose their daily social contacts, for example to colleagues or customers. In addition, the literature documents a negative relationship between unemployment and social participation. Social participation might comprise formal participation like activity in a club or organization and informal participation like interaction with friends and relatives (Dieckhoff and Gash, 2015). It has been found that the unemployed engage in social activities less often (see e.g. Kunze and Suppa, 2017) and have less social support from close relations and authority figures compared to employed individuals (see e.g. Jackson, 1999). Moreover, the psychological distress that goes along with being unemployed is compounded by the negative social attitudes towards unemployment which risk further alienating the unemployed from mainstream society (Gallie et al., 2003). As a consequence, the loss of social contacts can lead to lower life satisfaction. Dolan et al. (2008) provide a detailed literature review on the determinants of subjective well-being and find evidence that an important factor which positively influences subjective well-being is social contacts.

On the other hand, the additional leisure time could also be beneficial for social participation of the unemployed. Studies that focus on the time use of employed and

unemployed individuals show that unemployed persons spent more time on home production and leisure activities such as socializing than the employed (see e.g. Krueger and Mueller, 2012). Hence, the net effect of job loss on social participation is not clear a priori.

*Social status.* According to Jahoda (1981) an individual's position in life is in large part defined by one's job. This notion is supported by Paul and Batinic (2010) who state that individuals tend to see themselves in a similar way as others see them and even employed workers with a relatively low occupational status, for example manual workers, feel that they are treated with more respect and recognition than unemployed persons. Job loss might bring a certain stigma as well as feelings of shame and worthlessness. The loss in social prestige may be reflected in the subjective perception of occupying a lower social status. There are studies that focus on the relationship between social norms that are associated with different labor market states and subjective well-being. Findings point to lower life satisfaction due to status and identity effects caused by the event of job loss (see e.g. Clark, 2003; Stutzer and Lalive, 2004 and Hetschko et al., 2014).

*Self-efficacy.* In social-cognitive theory the construct of self-efficacy deals with the ability of an individual to deal with demanding situations by taking adaptive action (Bandura, 1997). Self-efficacy might be an important individual characteristic in modern labor markets in which more and more responsibility is shifted to the worker. Tisch and Wolff (2015) discuss the link between employment and self-efficacy. Employed workers are likely to be more confident with respect to their problem-solving capabilities due to the feedback received from people outside of their family like colleagues and superiors. Moreover, an employment relationship links individuals to a collective purpose or goal that might lead to increased self-efficacy when such goals are achieved. Regular activity at the workplace might help an individual to learn about and to value his or her own skills. Hence, Jahoda's latent functions of employment should positively influence self-efficacy. Fryer (1986) states that individuals might differ in their reaction to unemployment which cannot be explained by Jahoda's deprivation theory. He assumes that individuals want to actively control their lives by making plans and pursuing goals. Hence, job loss and the associated loss of the above mentioned functions may lead to a lower level of self-efficacy. In addition, becoming unemployed might be viewed as individual failure (Silver et al., 2005).

**Social integration.** Labor market integration plays a central role in feeling part of society. Sociologists have provided some empirical evidence that employment is related

to a higher level of perceived social integration than unemployment (see e.g. Gundert and Hohendanner, 2014 and Layte et al., 2010). As discussed above job loss might lead to multiple deprivations such as financial constraints, social contacts and social status which could determine the degree to which individuals feel as though they belong to society. In this study I analyze the impact of job loss on an overall subjective evaluation of social integration as defined by those components which are regarded as important from an individual's point of view.

**Well-being and mental health.** There are a number of existing studies that show the detrimental effects of unemployment on individuals' subjective well-being (see e.g. Frey and Stutzer, 2002 and Helliwell, 2006 who give a literature review on happiness research). Life satisfaction can be viewed as the ultimate result of what resources enable people to do and to be, in other words their ability to convert resources into a good life. Furthermore, being emotionally stable is a central dimension of employability and a basis for regular activity, which can be interpreted as an individual's potential to be part of society. In contrast, job displacement could cause psychosocial and financial stress which might result in unhappiness and mental health problems (see e.g. McKee-Ryan et al., 2005 and Paul and Moser, 2009 for meta-analyses on the mental health effects of unemployment). In the short-run, mental health problems might appear, for instance, in the form of fear, dejection or irritability. Studies showed that in the long-run the unemployed face a higher risk of dying early and are more likely to commit suicide (see e.g. Ruhm, 2000 and Sullivan and von Wachter, 2009) which could be interpreted as the worst form of social exclusion.

However, individuals might also quit their job voluntarily, for instance due to dissatisfaction with working-conditions. In this scenario, the effect of becoming unemployed on subjective well-being is ambiguous from a theoretical point of view.

There might be additional contributing factors to why unemployed individuals are socially excluded. Anxiety due to reduced life-course predictability might also influence whether an individual feels part of society or not. Unemployed individuals are likely to face a lower level of life-course predictability compared to employed workers as their situation might require a change of residence or to get involved with new social groups (Gundert and Hohendanner, 2014). In addition, the trust in institutions and other people might decline due to job loss, which could in turn affect social and mental well-being (Helliwell and Wang, 2011). Furthermore, stigmatization and human capital depreciation might also foster social exclusion. Unfortunately, the PASS-ADIAB 7515

does not contain questions reflecting information on these potential channels.

## 3 Data and Measurement of Outcomes

### 3.1 Data Source

This study is based on individual level data provided by the German Federal Employment Agency. The PASS-ADIAB 7515 data set combines weakly anonymous survey data provided by the household panel study ‘Labour Market and Social Security’ (PASS) with administrative data from the Integrated Employment Biographies which are based on employers’ notifications to the social security authorities.

The PASS is a household panel survey and is designed for research on the living-conditions of low-income households in Germany (Trappmann et al., 2010). The survey is financed by the Ministry of Labour and Social Affairs and has been conducted on yearly basis since December 2006.<sup>3</sup> The PASS-ADIAB 7515 is based on the nine subsequent annual waves of the PASS (2007–2015). In the first wave about 12,500 households and 19,000 individuals were interviewed. The initial sample consists of two subsamples of almost equal size, one of which is drawn from the unemployment registers of the Federal Employment Agency and contains a sample of households with at least one benefit unit on the reference date in July 2006, while the second is a general population sample, oversampling low status households. The initial subsample of benefit recipients is refreshed each year. In the context of panel surveys sample attrition between survey waves plays a crucial role. Attrition might be caused by death, moving abroad or non-response due to non-contactability or refusal. The attrition rates of the PASS panel range between 18% (Wave 9) and 43% (Wave 2) of households between two consecutive waves. Approximately 20% of the dropouts are only temporary and return in the following wave. In the ninth wave 13,271 individuals living in 8,921 households were interviewed.<sup>4</sup>

The PASS gathers detailed information on individual and household characteristics in the fields of employment, education, income, health, social life and housing. For the purpose of this study, examining the effects of job loss, the PASS has the advantage of including questions on the subjective assessment of well-being, living conditions and individual attitudes. The Integrated Employment Biographies complement the survey

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<sup>3</sup>The response rate on the household level in the first wave of 30.5% (Bethmann et al., 2016) is in line with other surveys in comparable populations. For example the LSS 2005 (Meßmann et al., 2008) and the benefit-recipient survey conducted as part of the evaluation of the experimentation clause (ZEW, IAQ and TNS Emnid, 2007) achieve almost equal response rates.

<sup>4</sup>Table A.1 in Appendix A provides a detailed description of the number of interviews in each wave.

data with detailed information on individual employment histories including start and end date of dependent employment, registered unemployment or registered job-search or unemployment benefit receipt periods on a daily basis. In this way, I am able to construct precise durations and numbers of periods in a particular employment state.<sup>5</sup> This administrative data source covers all surveyed persons who have at least one entry in their social security records from 1975 onwards in West Germany and starting from 1992 in East Germany. Periods of self-employment, civil service, and of military service are not included in the data set. Alongside information on different labor market states, the data include individual information on (daily) wage records and on firm characteristics such as industry code, median wage paid or firm size. An individual's past labor market performance should be highly related to unobserved factors like ability and motivation which are likely to influence my outcome variables. Hence, information on individual employment histories may help to identify the causal effects of job loss (Heckman et al., 1997).

### **3.2 Measurement of Outcome Variables**

In the following I describe how the outcome variables social integration, well-being and mental health, economic resources and the psychosocial needs social participation, social status and self-efficacy are measured in this study. The PASS questions underlying the outcome variables and a description of their construction is presented in the corresponding section in Appendix B.

Social integration is quantified by the subjective perception of social affiliation ranging from 1 to 10; from feeling excluded (1) to feeling part of society (10) (see Section B.1). In this paper the impact of job loss on two measures of emotional stability is analyzed (see Section B.2): life satisfaction and mental health status. To quantify life satisfaction I make use of a question which is standard in large-scale surveys like the GSOEP or the BHPS. Individuals are asked to assess on a 0 to 10 scale how satisfied they are currently with their life as a whole, with 0 meaning that the person is completely dissatisfied and 10 meaning completely satisfied. In addition, I use a variable with five categories indicating whether an individual has been "extremely", "quite a bit", "moderately", "a little bit" or "not at all" affected by mental health problems, like fear, dejection or irritability in the last four weeks.

To measure the access to resources enabling a basic standard of living and social

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<sup>5</sup>Survey data can only be linked to administrative data from the Federal Employment Agency for those who agreed to the linkage. Table A.2 in Appendix A shows that on average 80% of the respondents agree on merging the two data sets in each wave.

participation, I use two variables (see Section B.3). First, I use a deprivation index which is included in the PASS data set. The surveyed households are asked to indicate whether they possess a list of basic goods considered essential for an appropriate standard of living in society. For instance, the household is asked whether it has an apartment with at least as many rooms as persons living there, with a garden or balcony and whether the household possesses a car. Moreover, the household members are asked to indicate whether they participate in activities satisfying basic needs, such as having a hot meal or saving a fixed amount of money, as well as in social activities, such as inviting friends for dinner at home or going to the cinema once in a while. All in all the deprivation index is based on a list of 26 goods or activities. In addition, survey participants are asked whether the household does not possess these goods or does not participate in certain activities due to financial or other reasons. In order to construct the deprivation index properly only items that are missing for financial reasons are counted. In this way, it is ensured that conscious decisions, for instance a household choosing not to own a car or television, are not misinterpreted as a reduced standard of living. As a second measure of economic resources, I use the subjective satisfaction with the standard of living in total on a 0 to 10 scale, ranging from "completely dissatisfied" to "completely satisfied".

I quantify social participation with the help of two different measures (see Section B.4). First, I exploit information on how many close friends (can also include family members outside the household) the individuals have.<sup>6</sup> Moreover, I use information on the activity in organizations or associations. The PASS includes a question on whether the respondent is actively engaged in a union, political party, church community, clubs such as music, sport or culture clubs or another organization. Based on the responses to this question I construct a variable ranging from 0 to 5 indicating how many activities the individual is engaged in. To measure social status the relative ranking matters. I make use of a question asked in PASS, where the respondent should rank himself or herself on a 1 to 10 scale, where 1 means belonging to the bottom of society and 10 to the top (see Section B.5). The self-efficacy index used in this study is introduced and tested by Schwarzer and Jerusalem (2006). It is based on a five item battery where the respondent has to decide whether they "apply completely", "tend to apply", "tend not to apply" or "do not apply at all" (see Section B.6).

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<sup>6</sup>Unfortunately, the PASS-ADIAB does not include information on the composition of the social network. The network of unemployed persons might change with a higher proportion of friends being also unemployed and at risk of social marginalization (Gallie and Paugam, 2003).

