

The Accuracy of Job Seekers' Wage Expectations*

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Abstract

Job seekers' misperceptions about the labor market can distort their decision-making and increase the risk of long-term unemployment. Our study establishes objective benchmarks for the subjective wage expectations of unemployed workers. This enables us to provide novel insights into the accuracy of job seekers' wage expectations. First, especially workers with low objective earnings potential tend to display excessively optimistic beliefs about their future wages and anchor their wage expectations too strongly to their pre-unemployment wages. Second, among long-term unemployed workers, overoptimism remains persistent throughout the unemployment spell. Third, higher extrinsic incentives to search more intensively lead job seekers to hold more optimistic wage expectations, yet this does not translate into higher realized wages for them. Lastly, we document a connection between overoptimistic wage expectations and job seekers' tendency to overestimate their reemployment chances. We discuss the role of information frictions and motivated beliefs as potential sources of job seekers' optimism and the heterogeneity in their beliefs.

Keywords: Subjective expectations, objective benchmarks, job search, unemployment, reemployment wages

JEL codes: D83, D84, J64

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1 Introduction

Job search is a challenging process, in which unemployed workers encounter significant uncertainty about their future outcomes. It is well-recognized that workers often have an incomplete understanding of their labor market prospects (see, e.g., [Spinnewijn, 2015](#); [Balleer *et al.*, 2021](#); [Mueller *et al.*, 2021](#); [Adams-Prassl *et al.*, 2023](#)) and potential job matches (see, e.g., [Krueger and Mueller, 2016](#); [Belot *et al.*, 2019](#); [Jäger *et al.*, 2023](#)). This, in turn, can distort their decision-making during job search and may increase the risk of long-term unemployment. However, despite the increasing evidence indicating the presence of systematic biases in job seekers' beliefs (see [Mueller and Spinnewijn, 2023](#), for an overview), there is still a limited understanding of the underlying causes and, in particular, which groups of workers are affected most by these misperceptions.

In our study, we examine the accuracy of job seekers' expectations about their wages upon reemployment and analyze heterogeneity in the extent to which they exhibit overly optimistic or pessimistic beliefs about their potential earnings. To that end, we explore a unique combination of survey and administrative data on job seekers in Germany. The large-scale survey provides insights into the perceptions of more than 5,000 newly unemployed workers about their future wages. Simultaneously, we leverage administrative records to establish objective benchmarks for their actual earnings potential based on the realized wages of comparable workers in a similar situation. To approximate job seekers' objective wage potential, we account for a rich set of socio-demographic characteristics, regional information, and detailed employment biographies and employ flexible LASSO regressions.

While job seekers, on average, overestimate their future wages by about 17%, the comparison of subjective beliefs and objective benchmarks allows us to show that there is significant heterogeneity in the levels of overoptimism among different groups of workers. We find that especially job seekers with lower objective earnings potential tend to hold disproportionately optimistic views regarding their future income. Those positioned in the lowest decile of the objective benchmark distribution overestimate their potential wages by approximately 36%, whereas the level of overoptimism is comparatively modest at around 6% among individuals in the top decile of the distribution. Moreover, we observe considerable heterogeneity in the accuracy of job seekers' wage expectations concerning their personal characteristics. For example, we find that men and high-skilled workers overestimate their wages relative to their objective earnings potential more strongly than women and low-skilled workers.

In examining the influence of job seekers' pre-unemployment wages, we demonstrate that expected wage changes are more tightly compressed around zero compared to the distribution

of objectively predicted wage changes. This observation suggests that job seekers tend to anchor their wage expectations more strongly to their pre-unemployment wages than what is objectively justified. At the same time, we find that this anchoring effect is asymmetric. While the beliefs of job seekers who can reasonably expect a wage increase compared to their previous salary are relatively accurate, those who are predicted to face a wage penalty anchor their expectations too strongly to their pre-unemployment wage. This finding indicates that job seekers do not sufficiently account for the potential scarring effects of unemployment when forming their wage expectations.¹

In addition, we explore repeatedly elicited wage expectations for job seekers who are still searching for a job about one year after becoming unemployed. We find that the overoptimism among this group of long-term unemployed remains persistent throughout the unemployment spell. This suggests that those facing challenges in securing a job are hesitant to adjust their wage expectations despite the feedback they receive during the job search process. This reluctance to adapt might be one factor hindering their successful reintegration into the labor market.

It is essential to recognize that job seekers' beliefs can also be influenced by their own actions. To shed light on the causal impact of individuals' search behavior on the accuracy of their wage expectations, we exploit exogenous variation in the incentives of unemployed workers to search for jobs. Specifically, we leverage regional differences along the administrative borders of local employment agency (LEA) districts, where job seekers face varying risks of being subject to punitive benefit sanctions. This variation arises because LEAs have the discretion to decide how strictly they punish job seekers for non-compliance with their search requirements. Consequently, caseworkers in LEA districts with more stringent sanction regimes may exert greater pressure on job seekers, leading them to perceive stronger incentives to apply for and accept jobs.

Supporting this notion, we find that a 10 percentage point higher sanction intensity – this is equivalent to an increase of approximately one standard deviation – raises the number of weekly job applications by about 9.8%. Simultaneously, a stricter sanction regime fosters greater optimism among job seekers regarding their earnings potential. Raising the sanction intensity by 10 percentage points increases job seekers' wage expectations relative to the objective benchmark by about 1.8%. In contrast, we find no evidence that the sanction intensity has a positive effect on job seekers' realized wages upon reemployment. The rise in overoptimistic beliefs may appear somewhat surprising, given that an enhanced sanction risk is presumed to directly influence job

¹Existing evidence suggests that the experience of unemployment is associated with wage penalties upon reemployment (see, e.g, [Arulampalam, 2001](#); [Gregory and Jukes, 2001](#)). Consistent with this notion, our objective benchmarks indicate that job seekers' average wage potential decreases by about 12% compared to their pre-unemployment wage.

seekers to become less selective, leading them to lower their wage expectations. However, the increased search incentives may induce indirect effects that foster heightened levels of optimism. For instance, job seekers may adopt more optimistic wage expectations as a way to enhance their motivation to search for jobs and to cope with the increased threat of benefit sanctions.

In the final part of our analysis, we provide descriptive evidence on the labor market implications of wage optimism. The matched survey-administrative data enable us to examine the extent to which job seekers' belief accuracy predicts their search behavior, realized wages, and perceived and actual job finding rates. It turns out that being overly optimistic about the potential wage one could earn is positively related to the number of job applications and realized wages upon finding employment. At the same time, we observe a wedge between the perceived and actual job finding rates for increasing levels of wage optimism. On the one hand, job seekers who are most optimistic about their potential wages also report the highest perceived chances of finding a job. On the other hand, job seekers' actual prospects of finding a job decline as their wage optimism rises. This suggests that the more optimistic workers are about the wages they can earn upon reemployment, the more likely they are to overestimate their job finding prospects. This pattern is in line with the idea that optimistic job seekers who receive wage offers lower than their expectations tend to be excessively selective and reject offers more frequently than warranted, thereby prolonging unemployment (see also [Dubra, 2004](#); [Conlon *et al.*, 2018](#); [Mueller *et al.*, 2021](#)).

What causes the overall optimism of unemployed workers and the heterogeneity in their beliefs? It is often argued that job seekers are not fully informed about the job finding process and learn about their labor market prospects during job search ([Burdett and Vishwanath, 1988](#); [Gonzalez and Shi, 2010](#)). [Conlon *et al.* \(2018\)](#) show that job seekers' wage expectations increase when they receive an offer exceeding their initial belief. Aligning with this notion, our findings suggest that job seekers with greater unemployment experience and those who receive more advice from their caseworker tend to hold more accurate earnings expectations. Against this backdrop, one may expect that providing job seekers with information about their objective earnings potential may reduce their tendency to hold excessively optimistic wage expectations.²

However, an alternative view is that misperceptions can arise from the way individuals process the information available to them. The literature on motivated reasoning suggests that

²Related to this idea, various studies have investigated the causal effects of informing unemployed workers about potentially promising job matches ([Belot *et al.*, 2019](#); [Altmann *et al.*, 2022](#); [Behaghel *et al.*, 2022](#); [Ben Dhia *et al.*, 2022](#); [Belot *et al.*, 2022](#)) or the search process in general ([Altmann *et al.*, 2018](#)), which can have positive effects on job seekers' labor market integration. Moreover, [Jäger *et al.* \(2023\)](#) provide employed workers with information about their outside options, that is, the average wage of workers with similar characteristics in the same labor market, leading treated individuals to revise their wage expectations, as well as their job search and wage negotiation intentions.

the desire to maintain a positive self-image can significantly impact how individuals form their beliefs (Bénabou and Tirole, 2002, 2004, 2016). For this reason, they may selectively retrieve certain information and deliberately suppress negative feedback (Gennaioli and Shleifer, 2010; Bordalo *et al.*, 2020, 2021). Several of our findings speak to the empirical relevance of these ideas for the accuracy of job seekers' wage expectations. In particular, we find higher levels of overoptimism among individuals with the lowest objective earnings potential, especially among workers who are predicted to experience a wage decline compared to their past salary. This group of workers may have a heightened desire for motivated beliefs. Furthermore, we find that job seekers who initially overestimate their wage potential by up to 17% continue to increase their wage expectations throughout the unemployment spell, despite receiving (most likely) negative feedback. Additionally, job seekers who are encouraged to search more intensively due to extrinsic incentives hold more optimistic wage expectations, yet this does not translate into higher realized wages for them. This aligns with the notion that these individuals adopt a more optimistic outlook to motivate themselves to comply with their search requirements.