## 4 Empirical Identification

The aim of this paper is to determine the causal effects of job loss on the dimensions of social exclusion defined in Section 2. The identification of causal effects relies on a comparison of the outcome levels of workers becoming unemployed to those of otherwise identical but still employed workers. However, in this setting selectivity issues are likely to play a role.

In general, an employment relationship ends either because workers are laid off, their contract expires and is not prolonged or they quit voluntarily. In the empirical analysis I study how the effects depend on the type of job loss. The distinction between voluntary and involuntary unemployment allows me to learn more about the self-selection of employees into unemployment. The PASS-ADIAB does not contain information on mass layoffs which could be used to estimate the effects of involuntary job loss as it is often done in the literature. However, the individual risk of being affected by a mass layoff might also be influenced by selection both on the part of the firm as well as on the employee side.<sup>7</sup> Firms of a different size, sector or workforce composition face different business risks and vary with respect to their employment contract designs. Similarly, employees might self-select, for instance due to family reasons, to work in firms that are less likely to make layoffs. The German Employment Protection Act (*Kündigungsschutzgesetz*) prescribes the requirements for making workers redundant.<sup>8</sup> This law states that termination with notice is only valid if it is based on reasons relating to either the employees' character, conduct, or urgent operational business requirements. The employer has to undertake a social selection of the relevant employees on the basis of length of employment, age, family support obligations and severe disability. However, there might still be a certain scope for an employer to lay off workers with low productivity or bad health. The individual probability of becoming unemployed might be influenced by unobservable factors like ability or motivation but also by lower levels of the outcome variables before job loss. For instance, unhappy people or people with few social contacts or mental health problems could be more likely to become unemployed.

The fundamental challenge of causal inference arises because we cannot observe the outcome levels of the same individual simultaneously with and without job loss which makes it impossible to observe causal effects directly (Imbens and Wooldridge, 2009). To address this issue, I apply inverse propensity score weighting (IPW). The basic idea

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<sup>7</sup>See e.g. Kletzer, 1998 and Pfann, 2006 who discuss selection of the employees who are affected by mass layoffs.

<sup>8</sup>This law applies only to firms that employ at least ten full-time employees.

of this approach is to make those workers who do not experience a job loss comparable in their observable characteristics to workers who do lose their job. This is achieved by weighting down the outcome levels for individuals from the comparison group who are over-represented and weighting up those who are under-represented. The weights are determined by the propensity score, the probability of not being employed in the next period ( $T = 1$ ), given observed covariates  $x$ :

$$p(x) = \mathbb{P}(T = 1|X = x) \quad (1)$$

The difference between the weighted outcome levels of the two groups is then a consistent estimate of the effect of job loss on the different dimensions of social exclusion of unemployed individuals (average treatment effect on the treated (ATT)).

The key assumption for identification of the ATT is the conditional independence assumption, which states that, conditional on the propensity score, potential outcomes are independent of the event of job loss (Rosenbaum and Rubin, 1983). To make the assumption that all selectivity is captured by observables reasonable in my application, I make use of a very large set of determinants of job displacement. For instance, the data provide information on sociodemographic characteristics, subjective indicators, individual health status and household situation. In addition, I have detailed information on individual employment histories and on previous jobs including firm characteristics and whether the position was a permanent position. The selection of the covariates follows screening of control variables used in other empirical studies on the non-pecuniary effects of job loss (see e.g. Kassenboehmer and Haisken-DeNew, 2009 and Marcus, 2013).<sup>9</sup> Moreover, I carefully study the influence of the outcome levels before job loss on the probability of becoming unemployed.

Given concerns over potentially biased results due to unobserved differences between workers who lose their job and their matching partners, I follow Heckman et al. (1997) who developed a conditional difference-in-differences extension of matching. In this study I combine IPW with a difference-in-differences approach (IPW-DID), as suggested by Abadie (2005), to eliminate permanent differences that are time-invariant and unobserved by the researcher.

In a nutshell, I make use of a two-step procedure to estimate the effect of job loss. In a first step, I estimate the individual probability of job loss between two consecutive waves by means of logit models given a detailed set of observed individual, household,

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<sup>9</sup>In the final specification I rely on a set of covariates that might determine job loss from a theoretical point of view and that allows differences between unemployed individuals and those still in employment to disappear for an even larger set of variables.



job and firm characteristics. These variables are measured at the first of two consecutive waves such that their levels are not affected by future job loss. Then, I use the fitted values of the propensity scores to calculate the weights. In a second step, I use the inverse-probability weights to compute weighted averages of the changes between the two survey waves of outcome levels for each treatment level. The estimator is given by

$$\hat{\tau}_{ATT} = \frac{\frac{1}{N} \sum_{i=1}^N \tilde{p}(x_i^{t_0}) \left( \frac{T_i^{t_1} (Y_i^{t_1} - Y_i^{t_0})}{\tilde{p}(x_i^{t_0})} - \frac{(1 - T_i^{t_1}) (Y_i^{t_1} - Y_i^{t_0})}{1 - \tilde{p}(x_i^{t_0})} \right)}{\frac{1}{N} \sum_{i=1}^N \tilde{p}(x_i^{t_0})} \quad (2)$$

where  $T_i^{t_1}$  indicates the event of job loss for individual  $i$ ,  $i = 1, \dots, N$ , in period  $t_1$ .  $Y_i^{t_0}$  and  $Y_i^{t_1}$  denote the observed outcomes of each individual in two consecutive periods  $t_0$  and  $t_1$ . The weights are normalized to ensure that the weighted number of control observations sums up to the number of treated:  $\tilde{p}(x_i^{t_0}) = \frac{\hat{p}(x_i^{t_0})}{\frac{1}{N} \sum_{i=1}^N \hat{p}(x_i^{t_0})}$ , where  $\hat{p}(x_i^{t_0})$  is the estimated probability of job loss conditional on observed characteristics measured in  $t_0$ .

The IPW-DID approach identifies the ATT under the assumption that the average outcomes of unemployed and still employed workers would follow a parallel trend in absence of the event job loss. Hence, this approach assumes that both groups are characterized by similar changes and not by similar levels of the outcome variables in the case of no job displacement. To test for the similarity or divergence, for example due to anticipation of the treatment, I conduct placebo tests by comparing the change in outcomes of both groups in periods before the event of job loss takes place.

## 5 The Sample and Model Diagnostics

### 5.1 Sample Selection

The analysis of the impact of job loss on several dimensions of social exclusion is built on the nine waves of PASS (2007–2015). The sample is restricted to respondents who were interviewed in two consecutive waves  $t_0$  and  $t_1$  and whose administrative records could be identified. Daily information on employment biographies allow me to determine an individual's current employment status at the interview date. Individuals are either part-time or full-time employed and do not receive unemployment benefits in the first of the two consecutive waves (wave  $t_0$ ). I define two different groups of individuals that can be distinguished by the event of job loss in the second of two consecutive waves (wave  $t_1$ ). The treatment group consists of individuals who stated that they were employed in wave  $t_0$  and are unemployed and not employed in parallel, for instance via

a mini job or an active labor market program in wave  $t_1$ .<sup>10</sup> This means that I am analyzing a combination of short-term and medium-term effects of job loss: the duration of the current unemployment spell ranges between one day and one year. Individuals that belong to the control group are continuously employed between two consecutive waves.<sup>11</sup> The sample is restricted to individuals who are between 18 and 64 years old, not in education and for whom no information on observable characteristics and outcome variables that are used in the empirical specification are missing. A detailed description of the variables used in this study can be found in Appendix C (Tables C.1 and C.2).

I end up with a treatment group that consists of 635 cases in which workers are employed in wave  $t_0$  and are unemployed in wave  $t_1$  and a control group that consists of 17,047 cases in which workers are continuously employed between two consecutive survey waves. Table D.1 in Appendix D shows that the same individual might be either in the treatment group, the control group or in both groups several times. Approximately half of the group of workers who lose their jobs and 11% of the control cases are individuals who are considered only once in the analysis.

## 5.2 Descriptive Statistics

Table 1 shows selected descriptive statistics of the observable characteristics that are used in the empirical analysis separately for workers that become unemployed and workers that are continuously employed between two consecutive waves. Additional descriptives are reported in Table D.2 in Appendix D. The variables presented in Tables 1 and D.2 can be grouped into the following categories: initial levels of outcome variables, sociodemographics, subjective indicators, household and partner characteristics, characteristics of the previous job and the previous firm as well as information on the employment history.

There are substantial differences in the baseline outcome levels between both groups. I find significant lower levels in all dimensions for workers whose employment relationship ends between two waves except for the deprivation index, for which I find a significantly higher level indicating limited access to economic resources. Regarding sociodemographics, I find that men, young workers as well as workers with an immi-

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<sup>10</sup>I consider individuals as unemployed in wave  $t_1$  in case they are unemployed according to the Integrated Employment Biographies in  $t_1$  or they have no unemployment entry in the social security records for at most six months but had one before and have an unemployment or employment entry thereafter. In addition, I consider individuals as unemployed in wave  $t_1$  if they have no unemployment entry in  $t_1$  but enter unemployment from employment within three months. I use survey data on the actual labor market state in  $t_1$  in case administrative information are missing.

<sup>11</sup>94% of the control persons do not change their employer between two consecutive waves  $t_0$  and  $t_1$ .

**Table 1: Selected descriptive statistics**

Job loss	Yes	No	Difference	
<b>Initial outcome levels</b>				
Social integration [1-10]	7.39	7.99	-0.60	***
Life satisfaction [0-10]	6.77	7.43	-0.66	***
Mental health status [1-5]	3.85	4.04	-0.18	***
Deprivation index [0-11]	0.82	0.39	0.43	***
Satisfaction with standard of living [0-10]	6.62	7.39	-0.77	***
Number of close friends	1.98	2.19	-0.21	***
Social engagement [0-5]	0.50	0.77	-0.27	***
Social status [1-10]	5.73	6.28	-0.55	***
Self-efficacy [1-4]	3.03	3.08	-0.04	*
<b>Sociodemographics &amp; household characteristics</b>				
Female	0.41	0.53	-0.12	***
Age	40.93	44.18	-3.25	***
Migrant	0.07	0.04	0.03	***
Married	0.39	0.60	-0.20	***
Number of own children	1.24	1.46	-0.22	***
Home owner	0.22	0.47	-0.25	***
Serious health restrictions	0.25	0.18	0.06	***
PQ: no vocational training	0.17	0.09	0.08	***
PQ: vocational training	0.66	0.64	0.02	*
PQ: advanced vocational training	0.05	0.10	-0.05	***
PQ: academic degree	0.13	0.17	-0.05	***
East Germany	0.30	0.26	0.04	**
<b>Previous job characteristics &amp; employment history</b>				
Permanent contract	0.57	0.86	-0.29	***
Tenure	19.82	71.85	-52.03	***
Daily wage	51.90	77.57	-25.67	***
Sector: Agriculture/Production	0.10	0.17	-0.07	***
Sector: Consumption/Food	0.05	0.07	-0.01	
Sector: Construction	0.09	0.05	0.05	***
Sector: Trade	0.12	0.13	-0.01	
Sector: Transportation/Services I	0.29	0.19	0.10	***
Sector: Services II	0.15	0.07	0.08	***
Sector: Education/Health	0.12	0.20	-0.07	***
Sector: Public	0.08	0.12	-0.05	***
Number of employment periods with ssc	7.86	5.52	2.34	***
Employment duration with scc	115.72	183.84	-68.12	***
Number of marginal employment periods	1.63	1.14	0.49	***
Marginal employment duration	12.71	16.77	-4.06	***
Number of unemployment periods	4.53	2.30	2.23	***
Unemployment duration	68.17	30.44	37.74	***
Number of non-employment periods	2.92	2.07	0.85	***
Non-employment duration	41.51	40.69	0.81	
<b>Number of observations</b>	<b>635</b>	<b>17,047</b>		

*Notes:* PQ: Professional qualification. ssc: social security contributions. Scales of the outcome variables are shown in squared brackets. Differences are statistically significant at the \*10%, \*\* 5% and \*\*\* 1% level.

*Source:* PASS-ADIAB 7515, own computations.

gration background are more likely to become unemployed. Individual unemployment probabilities are higher for low-skilled individuals. Furthermore, workers who lose their job between two consecutive waves are on average less healthy. There are significant differences between both groups with respect to household characteristics. Workers that become unemployed are less often married and are less likely to have children or to be homeowners. Finally, I find a clear pattern when looking at previous job characteristics as well as at the employment history. Individuals that become unemployed have shorter tenures as well as less employment experience and more often suffer from interruptions caused by periods of unemployment or non-employment. Moreover, they are more often employed on a temporary basis, receive on average lower wages and are more likely to work in the production, construction or service industry than individuals who remain employed.

### 5.3 Model Diagnostics

In the baseline specification I apply IPW-DID on the pooled sample based on the nine waves of PASS. In this paragraph I describe balance diagnostics for assessing whether the specification of the propensity score model has been adequately chosen. The results of the propensity score matching can be found in Table D.3 in Appendix D. As shown in the previous subsection, before weighting, individuals that become unemployed and those who remain employed differ with respect to most determinants of job loss as well as the baseline levels of the social exclusion measures. Following Austin (2011) and Guo and Fraser (2015), I examine the standardized differences in means after weighting between individuals who become unemployed and those who do not to test for balance. The standardized difference gives the difference in averages by treatment status, scaled by the square root of the sum of the variances and is formally given by

$$d = \frac{(\bar{x}_{treatment} - \bar{x}_{control})}{\sqrt{\frac{S_{treatment}^2 + S_{control}^2}{2}}} \quad (3)$$

where  $\bar{x}_{treatment}$  and  $\bar{x}_{control}$  denote the sample means and  $S_{treatment}^2$  and  $S_{control}^2$  the sample variances in treatment and control group, respectively. Moreover, I also look at variance ratios. A perfectly balanced covariate has a standardized difference of zero and variance ratio of one. Austin (2011) points out that there exists no universally agreed criterion for how small a standardized difference has to be to provide balance. I follow his rule of thumb according to which a standardized difference of less than 0.1 is taken to indicate a negligible difference in the means of treatment and control group.

The balancing tests of my baseline specification can be found in Table D.4 in Ap-

pendix D. This table shows that the standardized differences are close to zero and the variance ratios are close to one for a large set of covariates which is larger than the set of covariates included in the baseline specification.<sup>12</sup>

Table D.6 in Appendix D shows summary statistics of the propensity scores for the unemployed and individuals still in work, which show that there is sufficient overlap between treatment and control group to be able to conduct a proper analysis.

## 6 Empirical Findings

In this section I present the baseline results of the IPW-DID estimates of the effect of job loss on the different dimensions of social exclusion as defined in Section 2.2. In a next step I look at heterogeneous effects for subgroups defined by sociodemographic characteristics and by the type of and amount of time since job loss. Finally, I discuss the robustness of the results.

### 6.1 Baseline Results

Table 2 presents the estimation results of the baseline specification. The number of observations for individuals that become unemployed between two consecutive waves corresponds to 635 while the number of observations for individuals that remain employed corresponds to 17,047 for all outcomes except for the self-efficacy index. The measure of self-efficacy is not available in wave 5 and 9, which leads to roughly 40% fewer observations. The results show that individuals who become unemployed on average lose out in multiple dimensions. The changes in the outcome variables are standardized in order to allow for better comparability of the estimated effect sizes.<sup>13</sup> My findings provide evidence that job loss is accompanied by a decrease in the overall assessment of social integration and subjective well-being. The estimated short- and medium-term effects on life satisfaction are stronger: job loss leads to a decrease of 0.55 standard deviations (SDs) in life satisfaction compared to 0.33 SDs in social integration. My

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<sup>12</sup>The baseline specification is based on information for 46 covariates. These variables are partly divided into dummy variables which leads to 99 control variables in total. I conduct several robustness checks to examine the sensitivity of the choice of covariates included in the estimations. Table D.5 in Appendix D presents the estimation results for a larger set of covariates, e.g. including the "Big Five" personality traits: extraversion, tolerance, conscientiousness, neuroticism and openness and an aggregation of the control variables to independent factors using factor analysis. The results are comparable to the baseline specification.

<sup>13</sup>Figure D.1 in Appendix D presents the distributions of changes in outcome variables between two consecutive waves.

results suggest further that job loss can be associated with severe mental health problems. Becoming unemployed reduces mental health by 0.31 SDs. Moreover, I find that the deprivation index, which represents a measure of poverty, increases substantially by 0.61 SDs while satisfaction with the standard of living decreases by 0.53 SDs.

**Table 2: Baseline results for the consequences of job loss**

Change in outcomes	Effect of job loss	Standard error	Standard deviation
<b>Social integration</b>	-0.333***	(0.054)	1.602
<b>Well-being and mental health</b>			
Life satisfaction	-0.549***	(0.060)	1.330
Mental health status	-0.309***	(0.046)	1.152
<b>Economic resources</b>			
Deprivation index	0.608***	(0.071)	0.493
Satisfaction with standard of living	-0.529***	(0.057)	1.451
<b>Psychosocial needs</b>			
Social participation			
Number of close friends	-0.049	(0.043)	1.084
Social engagement	-0.048	(0.038)	0.650
Social status	-0.244***	(0.048)	1.354
Self-efficacy	-0.202***	(0.062)	0.379

*Notes:* Estimates from IPW-DID are based on 635 treated and 17,047 control persons (the estimates for self-efficacy are based on 417 treated and 10,359 control persons). The propensity of job loss is based on a logit model with the control variables reported in Tables C.1 and C.2 in Appendix C. The differences in the outcome variables are standardized. Standard errors are robust and calculated by taking into account that propensity scores are estimated. Coefficients are statistically significant at the \*10%, \*\* 5% and \*\*\* 1% level.

*Source:* PASS-ADIAB 7515, own computations.

The psychosocial needs that are typically met by an employment relationship are partly influenced by periods of unemployment; I find no relationship between unemployment and social participation. There is no change in the number of close friends or activities an individual is engaged in due to job loss. The variable social status which measures the position in society decreases by 0.24 SDs if an individual becomes unemployed. The results imply negative and significant effects of 0.20 SDs on the self-efficacy index which measures an individual's ability to cope with demanding situations.

To sum it up, the largest negative short- and medium-term effects of job loss can be found with respect to economic resources and life satisfaction. The individual's perception of social integration and mental health status are affected by the same magnitude while the impact on social status and self-efficacy are slightly less strong. Furthermore, I find no effect of becoming unemployed on social participation. The long-term con-

sequences of job loss might be more severe and will be investigated in more detail in Section 6.2.

## 6.2 Heterogeneous Treatment Effects

*Heterogeneous effects by sociodemographic characteristics.* In this subsection I will show estimation results for different subgroups defined by sociodemographic characteristics. I conduct the analysis separately for men and women, low-/medium-skilled and high-skilled workers, individuals who have a partner and those who do not. For each of these subgroups I redo the two-step estimation procedure as described in Section 4. In this way, I ensure that observable characteristics are balanced between treated and control individuals for each subgroup. The results are shown in Table 3.

It is well known that women react differently to labor market events and shocks compared to men (see e.g. Bergemann and van den Berg, 2008). Moreover, men and women differ with respect to preferences, for instance concerning risk or leisure (Croson and Gneezy, 2009). However, the results in Table 3 point to no substantial effect heterogeneity by gender despite for social engagement. I do find that men reduce their social activities significantly, although this effect is comparatively small.

The results in Table 3 suggest that low- and medium-skilled individuals feel the effects of unemployment more strongly.<sup>14</sup> The negative effects of job loss are stronger in every dimension except for economic resources, for which the results are comparable. In particular, low- and medium-skilled workers are significantly more dissatisfied with their life (difference of 0.38) than high-skilled. This finding is in line with results from other studies that show that high-skilled workers face a lower risk of becoming long-term unemployed due to higher job search intensity and reemployment success compared to unemployed individuals with lower levels of education (see e.g. Farber, 2005 and Riddell and Song, 2011). Furthermore, being highly educated might help in coping with shocks like job loss (Bonanno, 2004) which is reflected in the fact that I find no impact of becoming unemployed on self-efficacy for this group of workers.

With respect to family status, the estimates indicate that individuals who have a partner experience less harsh effects from unemployment than single people do. This is especially true for life satisfaction and financial restrictions. For instance, the effect on the deprivation index is significantly lower than for individuals without a partner. A potential second income source seems to compensate at least partly for the financial loss due to unemployment. Moreover, a supportive partner can compensate for some of

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<sup>14</sup>Low-skilled individuals are defined as having no professional qualification, medium-skilled as having a vocational training and high-skilled as having an advanced vocational training or an academic degree.

the latent negative effects of unemployment like loss of time structure, social contacts and activity.

**Table 3: Heterogeneous effects by sociodemographic characteristics**

Specification	(1) Men	(2) Women	(3) Low-/medium- skilled	(4) High- skilled	(5) Partner	(6) No partner
Change in outcomes	Effect of job loss					
<b>Social integration</b>	-0.320*** (0.073)	-0.338*** (0.076)	-0.352*** (0.059)	-0.114 (0.151)	-0.360*** (0.066)	-0.246*** (0.094)
<b>Well-being and mental health</b>						
Life satisfaction	-0.472*** (0.078)	-0.594*** (0.083)	<b>-0.589***</b> (0.066)	<b>-0.205</b> (0.125)	-0.415*** (0.070)	-0.663*** (0.149)
Mental health status	-0.310*** (0.065)	-0.310*** (0.068)	-0.333*** (0.051)	-0.128 (0.110)	-0.353*** (0.057)	-0.247*** (0.073)
<b>Economic resources</b>						
Deprivation index	0.677*** (0.102)	0.528*** (0.100)	0.613*** (0.076)	0.522*** (0.184)	<b>0.426***</b> (0.093)	<b>0.709***</b> (0.123)
Satisfaction with standard of living	-0.509*** (0.075)	-0.541*** (0.079)	-0.532*** (0.061)	-0.433*** (0.150)	<b>-0.412***</b> (0.065)	<b>-0.660***</b> (0.133)
<b>Psychosocial needs</b>						
Social participation						
Number of close friends	-0.020 (0.058)	-0.090 (0.059)	-0.044 (0.047)	-0.121 (0.105)	-0.025 (0.055)	-0.086 (0.071)
Social engagement	<b>-0.099**</b> (0.049)	<b>0.040</b> (0.054)	-0.069* (0.040)	0.043 (0.106)	-0.049 (0.049)	-0.103 (0.084)
Social status	-0.226*** (0.068)	-0.247*** (0.067)	-0.276*** (0.052)	0.008 (0.131)	-0.202*** (0.059)	-0.212** (0.092)
Self-efficacy	-0.202** (0.103)	-0.183** (0.087)	<b>-0.236***</b> (0.067)	<b>0.080</b> (0.161)	-0.177** (0.078)	-0.203* (0.112)

Notes: Estimates from IPW-DID are based on 377 treated and 8,053 control persons in specification (1), on 258 and 8,994 in (2), on 525 and 12,401 in (3), on 110 and 4,646 in (4), on 350 and 12,146 in (5) and on 285 and 4,901 in (6). The propensity of job loss is based on a logit model with the control variables reported in Tables C.1 and C.2 in Appendix C. Robust standard errors are in parentheses. They are calculated by taking into account that propensity scores are estimated. Coefficients are statistically significant at the \*10%, \*\* 5% and \*\*\* 1% level. Differences in the effects of job loss between subgroups that are significantly different from zero at the 10% level are indicated by bold numbers. Standard errors of the differences are obtained by bootstrapping (2,500 replications).