Our study is the first to establish objective benchmarks for the subjective wage expectations of unemployed workers. By doing so, we contribute to a growing body of literature demonstrating job seekers' average tendency to be overly optimistic about their job finding prospects (Spinnewijn, 2015; Balleer *et al.*, 2021; Mueller *et al.*, 2021; Van den Berg *et al.*, 2023) and their reluctance to update their wage expectations over time (Krueger and Mueller, 2016; Conlon *et al.*, 2018; Drahs *et al.*, 2018). In this context, our approach enables us to document significant heterogeneity concerning the accuracy of job seekers' wage expectations. In addition, we empirically establish a connection between optimistic wage expectations and job seekers' tendency to overestimate their reemployment prospects. These findings support the theoretical notion that overly optimistic beliefs are associated with being excessively selective and rejecting offers more frequently than justified (see, e.g., Mueller *et al.*, 2021; Mueller and Spinnewijn, 2023).

Moreover, when comparing our findings to those of Jäger *et al.* (2023), who employ a similar approach to study the beliefs of employed workers about their outside options, we note that the extent of anchoring seems to be less pronounced for the wage expectations of unemployed workers in contrast to employed workers. This difference could potentially be attributed to unemployed job seekers having already acquired information about their earnings potential during their job search.

Additionally, our study sheds light on how job seekers' incentives to search for employment influence individuals' behavior and beliefs. In doing so, we contribute to a limited body of

research that examines the response of job search behavior to changes in the benefit environment. Aligning with existing studies focusing on the generosity of UI benefit payments (see, e.g., [Marinescu, 2017](#); [Lichter and Schiprowski, 2021](#)), we find that more restrictive policy regimes encourage unemployed workers to apply for jobs more intensively. Simultaneously, our finding that an enhanced sanction risk fosters greater wage optimism among unemployed workers challenges the notion that a stricter regime makes job seekers less selective in their job choices. Rather, the heightened incentives to search for jobs appear to induce indirect effects, leading to a more optimistic outlook regarding the wages individuals can earn upon reemployment. This phenomenon may contribute to the observation that, in various settings, reservation wages do not respond to variation in benefit payments or changes in the benefit rules as predicted by standard job search theory ([Schneider, 2008](#); [Krueger and Mueller, 2016](#); [Le Barbanchon *et al.*, 2019](#); [Lichter and Schiprowski, 2021](#)).³ It is worth noting that there is no indication that job seekers' increased wage optimism, which comes with the higher search intensity, is warranted. On the contrary, realized wages upon reemployment tend to be (insignificantly) lower when job seekers are subject to a more restrictive sanction regime. This aligns with previous evidence suggesting that benefit sanctions often lead job seekers to eventually accept lower-quality jobs ([Arni *et al.*, 2013](#); [Van den Berg and Vikström, 2014](#); [Van den Berg *et al.*, 2019](#)). Against this backdrop, it is conceivable that job seekers facing an elevated risk of sanctions only revise their wage expectations as time progresses.

The remainder of this paper proceeds as follows. In the next section, we discuss our empirical setting, while Section 3 illustrates some of the theoretical issues related to the wage expectations of unemployed workers. Section 4 presents empirical evidence on the accuracy of job seekers' wage expectations and Section 5 concludes.

2 Empirical Setting

To examine the accuracy of job seekers' wage expectations, our analysis builds on different complementary data sources providing information on unemployed workers in Germany. To begin with, we rely on a large-scale survey involving 17,400 workers who became unemployed between June 2007 and May 2008 and were eligible for unemployment insurance (UI) benefits (see [Arni *et al.*, 2014](#)). The first interview was conducted within 7 to 14 weeks after entering

³Using French administrative data on reservation wages and changes in UI rules, [Le Barbanchon *et al.* \(2019\)](#) estimate a null effect of the potential benefit duration on reservation wages, which is consistent with the estimates by [Lichter and Schiprowski \(2021\)](#) based on German survey data. Similarly, [Krueger and Mueller \(2016\)](#) cannot reject that the elasticity of reservation wages to benefit levels in the U.S. is equal to zero, while [Schneider \(2008\)](#) finds no significant effect of imposed benefit sanctions on the reservation wages of unemployed workers in Germany.

unemployment, followed by a second interview wave 12 months later. The survey encompasses detailed data on socio-demographic characteristics, personality traits, job search behavior, and, notably for our study, subjective beliefs about labor market prospects, especially wages upon reemployment.