Source: PASS-ADIAB 7515, own computations.

*Heterogeneous effects by amount of time since and type of job loss.* In this subsection I start by empirically testing the hypothesis that the negative consequences of job loss become more severe the longer the duration of unemployment. To do so, I distinguish individuals who have been unemployed for at least six months and less than six months at the interview date after job loss. Furthermore, I consider the change in outcome levels two waves after becoming unemployed in case the individual has still not found a job at this interview date. The results are reported in column (2), (3) and (4) of Table 4



and suggest that the negative consequences of job loss become more severe the longer the duration of unemployment, which is in line with recent findings in the literature on subjective well-being (see e.g. Clark et al., 2008). The coefficients in column (2) indicate that this is particularly true with respect to life satisfaction (decrease by 0.20) and economic resources (the deprivation index increases by 0.27 and satisfaction with standard of living decreases by 0.26). The coefficients point in the same direction by looking at the unemployment duration at the first interview date after job loss.

Individuals who experience periods of unemployment between two waves but are employed again in the second of two consecutive waves, are not included in my analysis so far as their outcome levels are measured during periods of employment. However, it would be interesting to study whether the negative effects of job loss are only temporary and vanish as soon as the individual finds a job again. Column (5) in Table 4 shows the estimates for treated individuals who are reemployed in  $t_1$ . I find that individuals whose employment relationship is interrupted by a period of unemployment have still lower levels in most dimensions. These results suggest that unemployment has long-lasting negative effects even for the currently employed. This finding receives support by Clark et al. (2001) who find that employees with past unemployment experience have lower life satisfaction.

Finally, I show results separately for individuals who are laid off and those who lose their job due to other reasons, e.g. whose contract expired or who quit their job voluntarily (specification (6) and (7) in Table 4). In my sample 71% of all workers become unemployed due to dismissal by the employer. I find a stronger effect of being laid off on social status. The other coefficients do not differ much. I also studied the effects of unemployment dependent on previous job characteristics (results are reported in Table D.7 in Appendix D). Interestingly, I find stronger effects of job loss on mental health and self-efficacy for individuals who previously worked in small firms (firms with less than 50 employees). This could be a hint that redundancies in small firms are less anonymous and more often considered as individual failure.

### **6.3 Sensitivity Analysis**

In this subsection I conduct some sensitivity checks to examine the robustness of my findings. The results are reported in Table 5.

In a first step, I check the robustness of my results with respect to the model specification. The review article of Imbens and Wooldridge (2009) discusses in great detail the properties of different estimators which are standard in the treatment effects literature. In comparison to simple matching estimators which impute the missing potential out-

**Table 4: Heterogeneous effects by time since and type of job loss**

Specification	(1) Baseline	(2) Unemployed in $t_2$	(3) $\geq 6$ months unemployed	(4) < 6 months unemployed	(5) Reemployed in $t_1$	(6) Laid off	(7) Other job loss
Change in outcomes	Effect of job loss						
<b>Social integration</b>	-0.333*** (0.054)	<b>-0.490***</b> (0.103)	-0.346*** (0.076)	-0.326*** (0.070)	<b>-0.060*</b> (0.032)	-0.361*** (0.077)	-0.296*** (0.085)
<b>Well-being and mental health</b>							
Life satisfaction	-0.549*** (0.060)	<b>-0.747***</b> (0.106)	-0.568*** (0.085)	-0.535*** (0.070)	<b>-0.091***</b> (0.034)	-0.543*** (0.074)	-0.560*** (0.098)
Mental health status	-0.309*** (0.046)	-0.417*** (0.092)	-0.258*** (0.068)	-0.327*** (0.058)	<b>-0.057*</b> (0.030)	-0.334*** (0.060)	-0.254*** (0.078)
<b>Economic resources</b>							
Deprivation index	0.608*** (0.071)	<b>0.879***</b> (0.146)	<b>0.784***</b> (0.110)	<b>0.513***</b> (0.088)	<b>0.134***</b> (0.042)	0.575*** (0.088)	0.641*** (0.132)
Satisfaction with standard of living	-0.529*** (0.057)	<b>-0.787***</b> (0.105)	-0.602*** (0.080)	-0.465*** (0.068)	<b>-0.195***</b> (0.035)	-0.544*** (0.070)	-0.482*** (0.090)
<b>Psychosocial needs</b>							
Social participation							
Number of close friends	-0.049 (0.043)	-0.088 (0.074)	-0.130** (0.061)	-0.001 (0.054)	-0.012 (0.029)	-0.053 (0.061)	-0.011 (0.069)
Social engagement	-0.048 (0.038)	0.083 (0.062)	-0.029 (0.053)	-0.066 (0.046)	-0.015 (0.027)	-0.054 (0.043)	0.010 (0.075)
Social status	-0.244*** (0.048)	<b>-0.418***</b> (0.097)	-0.220*** (0.071)	-0.259*** (0.059)	<b>-0.070**</b> (0.031)	<b>-0.362***</b> (0.063)	<b>-0.109</b> (0.078)
Self-efficacy	-0.202*** (0.062)	-0.277** (0.129)	-0.070 (0.092)	-0.293*** (0.075)	<b>-0.049</b> (0.039)	-0.228*** (0.080)	-0.101 (0.090)

*Notes:* Estimates from IPW-DID are based on 635 treated and 17,047 control persons in specification (1), (3) - (7), on 187 and 12,885 in (2), on 271 treated in (3), on 363 in (4), on 1,290 in (5), on 415 in (6) and on 172 in (7) (for 48 treated this information is missing). The propensity of job loss is based on a logit model with the control variables reported in Tables C.1 and C.2 in Appendix C. Robust standard errors are in parentheses. They are calculated by taking into account that propensity scores are estimated. Coefficients are statistically significant at the \*10%, \*\* 5% and \*\*\* 1% level. Differences in the effects of job loss between subgroups that are significantly different from zero at the 10% level are indicated by bold numbers. Standard errors of the differences are obtained by bootstrapping (2,500 replications).

*Source:* PASS-ADIAB 7515, own computations.

comes of the treated individuals with outcome levels of nearest neighbors of the comparison group, IPW avoids the requirement of choosing any tuning parameter. Hence, finding an optimal value for the number of nearest neighbors for nearest-neighbor matching, a caliper for radius caliper matching or a bandwidth for kernel matching is not needed. Imbens and Wooldridge (2009) point out that with IPW estimators concerns arise when the covariate distributions of the two treatment groups are substantially different, implying that the propensity score is approaching zero or one. One concern is that in this case the parametric model choice of the propensity score, such as probit vs logit models, becomes more important. To address this issue, specification (2) of Table 5 shows the estimation results by applying a probit instead of a logit estimation of the probability of job loss. Moreover, I compare the results of the baseline specification to results obtained by alternative estimators (specification (3) and (4) of Table 5): IPW with regression adjustment (see e.g. Wooldridge, 2007) and one-to-five nearest-neighbor matching (see

e.g. Abadie and Imbens, 2006). Overall, the estimates are not sensitive to the choice of the model specification.

**Table 5: Robustness checks: results for the consequences of job loss**

Specification	(1)	(2)	(3)	(4)	(5)
	Baseline	Probit	IPW-RA	5 NN	One person
Change in outcomes	Effect of job loss				
<b>Social integration</b>	-0.333*** (0.054)	-0.332*** (0.053)	-0.335*** (0.050)	-0.324*** (0.051)	-0.348*** (0.064)
<b>Well-being and mental health</b>					
Life satisfaction	-0.549*** (0.060)	-0.530*** (0.055)	-0.539*** (0.054)	-0.518*** (0.052)	-0.597*** (0.075)
Mental health status	-0.309*** (0.046)	-0.315*** (0.045)	-0.293*** (0.045)	-0.292*** (0.045)	-0.278*** (0.059)
<b>Economic resources</b>					
Deprivation index	0.608*** (0.071)	0.617*** (0.070)	0.637*** (0.070)	0.619*** (0.068)	0.538*** (0.079)
Satisfaction with standard of living	-0.529*** (0.057)	-0.510*** (0.053)	-0.495*** (0.052)	-0.510*** (0.046)	-0.543*** (0.070)
<b>Psychosocial needs</b>					
Social participation					
Number of close friends	-0.049 (0.043)	-0.049 (0.042)	-0.065 (0.040)	-0.019 (0.041)	-0.061 (0.056)
Social engagement	-0.048 (0.038)	-0.045 (0.036)	-0.051 (0.036)	-0.026 (0.034)	-0.078 (0.049)
Social status	-0.244*** (0.048)	-0.234*** (0.047)	-0.254*** (0.046)	-0.240*** (0.043)	-0.272*** (0.061)
Self-efficacy	-0.202*** (0.062)	-0.193*** (0.060)	-0.189*** (0.060)	-0.156*** (0.056)	-0.221*** (0.074)

*Notes:* IPW-RA: Inverse propensity score weighting with regression adjustment, 5 NN: one-to-five nearest-neighbor matching. Estimates are based on 635 treated and 17,047 control persons in specification (1) - (4) and on 412 treated and 5,499 control persons in specification (5). The propensity of job loss is based on a logit model in specification (1), (3) - (5). The variables used in the propensity score estimation are reported in Tables C.1 and C.2 in Appendix C. Robust standard errors are in parentheses. They are calculated by taking into account that propensity scores are estimated. Coefficients are statistically significant at the \*10%, \*\* 5% and \*\*\* 1% level.

*Source:* PASS-ADIAB 7515, own computations.

In a last step, I only include the first observation of each individual in the estimation sample (specification (5) of Table 5). The number of individuals that become unemployed decreases to 412 and the number of individuals that remain employed between two consecutive waves to 5,499. The estimated coefficients are comparable to the baseline specification.

## 6.4 Placebo Tests

Finally, I test the reliability of my results by conducting placebo tests. In particular, I estimate the effect of job loss on the change in outcomes between wave  $t_{-1}$  and  $t_0$ . If the outcomes are affected in periods before the job loss occurs that would suggest that either treatment and control group are still systematically different or anticipation effects play a role. The results of the placebo test shown in Table D.8 in Appendix D do not indicate any significant effects. In addition, Figure D.2 in Appendix D presents the mean of the outcome variables in levels in the consecutive waves  $t_{-3}$ ,  $t_{-2}$ ,  $t_{-1}$ ,  $t_0$  and  $t_1$  separately for treated and control individuals before and after inverse propensity score weighting. While there are highly significant differences between treatment and control group before weighting in the time period before job loss, these differences vanish after weighting.<sup>15</sup> All in all the placebo tests indicate that the treatment and control groups are similar with respect to changes in outcomes in earlier periods.

## 7 Discussion and Conclusions

In this paper I empirically assess the economic and social consequences of job loss. While the number of economic studies on the relationship between unemployment and measures of social integration are quite rare, studies in the field of psychology and sociology point to social exclusion as a result of unemployment (see e.g. Böhnke, 2004; Layte et al., 2010 and Gundert and Hohendanner, 2014). These studies typically rely on survey data only, cannot rule out bias due to unobservables or reversed causality and do not examine the multidimensionality of the consequences of job loss in great detail.

By applying inverse probability weighting combined with differences-in-differences, I study the causal impact of unemployment on different dimensions of the process of social exclusion. I find the strongest negative effects in terms of size on life satisfaction and economic resources, slightly weaker negative effects on perceived social integration, mental health, social status and self-efficacy and no effect on social participation. Moreover, I find some evidence for effect heterogeneity. The results suggest that high-skilled workers and individuals with a partner experience the effects of unemployment less strongly. In addition, I find larger negative effects of job loss in the

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<sup>15</sup>The number of observations decreases considerably the further I go back in time. The difference in outcome levels between treatment and control group after IPW is insignificant for each outcome variable in the time periods before job loss, except for mental health status in  $t_{-2}$  and deprivation index in  $t_{-1}$  (significant at 10% level) and number of close friends in  $t_{-2}$  (significant at 5% level). However, the reduced number of observations and the three mentioned differences in outcome levels do not lead to diverging trends across both groups.

long-run. Individuals who are unemployed for more than one year do feel more socially excluded, are unhappier and more financially constrained. The negative effects of job loss are still present even if the individual becomes employed again.

This paper shows that the loss of regular work influences social exclusion in various ways. From an economic point of view, social isolation carries a high risk of individuals ending up in a state from which they will never return to work. Discouragement effects, stigmatization, the decay of human capital and living in deprived neighborhoods can lead to both less job search effort and lower chances of being hired, and hence to longer durations of unemployment (see e.g. Pissarides, 1992; Atkinson and Kintrea, 2001 and Biewen and Steffes, 2010).

These considerations could provide new insights into the effectiveness of active labor market policy programs with respect to reducing this risk. While the effects of government sponsored programs on reemployment probabilities are rather mixed (see e.g. Bergemann and van den Berg, 2008 and Card et al., 2010 for an overview), temporary employment, for instance in the form of job creation schemes or wage subsidies might foster the reintegration of the unemployed into society. Along this line, the German government recently launched the federal program *soziale Teilhabe am Arbeitsmarkt* to promote social inclusion of long-term unemployed individuals (see IAQ, ZEW, ZOOM and SOKO, 2018). The studies of Wulfgramm (2011) and Gundert and Hohendanner (2015) on the effects of the German ‘One-Euro-Job’ workfare program on social integration and life satisfaction, respectively, emphasize that the unemployed benefit from participation the more the activities resemble regular jobs. Hence, from a policy perspective, it is important to design active labor market policy programs that credibly simulate regular employment in terms of duration, working hours, social and financial benefits. Programs that positively influence the employability of participants as well as boost self-esteem might prevent individuals from feeling rejected by society and thus avoid the onset of a downward spiral ending in long-term unemployment.

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# Appendix

## A PASS Data Addendum

**Table A.1: Number of interviews**

Sample	Number of interviews	Refreshment sample
1 <sup>st</sup> wave (2006/07)	18,954 individuals living in 12,794 households	
2 <sup>nd</sup> wave (2007/08)	12,487 individuals living in 8,429 households	1,041 households
3 <sup>rd</sup> wave (2008/09)	13,439 individuals living in 9,535 households	1,186 households
4 <sup>th</sup> wave (2010)	11,768 individuals living in 7,848 households	748 households
5 <sup>th</sup> wave (2011)	15,607 individuals living in 10,235 households	753 households
6 <sup>th</sup> wave (2012)	14,619 individuals living in 9,513 households	961 households
7 <sup>th</sup> wave (2013)	14,449 individuals living in 9,509 households	949 households
8 <sup>th</sup> wave (2014)	13,460 individuals living in 8,998 households	795 households
9 <sup>th</sup> wave (2015)	13,271 individuals living in 8,921 households	900 households

*Notes:* The panel household sample in wave 5 was supplemented for both recipients of Unemployment Benefit II and the general population sample from new postcode regions in wave 4.

*Source:* Bethmann et al. (2016).

**Table A.2: Agreement on linkage of survey data to administrative data**

Sample	Number of interviews with question on linkage	Number of interviews with agreement on linkage	in %
1 <sup>st</sup> wave (2006/07)	17,249	13,766	79.8
2 <sup>nd</sup> wave (2007/08)	3,358	2,560	76.2
3 <sup>rd</sup> wave (2008/09)	2,656	2,128	80.1
4 <sup>th</sup> wave (2010)	2,032	1,774	87.3
5 <sup>th</sup> wave (2011)	5,145	4,414	85.8
6 <sup>th</sup> wave (2012)	2,482	2,002	80.7
7 <sup>th</sup> wave (2013)	1,973	1,613	81.8
8 <sup>th</sup> wave (2014)	1,653	1,327	80.3
9 <sup>th</sup> wave (2015)	1,727	1,471	85.2

*Source:* Bethmann et al. (2016).

## **B Construction of the Outcome Variables**

### **B.1 Social Integration**

#### *PASS question on social integration*

Some people may feel like they are integrated into normal social life and that they are a proper part of society while others may feel excluded. What about in your case? To what extent do you feel that you are part of society or to what extent do you feel excluded? Please use the numbers from 1 to 10 to rate your opinion. 1 means that you feel excluded from social life. 10 means, that you feel part of it. The numbers from 2 to 9 allow you to grade your assessment.

### **B.2 Well-being and Mental Health**

#### 1. *PASS question on life satisfaction*

How satisfied are you currently with your life as a whole? 0 means that you are "completely dissatisfied", 10 means that you are "completely satisfied". The numbers 1 to 9 allow you to grade your assessment.

#### 2. *PASS question on mental health status*

How strongly have you been affected by mental health problems, like fear, dejection or irritability in the past four weeks? Please tell me, whether you have been affected "not at all", "a little bit", "moderately", "quite a bit" or "extremely"?

#### 3. *Construction of variable "mental health status"*

The variable measures the mental health status ranging from 1 "extreme problems" to 5 "no problems".

### **B.3 Economic Resources**

#### 1. *PASS question on deprivation*

If you think of your household, which of the following items do you have? For the items you don't have, is this for financial reasons or for other reasons?

- (a) Do you have an apartment with at least as many rooms as persons living there?
- (b) Do you have an apartment without damp walls or floors?
- (c) Do you have a separate bathroom with a bathtub or shower in your apartment?

- (d) Do you have a toilet inside your apartment?
- (e) Do you have central heating, self-contained central heating or district heating? (*not asked after wave 5*)
- (f) Do you have a garden, a balcony or a terrace?
- (g) Do you have sufficient winter clothing for each member of the household?
- (h) Do you have a car?
- (i) Do you have a television?
- (j) Do you have a video recorder or DVD player?
- (k) Do you have a computer with internet access?
- (l) Do you have a washing machine?
- (m) Do you have an upright freezer, a chest freezer or a refrigerator with a freezer section? (*not asked after wave 5*)

And which of the following things do you or does your household do? For those activities you don't do, is this for financial reasons or for other reasons?

- (n) Buy new clothing once in a while for each family member, even if the old clothes are not yet worn out?
- (o) Have you a hot meal at least once a day?
- (p) Go on a holiday away from home for at least one week a year for each member of the family (this need not be taken jointly)?
- (q) Invite friends over for dinner at your home at least once a month?
- (r) Eat out at a restaurant with the family at least once a month?
- (s) Can each member of the family go to the cinema, the theater or a concert at least once a month?
- (t) Save a fixed amount of money at least once a month?
- (u) Replace worn but still usable furniture with new furniture?
- (v) Pay for unexpected expenses with one's own money, e.g. to replace a broken washing machine?
- (w) Receive medical treatment which is not fully covered by your health insurance, such as dentures or glasses if you/one of your family members need them?
- (x) Buy over-the-counter drugs such as pain relievers or medication for a cold, if you/someone in the family needs them even if your health insurance does not cover the costs?

(y) Always pay the rent for the apartment and/or the interest on the house or apartment one lives in on time?

(z) Always pay the gas, heating and electricity bill on time? (*not asked after wave 5*)

## 2. *Construction of deprivation index*

The deprivation index used in this study is included in PASS and ranges between 0 and 11.08 (see Bethmann et al. (2016) for a detailed description of the construction of the variable). This index is based on how many items are missing and how many activities are not done for financial reasons. Items that are answered with "don't know" or "details refused" are not considered. The index is a weighted index which weights the items according to the share of respondents who considered a particular item as necessary. This procedure is commonly used for the construction of poverty measures (applied for instance by Halleröd, 1995).

## 3. *PASS question on satisfaction with standard of living*

How satisfied are you today with your overall standard of living? For your assessment you can use the numbers from 0 to 10. 0 means that you are "completely dissatisfied", 10 means you are "completely satisfied". The numbers 1 to 9 allow you to grade your assessment.

## **B.4 Social Participation**

### 1. *PASS question on number of close friends*

How many close friends, or family members with whom you have a close relationship, do you have outside your household?

### 2. *PASS question on social engagement*

Are you actively engaged in one of the following organizations or associations? (Multiple responses possible.)

(a) Union

(b) Political party

(c) Church community

(d) Clubs such as music, sport or culture clubs

(e) Another organization not mentioned here

(f) No, not actively engaged



3. *Construction of variable "social engagement"*

This variable indicates the engagement in organizations/associations out of the five options (a) to (f). This measure ranges from 0 "not actively engaged" to 5 "engaged in all 5 organizations/associations".

## **B.5 Social Status**

*PASS question on social status*

There are groups in our society which tend to be at the top of the social ladder and other groups that tend to be at the bottom. How would you rank yourself using the numbers 1 to 10? 1 means that you are at the very bottom, 10 means that you are positioned at the very top. The numbers from 2 to 9 allow you to grade your assessment.

## **B.6 Self-Efficacy**

1. *PASS question on self-efficacy*

If unexpected difficulties or problems occur, you can deal with them in a number of different ways. Here we have compiled a couple of opinions regarding this topic. Please tell me whether they apply to you "completely", "tend to apply" or "tend not to apply" or "do not apply at all".

- (a) For every problem I have a solution.
- (b) Even if surprising events occur, I believe I can handle them well.
- (c) I have no difficulties in realizing my goals.
- (d) In unexpected situations I always know how to act.
- (e) I always succeed in resolving difficult problems if I make an effort.

2. *Construction of self-efficacy index*

I take the sum of the four possible outcomes of the five items for each individual and divide by the number of items. If an individual responded only to some of the items, the index is based on the items that are answered. The resulting index ranges from 1 "low self-efficacy" to 4 "high self-efficacy".

## C Description of Variables

**Table C.1: Description of variables based on PASS**

Variable	Description
<b>Outcomes measured in waves <math>t_0</math> and <math>t_1</math></b>	
Social integration	Categorical variable measuring perceived social affiliation ranging from 1 (feeling excluded) to 10 (feeling affiliated)
Life satisfaction	Categorical variable measuring life satisfaction ranging from 0 (completely dissatisfied) to 10 (completely satisfied)
Mental health status	Categorical variable for assessment of mental health status over the last 4 weeks ranging from 1 (extreme problems) to 5 (no problems)
Economic resources	Deprivation index based on 26 items (for construction of variable see Appendix B Section B.3) & Categorical variable measuring satisfaction with standard of living ranging from 0 (completely dissatisfied) to 10 (completely satisfied)
Social participation	Number of close friends & Categorical variable measuring social engagement ranging from 0 (not actively engaged) to 5 (engaged in all 5 organizations/associations) (for construction of variable see Appendix B Section B.4)
Social status	Categorical variable measuring assessment of position in society ranging from 1 (belonging to bottom) to 10 (belonging to the top)
Self-efficacy	Index ranging from 1 (low self-efficacy) to 4 (high self-efficacy) (for construction of variable see Appendix B Section B.6)
<b>Job loss measured in wave <math>t_1</math></b>	Dummy for becoming unemployed between two consecutive waves $t_0$ and $t_1$
<b>Control variables measured in wave <math>t_0</math></b>	
<b>Sociodemographics</b>	
Female	Dummy for being female
Age	Dummies for age groups: 25 - 34 years, 35 - 44 years, 45 - 54 years, > 54 years, reference category is < 25 years
Migrant	Dummy for being an immigrant
Married	Dummy for being married
Religious community	Dummy for belonging to a religious community
Smoker	Dummy for having ever smoked on a regular basis (in 2% of cases the information is missing and is treated as 0)
Serious health restrictions	Dummy for having serious health restrictions (includes officially recognized disabilities)
Hospital visits in last 12 months	Dummy for hospital visits in the last 12 months (in 1% of cases the information is missing and is treated as 0)
Professional qualification	Dummies for highest professional qualification level: vocational training ( <i>Teilfacharbeiter, Lehre, abgeschlossene Berufsfachschule</i> ), advanced vocational training ( <i>Meister, Techniker</i> ), academic degree ( <i>Universität, Fachhochschule</i> ), reference category is no vocational training

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**Table C.1: Description of variables based on PASS** (*continuation*)

Variable	Description
East Germany	Dummy for living in East Germany
<b>Subjective indicators</b>	
Attitudes to work	Index ranging from 1 (low work attitude) to 4 (high work attitude) (construction similar to the construction of the self-efficacy index)
Health satisfaction	Categorical variable measuring satisfaction with health from 0 (completely dissatisfied) to 10 (completely satisfied)
<b>Household characteristics</b>	
Household income	Dummies for net household income per month in €: 1000 - 1499, 1500 - 1999, 2000 - 2999, $\geq 3000$ , reference category is $\leq 999$
Couple with children aged < 16 years	Dummy for couple with children younger than 16 years
Number of own children	Dummies for number of own children (living in and outside the household): 1, 2, > 2, reference category is 0
Homeowner	Dummy for being a homeowner
<b>Partner characteristics</b>	
Partner in PASS	Dummy for identification of partner in PASS
Professional qualification of partner	Dummies for highest professional education level: vocational training, advanced vocational training/academic degree, information is missing, reference category is no vocational training
Employment status of partner	Dummies for being employed and information is missing
<b>Employment status</b>	
Permanent contract	Dummies for permanent contract and information is missing
Wave	Dummies indicating the wave of the interview, ranging from wave 2 to 8, reference category is wave 1

*Notes:* The variables married, professional qualification and number of own children are supplemented by information from the IEB if missing. The variables migrant, religious community, professional qualification, attitudes to work are treated as time-constant and filled with previous or subsequent information if missing. The variables married and number of own children are filled with previous information if missing. In 1% of cases information on household income is missing and filled with previous or subsequent information if the composition of the household does not change.

*Source:* PASS-ADIAB 7515, own computations.

**Table C.2: Description of variables based on IEB**

Variable	Description
<b>Control variables measured in wave <math>t_0</math></b>	
<b>Previous job characteristics</b>	
Employment with ssc	Dummy for being employed with social security contributions (ssc)
Employment full-time	Dummy for being employed full-time
Job classifications	Dummies for 5 job classifications: 1 Farmer/Production/Craftspeople/Technician, 2 White-collar employee, 3 Salesperson, 4 Clerical workers, 5 Service workers, reference category is 1
Tenure	Dummies for employment duration: categories are spitted according to percentiles of distribution: 25 - 50, 50 - 75, > 75, reference category is 0 - 25
Daily wage	Dummies for daily wage in € (2010 prices): categories are spitted according to percentiles of distribution: 25 - 50, 50 - 75, > 75, reference category is 0 - 25
<b>Previous firm characteristics</b>	
Firm size	Dummies for number of employees: 10 - 49, 50 - 249, 250 - 499, > 500, reference category is < 10
Sector of firm	Dummies for 8 sectors: 1 Agriculture/Production, 2 Consumption/Food, 3 Construction, 4 Trade, 5 Transportation/Services I, 6 Services II, 7 Education/Health, 8 Public, reference category is 1
<b>Employment history</b>	
Number of employment periods with ssc	Number of employment periods with social security contributions
Employment duration with ssc	Dummies for employment duration with social security contributions: categories are spitted according to percentiles of distribution: 25 - 50, 50 - 75, > 75, reference category is 0 - 25
Number of marginal employment periods	Number of marginal employment periods
Marginal employment duration	Dummies for marginal employment duration: categories are spitted according to percentiles of distribution: 25 - 50, 50 - 75, > 75, reference category is 0 - 25
Number of unemployment periods	Number of unemployment periods
Unemployment duration	Dummies for unemployment duration: categories are spitted according to percentiles of distribution: 25 - 50, 50 - 75, > 75, reference category is 0 - 25
Number of non-employment periods	Number of non-employment periods
Non-employment duration	Dummies for non-employment duration: categories are spitted according to percentiles of distribution: 25 - 50, 50 - 75, > 75, reference category is 0 - 25
District unemployment rate	District unemployment rate measured at the date of the interview

*Notes:* IEB: Integrated Employment Biographies, ssc: social security contributions. Periods of self-employment, civil service, and military service are not included in the IEB. Non-employment is defined as periods without entry in the social security records if the period lasts longer than one month. I allow for gaps of one month between periods of employment at the same firm and between two unemployment spells.

*Source:* PASS-ADIAB 7515, own computations.

## D Additional Descriptives and Estimation Results

**Table D.1: Number of individuals in treatment and control group**

How often in	Treatment group only	Control group only	Both groups?
1 time	3**	1,584	0
2 times	.	1,165	96
3 times	0	665	72
4 times	0	647	51
5 times	0	342	.
6 times	0	351	.
7 times	0	220	.
8 times	0	332	.
Total	351	5,306	254

*Notes:* There are less than 20 individuals who only appear twice in the treatment group as well as more than four times in both the treatment and the control group. Due to data protection rules of the FDZ, these are indicated as missing values.

*Source:* PASS-ADIAB 7515, own computations.

**Table D.2: Additional descriptive statistics**

Job loss	Yes	No	Difference	
<b>Sociodemographics</b>				
Religious community	0.50	0.60	-0.10	***
Smoker	0.71	0.60	0.11	***
Hospital visits in last 12 months	0.11	0.08	0.02	*
<b>Subjective indicators</b>				
Work attitude	3.07	3.12	-0.05	
Health satisfaction	6.85	7.30	-0.45	***
<b>Household characteristics</b>				
Household income < 1000 € per month	0.14	0.03	0.10	***
Household income 1000 - 1499 € per month	0.22	0.11	0.11	***
Household income 1500 - 1999 € per month	0.19	0.14	0.05	***
Household income 2000 - 2999 € per month	0.30	0.31	-0.01	
Household income > 2999 € per month	0.16	0.41	-0.25	***
Couple with children aged < 16 years	0.24	0.31	-0.07	***
Female * Couple with children aged < 16 years	0.10	0.14	-0.04	***
<b>Partner characteristics</b>				
Partner in PASS	0.55	0.71	-0.16	***
PQ: no vocational training	0.10	0.07	0.03	***
PQ: vocational training	0.32	0.40	-0.07	***
PQ: advanced vocational training/academic degree	0.07	0.18	-0.11	***

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**Table D.2: Additional descriptive statistics** (*continuation*)

Job loss	Yes	No	Difference	
PQ: missing	0.51	0.36	0.16	***
ES: employed	0.31	0.48	-0.17	***
ES: missing	0.56	0.41	0.15	***
<b>Previous job characteristics</b>				
Employment with ssc	0.94	0.92	0.02	***
Employment full-time	0.71	0.65	0.06	***
Job class: Farmer/Production/Craftspeople/Technician	0.32	0.23	0.09	***
Job class: White-collar employee	0.13	0.20	-0.07	***
Job class: Salesperson	0.07	0.07	0.00	
Job class: Clerical workers	0.16	0.22	-0.06	***
Job class: Service workers	0.33	0.28	0.05	
<b>Previous firm characteristics</b>				
Firm size: < 10 employees	0.23	0.15	0.07	***
Firm size: 10 - 49 employees	0.28	0.26	0.02	
Firm size: 50 - 249 employees	0.30	0.29	0.01	
Firm size: 250 - 499 employees	0.09	0.10	0.00	
Firm size: > 499 employees	0.10	0.20	-0.10	***
<b>Wave</b>				
Wave 1	0.10	0.11	-0.01	
Wave 2	0.12	0.11	0.02	
Wave 3	0.15	0.10	0.05	**
Wave 4	0.09	0.11	-0.02	**
Wave 5	0.13	0.14	-0.02	
Wave 6	0.15	0.14	0.00	
Wave 7	0.14	0.14	-0.01	
Wave 8	0.12	0.13	-0.01	
<b>Number of observations</b>	635	17,047		

*Notes:* PQ: Professional qualification. ssc: social security contributions. Differences are statistically significant at the \*10%, \*\* 5% and \*\*\* 1% level.

*Source:* PASS-ADIAB 7515, own computations.

**Table D.3: Logit estimation of probability of job loss**

Variable	Coefficient	Standard error
<b>Initial outcome levels</b>		
Social integration	0.003	(0.027)
Life satisfaction: value 6 or 7	-0.352***	(0.133)
Life satisfaction: value 8	-0.425***	(0.156)
Life satisfaction: value 9	-0.729***	(0.217)
Life satisfaction: value 10	-0.781***	(0.272)
Mental health status	-0.064	(0.042)
Deprivation index: 0 - 0.5	0.004	(0.122)
Deprivation index: 0.5 - 1	-0.192	(0.144)
Deprivation index: 1 - 1.5	0.025	(0.169)
Deprivation index: 1.5 - 2.5	-0.116	(0.184)
Deprivation index: > 2.5	0.285	(0.213)
Satisfaction with standard of living	0.070**	(0.035)
Number of close friends	-0.091**	(0.041)
Social engagement	-0.003	(0.070)
Social status	0.051	(0.036)
Self-efficacy: 2.8 - 3.4	0.008	(0.114)
Self-efficacy: > 3.4	0.186	(0.131)
<b>Sociodemographics</b>		
Female	-0.444***	(0.124)
Age group: 25 - 34 years	-0.339*	(0.198)
Age group: 35 - 44 years	-0.523**	(0.235)
Age group: 45 - 54 years	-0.613**	(0.270)
Age group: > 54 years	-0.102	(0.297)
Migrant	0.171	(0.192)
Married	-0.277*	(0.146)
Religious community	-0.187*	(0.103)
Smoker	0.062	(0.101)
Serious health restrictions	0.015	(0.117)
Hospital visits in last 12 months	0.181	(0.154)
PQ: vocational training	-0.127	(0.128)
PQ: advanced vocational training	-0.487**	(0.237)
PQ: academic degree	0.204	(0.193)
East Germany	-0.591***	(0.145)
<b>Subjective indicators</b>		
Work attitude	-0.148**	(0.073)
Health satisfaction	-0.057**	(0.027)
<b>Household characteristics</b>		
Household income 1000 - 1499 € per month	-0.542***	(0.167)
Household income 1500 - 1999 € per month	-0.501***	(0.177)
Household income 2000 - 2999 € per month	-0.689***	(0.179)
Household income > 2999 € per month	-0.775***	(0.216)

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**Table D.3: Logit estimation of probability of job loss (continuation)**

Variable	Coefficient	Standard error
Couple with children aged < 16 years	-0.390**	(0.176)
Female * Couple with children aged < 16 years	0.512**	(0.222)
Number of own children: 1	0.093	(0.141)
Number of own children: 2	0.210	(0.155)
Number of own children: > 2	0.273	(0.179)
Home owner	-0.158	(0.122)
<b>Partner characteristics</b>		
Partner in PASS	0.190	(0.218)
PQ: vocational training	0.113	(0.170)
PQ: advanced vocational training/academic degree	-0.337	(0.233)
PQ: missing	-0.013	(0.303)
ES: employed	-0.234	(0.158)
ES: missing	-0.217	(0.248)
<b>Previous job characteristics</b>		
Employment with ssc	0.822***	(0.244)
Employment full-time	0.352***	(0.121)
Permanent contract	-0.696***	(0.106)
Permanent contract missing	0.788***	(0.251)
Job class: White-collar employee	-0.063	(0.179)
Job class: Salesperson	-0.123	(0.227)
Job class: Clerical workers	-0.110	(0.151)
Job class: Service workers	-0.107	(0.130)
Tenure: 25 - 50 %ile	-0.768***	(0.107)
Tenure: 50 - 75 %ile	-1.417***	(0.178)
Tenure: > 75 %ile	-1.249***	(0.246)
Daily wage: 25 - 50 %ile	-0.335***	(0.121)
Daily wage: 50 - 75 %ile	-0.827***	(0.159)
Daily wage: > 75 %ile	-1.178***	(0.254)
<b>Previous firm characteristics</b>		
Firm size: 10 - 49 employees	-0.301**	(0.131)
Firm size: 50 - 249 employees	-0.325**	(0.134)
Firm size: 250 - 499 employees	-0.166	(0.181)
Firm size: > 499 employees	-0.313*	(0.180)
Sector: Consumption/Food	0.056	(0.230)
Sector: Construction	0.612***	(0.216)
Sector: Trade	0.067	(0.215)
Sector: Transportation/Services I	0.295*	(0.170)
Sector: Services II	0.426**	(0.194)
Sector: Education/Health	-0.145	(0.205)
Sector: Public	-0.179	(0.219)
<b>Employment history</b>		
Number of employment periods with ssc	0.041***	(0.014)
Employment duration with ssc: 25 - 50 %ile	-0.270**	(0.133)

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**Table D.3: Logit estimation of probability of job loss (continuation)**

Variable	Coefficient	Standard error
Employment duration with ssc: 50 - 75 %ile	-0.425**	(0.178)
Employment duration with ssc: > 75 %ile	-0.754***	(0.228)
Numer of marginal employment periods	0.057**	(0.029)
Marginal employment duration: 25 - 50 %ile	-0.162	(0.124)
Marginal employment duration: 50 - 75 %ile	-0.684***	(0.168)
Marginal employment duration: > 75 %ile	-0.999***	(0.227)
Number of unemployment periods	0.031	(0.024)
Unemployment duration: 0 - 25 %ile	-0.159	(0.261)
Unemployment duration: 25 - 50 %ile	0.497**	(0.229)
Unemployment duration: 50 - 75 %ile	0.724***	(0.235)
Unemployment duration: > 75 %ile	0.920***	(0.255)
Number of non-employment periods	0.032	(0.023)
Non-employment duration	-0.001	(0.001)
District unemployment rate	0.030*	(0.016)
<b>Wave</b>		
Wave 2	0.202	(0.199)
Wave 3	0.322	(0.197)
Wave 4	-0.326	(0.217)
Wave 5	-0.302	(0.214)
Wave 6	-0.154	(0.214)
Wave 7	-0.227	(0.214)
Wave 8	-0.406*	(0.218)
Constant	-0.759	(0.634)
Number of observations		17,682
Pseudo-R <sup>2</sup>		0.256

Notes: PQ: Professional qualification. ES: Employment status. ssc: social security contributions. Coefficients are statistically significant at the \*10%, \*\* 5% and \*\*\* 1% level.

Source: PASS-ADIAB 7515, own computations.

**Table D.4: Covariate balance summary after IPW**

	Standardized differences	Variance ratio
<b>Initial outcome levels</b>		
Social integration	-0.009	0.944
Life satisfaction	0.023	0.920
Mental health status	0.021	0.955
Deprivation index	0.011	1.010
Satisfaction with standard of living	0.036	0.909
Number of close friends	-0.020	0.997
Social engagement	-0.004	1.021
Social status	-0.022	1.102
Self-efficacy	0.024	1.051
<b>Sociodemographics</b>		
Female	0.011	1.004
Age	0.014	1.002
Migrant	-0.023	0.929
Married	0.007	1.003
Religious community	-0.009	1.000
Smoker	0.001	0.999
Serious health restrictions	-0.008	0.991
Hospital visits in last 12 months	-0.024	0.942
PQ: no vocational training	0.015	1.027
PQ: vocational training	-0.012	1.008
PQ: advanced vocational training	-0.004	0.982
PQ: academic degree	0.004	1.008
East Germany	0.014	1.012
<b>Subjective indicators</b>		
Work attitude	-0.025	1.009
Health satisfaction	0.004	1.033
<b>Big Five</b>		
Extraversion	0.025	0.962
Extraversion missing	0.045	1.054
Tolerance	-0.010	1.066
Tolerance missing	0.039	1.047
Conscientiousness	-0.062	1.017
Conscientiousness missing	0.053	1.064
Neuroticism	-0.082	0.942
Neuroticism missing	0.040	1.048
Openness	0.003	1.062
Openness missing	0.045	1.053
<b>Household characteristics</b>		
Household income < 1000 € per month	-0.010	0.980
Household income 1000 - 1499 € per month	-0.006	0.992

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**Table D.4: Covariate balance summary after IPW (continuation)**

	Standardized differences	Variance ratio
Household income 1500 - 1999 € per month	-0.010	0.984
Household income 2000 - 2999 € per month	0.021	1.020
Household income > 2999 € per month	0.001	1.001
Couple with children aged < 16 years	0.000	1.000
Female * Couple with children aged < 16 years	-0.003	0.991
Number of own children	-0.003	0.939
Home owner	0.005	1.007
<b>Partner characteristics</b>		
Partner in PASS	0.012	0.998
PQ: no vocational training	0.014	1.041
PQ: vocational training	0.013	1.010
PQ: advanced vocational training/academic degree	0.000	1.001
PQ: missing	-0.021	1.002
ES: employed	0.020	1.017
ES: missing	-0.022	1.006
<b>Previous job characteristics</b>		
Employment with ssc	0.009	0.968
Employment full-time	-0.017	1.015
Permanent contract	0.007	0.998
Permanent contract missing	-0.003	0.989
Job class: Farmer/Production/Craftspeople/Technician	0.025	1.021
Job class: White-collar employee	-0.010	0.979
Job class: Salesperson	-0.018	0.945
Job class: Clerical workers	0.005	1.009
Job class: Service workers	-0.011	0.992
Tenure	-0.026	1.030
Daily wage	-0.068	0.985
<b>Previous firm characteristics</b>		
Firm size: < 10 employees	-0.042	0.949
Firm size: 10 - 49 employees	0.004	1.004
Firm size: 50 - 249 employees	0.016	1.015
Firm size: 250 - 499 employees	0.009	1.025
Firm size: > 499 employees	0.021	1.060
Sector: Agriculture/Production	0.000	1.001
Sector: Consumption/Food	0.000	1.001
Sector: Construction	-0.020	0.946
Sector: Trade	0.000	1.000
Sector: Transportation/Services I	0.013	1.012
Sector: Services II	-0.019	0.964
Sector: Education/Health	0.011	1.025
Sector: Public	0.011	1.036
<b>Employment history</b>		

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**Table D.4: Covariate balance summary after IPW** (*continuation*)

	Standardized differences	Variance ratio
Number of employment periods with ssc	0.006	1.019
Employment duration with ssc	-0.042	1.064
Number of marginal employment periods	0.014	0.998
Marginal employment duration	0.002	1.041
Number of unemployment periods	-0.004	1.106
Unemployment duration	0.056	1.049
Number of non-employment periods	0.013	1.041
Non-employment duration	0.017	1.018
District unemployment rate	0.005	0.993
<b>Wave</b>		
Wave 1	-0.020	0.948
Wave 2	0.007	1.016
Wave 3	0.005	1.010
Wave 4	0.005	1.015
Wave 5	0.014	1.032
Wave 6	-0.002	0.996
Wave 7	-0.010	0.978
Wave 8	0.001	1.001

*Notes:* IPW: Inverse Probability Weighting. PQ: Professional qualification. ES: Employment status.  
ssc: social security contributions.

*Source:* PASS-ADIAB 7515, own computations.

**Table D.5: Results for the consequences of job loss based on different sets of covariates**

	Baseline	With Big Five	Factor analysis
Change in outcomes		Effect of job loss	
<b>Social integration</b>	-0.333*** (0.054)	-0.330*** (0.054)	-0.354*** (0.056)
<b>Well-being and mental health</b>			
Life satisfaction	-0.549*** (0.060)	-0.564*** (0.062)	-0.430*** (0.056)
Mental health status	-0.309*** (0.046)	-0.319*** (0.045)	-0.267*** (0.049)
<b>Economic resources</b>			
Deprivation index	0.608*** (0.071)	0.608*** (0.072)	0.684*** (0.072)
Satisfaction with standard of living	-0.529*** (0.057)	-0.543*** (0.058)	-0.540*** (0.059)
<b>Psychosocial needs</b>			
Social participation			
Number of close friends	-0.049 (0.043)	-0.064 (0.042)	-0.041 (0.044)
Social engagement	-0.048 (0.038)	-0.053 (0.038)	-0.084** (0.037)
Social status	-0.244*** (0.048)	-0.243*** (0.048)	-0.279*** (0.053)
Self-efficacy	-0.202*** (0.062)	-0.214*** (0.063)	-0.233*** (0.059)

*Notes:* Estimates from IPW-DID based on 635 treated and 17,047 control persons (the estimates for self-efficacy are based on 417 treated and 10,359 control persons). The propensity of job loss is based on a logit model with the control variables reported in Tables C.1 and C.2 in Appendix C. Robust standard errors are in parentheses. They are calculated by taking into account that propensity scores are estimated. Coefficients are statistically significant at the \*10%, \*\* 5% and \*\*\* 1% level.

*Source:* PASS-ADIAB 7515, own computations.

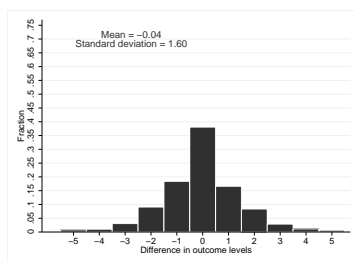
**Table D.6: Summary statistics of propensity scores**

	N	Mean	SD	Quantiles				
				Min	25%	50%	75%	Max
Treated	635	0.1743	0.1652	0.0005	0.0502	0.1200	0.2495	0.9180
Control	17,047	0.0308	0.0584	0.0002	0.0032	0.0089	0.0301	0.8405

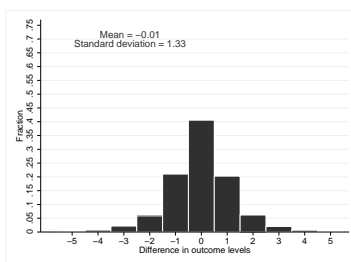
*Notes:* SD: Standard deviation.

*Source:* PASS-ADIAB 7515, own computations.

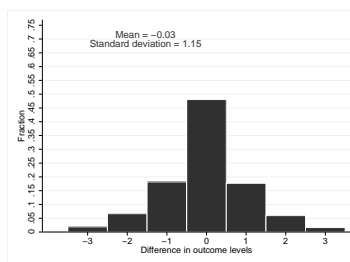
Figure D.1: Distribution of changes in outcome variables



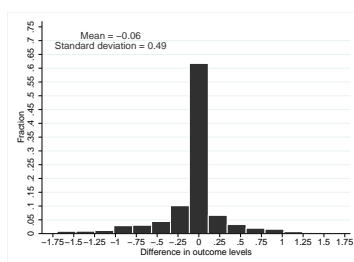
(A) Social integration



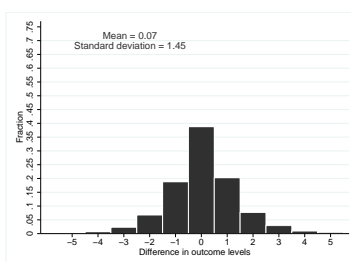
(B) Life satisfaction



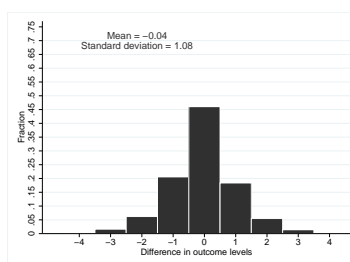
(C) Mental health status



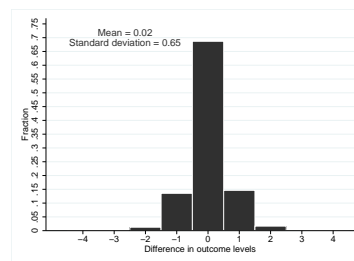
(D) Deprivation index



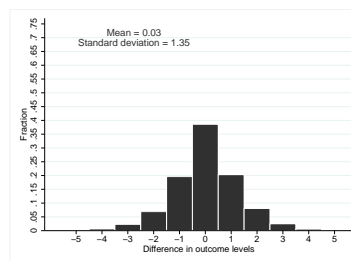
(E) Satisfaction with standard of living



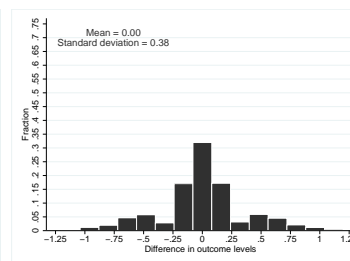
(F) Number of close friends



(G) Social engagement



(H) Social status



(I) Self-efficacy

Notes: Changes in the outcome variables are measured as differences in levels in two consecutive waves  $t_0$  and  $t_1$ .

Source: PASS-ADIAB 7515, own computations.

**Table D.7: Heterogeneous effects by previous job characteristics**

Specification	(1) Firm size: < 50 employees	(2) Firm size: ≥ 50 employees	(3) Job class: Farmer/Production	(4) Job class: White-collar	(5) Full-time	(6) Part-time
Change in outcomes	Effect of job loss					
<b>Social integration</b>	-0.368*** (0.093)	-0.367*** (0.076)	-0.297*** (0.099)	-0.350*** (0.067)	-0.317*** (0.067)	-0.394*** (0.087)
<b>Well-being and mental health</b>						
Life satisfaction	-0.528*** (0.085)	-0.598*** (0.078)	-0.408*** (0.100)	-0.591*** (0.076)	-0.520*** (0.069)	-0.562*** (0.103)
Mental health status	<b>-0.408***</b> (0.072)	<b>-0.220***</b> (0.067)	-0.259*** (0.087)	-0.318*** (0.056)	-0.324*** (0.057)	-0.248*** (0.080)
<b>Economic resources</b>						
Deprivation index	<b>0.465***</b> (0.102)	<b>0.768***</b> (0.110)	0.553*** (0.125)	0.597*** (0.090)	0.605*** (0.083)	0.560*** (0.130)
Satisfaction with standard of living	-0.471*** (0.075)	-0.612*** (0.083)	-0.371*** (0.102)	-0.604*** (0.069)	-0.551*** (0.068)	-0.485*** (0.092)
<b>Psychosocial needs</b>						
Social participation						
Number of close friends	-0.028 (0.074)	-0.089 (0.067)	0.009 (0.088)	-0.096* (0.052)	-0.039 (0.050)	-0.082 (0.077)
Social engagement	-0.020 (0.054)	-0.052 (0.050)	<b>-0.207***</b> (0.072)	<b>-0.011</b> (0.045)	-0.051 (0.045)	-0.043 (0.066)
Social status	-0.332*** (0.071)	-0.160** (0.073)	-0.200** (0.085)	-0.281*** (0.058)	-0.290*** (0.058)	-0.184** (0.085)
Self-efficacy	<b>-0.376***</b> (0.084)	<b>-0.010</b> (0.087)	-0.202 (0.153)	-0.211*** (0.075)	-0.152** (0.076)	-0.256** (0.107)

*Notes:* Estimates from IPW-DID are based on 324 treated and 7,052 control persons in specification (1), on 311 and 9,995 in (2), on 201 and 3,891 in (3), on 434 and 13,156 in (4), on 448 and 10,996 in (5) and on 187 and 6,051 in (6). The propensity of job loss is based on a logit model with the control variables reported in Tables C.1 and C.2 in Appendix C. Robust standard errors are in parentheses. They are calculated by taking into account that propensity scores are estimated. Coefficients are statistically significant at the \*10%, \*\* 5% and \*\*\* 1% level. Differences in the effects of job loss between subgroups that are significantly different from zero at the 10% level are indicated by bold numbers. Standard errors of the differences are obtained by bootstrapping (2,500 replications).

*Source:* PASS-ADIAB 7515, own computations.

**Table D.8: Placebo results for the consequences of job loss**

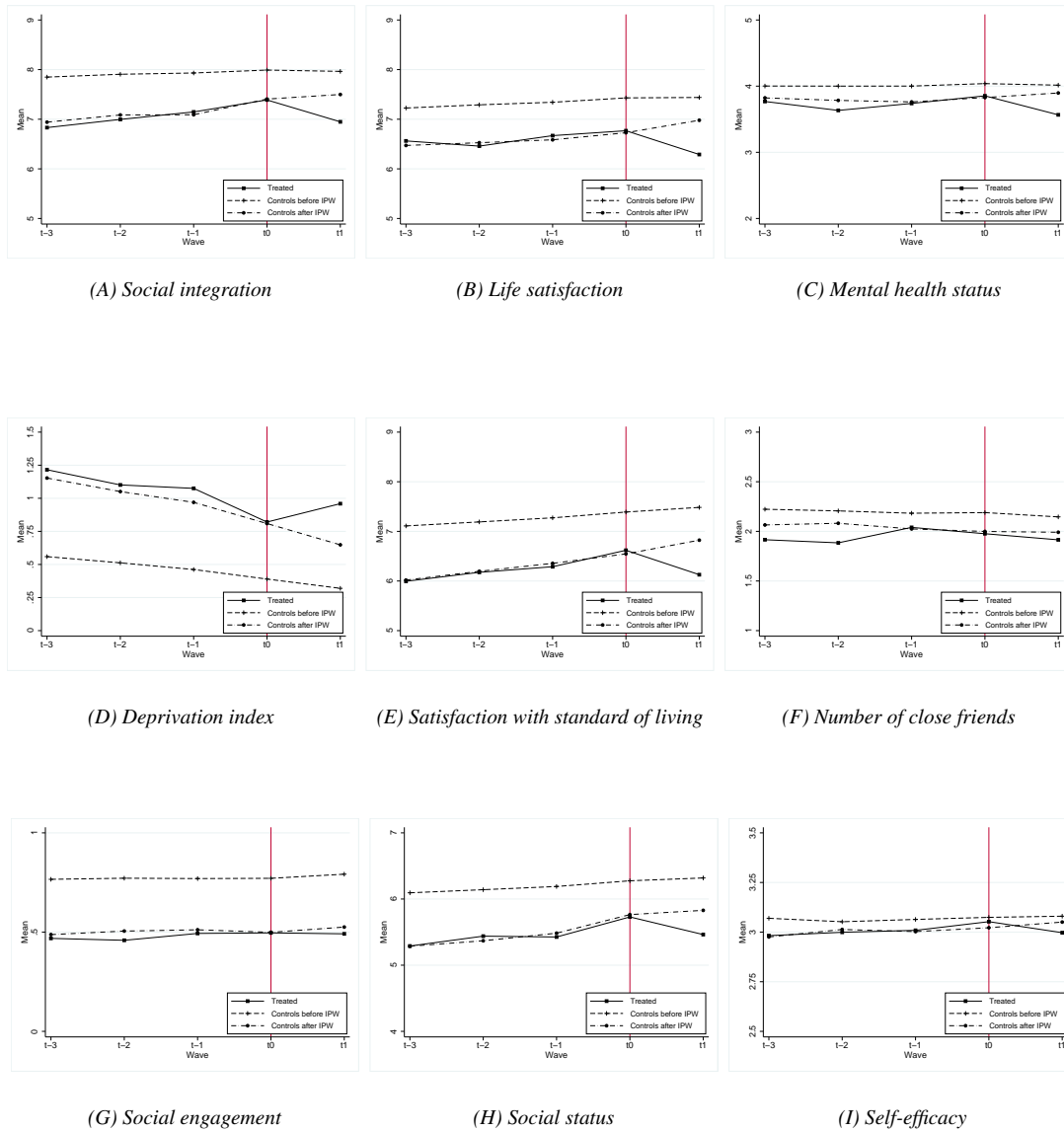
Change in outcomes between $t_{-1}$ and $t_0$	Effect of job loss	Standard error	Standard deviation
<b>Social integration</b>	-0.055	(0.063)	1.526
<b>Well-being and mental health</b>			
Life satisfaction	-0.064	(0.063)	1.277
<b>Mental health status</b>	0.020	(0.051)	1.136
<b>Economic resources</b>			
Deprivation index	-0.122	(0.089)	0.459
Satisfaction with standard of living	0.026	(0.064)	1.383
<b>Psychosocial needs</b>			
Social participation			
Number of close friends	-0.038	(0.051)	1.054
Social engagement	0.030	(0.040)	0.641
Social status	-0.004	(0.067)	1.293
Self-efficacy	-0.018	(0.084)	0.362

*Notes:* Estimates from IPW-DID are based on 448 treated and 13,075 control persons (the estimates for self-efficacy are based on 207 treated and 5,319 control persons). The propensity of job loss is based on a logit model with the control variables reported in Tables C.1 and C.2 in Appendix C. The differences in the outcome variables are standardized. Standard errors are robust and calculated by taking into account that propensity scores are estimated. Coefficients are statistically significant at the \*10%, \*\* 5% and \*\*\* 1% level.

*Source:* PASS-ADIAB 7515, own computations.



Figure D.2: Placebo tests on outcome levels



*Notes:* Means of the outcome variables are measured in levels in the consecutive waves  $t_{-3}$ ,  $t_{-2}$ ,  $t_{-1}$ ,  $t_0$  and  $t_1$  separately for treated and control individuals before and after inverse propensity score weighting (IPW). The difference in outcome levels between treatment and control group before IPW is significant at the 1%-level for each outcome variable in the time periods before job loss. The difference in outcome levels between treatment and control group after IPW is insignificant for each outcome variable in the time periods before job loss, except for mental health status in  $t_{-2}$  and deprivation index in  $t_{-1}$  (significant at 10%-level) and number of close friends in  $t_{-2}$  (significant at 5%-level).

*Number of observations:*  $t_{-3}$ : 190 treated and 7,027 control persons,  $t_{-2}$ : 303 treated and 9,690 control persons,  $t_{-1}$ : 448 treated and 13,075 control persons,  $t_0$  and  $t_1$ : 635 treated and 17,047 control persons.

*Source:* PASS-ADIAB 7515, own computations.