In addition to the survey, we leverage administrative records to access highly reliable data regarding job seekers' actual labor market outcomes and their employment histories prior to unemployment. We utilize the administrative data for two purposes. Firstly, we can directly link the survey information with the administrative records at the individual level for about 87% of the survey respondents (Eberle *et al.*, 2017). Secondly, we incorporate administrative information from a larger sample of unemployed workers to establish objective benchmarks for job seekers' earnings potential. Importantly, both datasets consist of individuals randomly sampled from the same population of unemployed workers. This ensures that job seekers within the different datasets can be directly compared and that we have access to similar information regarding their labor market biographies.⁴

2.1 Subjective wage expectations and objective benchmarks

The survey elicits job seekers' beliefs about the monthly net salary (in €) they expect to receive upon starting a new job, using the following question:

“Now, I am interested in the salary you anticipate receiving in your next job. What is your expected monthly net income in €?”

The question is asked during the initial survey interview, which takes place 7 to 14 weeks after entry into unemployment, and is directed at all individuals who are still unemployed at this stage and are actively searching for a job. Moreover, our analysis focuses exclusively on individuals who previously held full-time positions to minimize the influence of variation in working hours on monthly wage expectations. This results in an estimation sample of 5,376 survey respondents who can be linked to the administrative records.

The objective of our empirical analysis is to examine the accuracy of individuals' subjective wage expectations, which is notoriously challenging for two reasons. First, we need to compare subjective beliefs to realizations of the same outcome. However, realized wages of the job seekers observed in our survey data represent only one instance of the objective ex-ante distribution of wages, and they might be affected by unforeseeable labor demand shocks that individuals cannot

⁴The *IZA/IAB Administrative Evaluation Dataset* offers administrative data for a 4.7% random sample of individuals who entered unemployment between 2001 and 2008 (Caliendo *et al.*, 2011; Eberle and Schmucker, 2015), while the *the IZA Evaluation Dataset Survey* provides survey data for a representative subset of individuals who entered unemployment between June 2007 and May 2008. Furthermore, the *IZA/IAB Linked Evaluation Dataset* combines survey and administrative data, linking them for 87% of the survey respondents.

be aware of when reporting their subjective beliefs. Second, job seekers' expectations may impact their job search behavior, which in turn can influence actual labor market outcomes. In order to address these concerns, we adopt an approach where we estimate objective benchmarks for job seekers' earnings potential based on the realized wages of comparable individuals in similar situations.

To that end, we utilize administrative data from a larger sample of 84,617 workers who became unemployed between January 2005 and May 2007 (see Appendix A for additional information regarding the prediction of objective benchmarks). This time period was chosen to avoid any overlap with the survey sample, ensuring that the objective predictions are not influenced by the beliefs and behaviors of survey respondents.⁵ In order to ensure comparability with the survey sample, we apply similar restrictions to the administrative data. Specifically, we focus on newly unemployed individuals who are eligible for unemployment insurance (UI) benefits and were previously employed in non-subsidized full-time positions for at least three months. Moreover, we restrict the sample to job seekers who have not found regular employment within three months after entry, which is the average time until the first interview of the survey.

We employ flexible LASSO regressions to predict reemployment wages, accounting for a comprehensive set of pre-determined covariates available in the matched survey-admin data. This includes socio-demographic characteristics, information on the last job before unemployment, labor market history over the past ten years, and local labor market characteristics. The dependent variable is the first monthly salary received in a regular job within 24 months after entry into unemployment, and we test the robustness of our findings using different time horizons.⁶ To compare the objective benchmarks with subjective wage expectations, we convert the realized wages recorded in administrative records from gross to net terms by deducting social security contributions and income taxes. The exact procedure is described in Appendix A.

To evaluate the quality of the benchmarks, we estimate the out-of-sample R^2 by regressing realized wages on predicted wages using distinct test datasets, i.e., samples not utilized during the prediction generation process. As shown in Table A.3, we find values of R^2 within the range of 0.48 to 0.53, suggesting that we are equipped with meaningful objective benchmarks for individuals' wages. Further supporting this notion, Table A.4 reveals that the objective benchmarks derived from wages of comparable workers exhibit greater predictive power for

⁵As a robustness check, we also employ a random sample comprising 80% of all entries into unemployment between June 2007 and May 2008, which aligns with the survey period. Detailed summary statistics for both samples can be found in Appendix Table A.1.

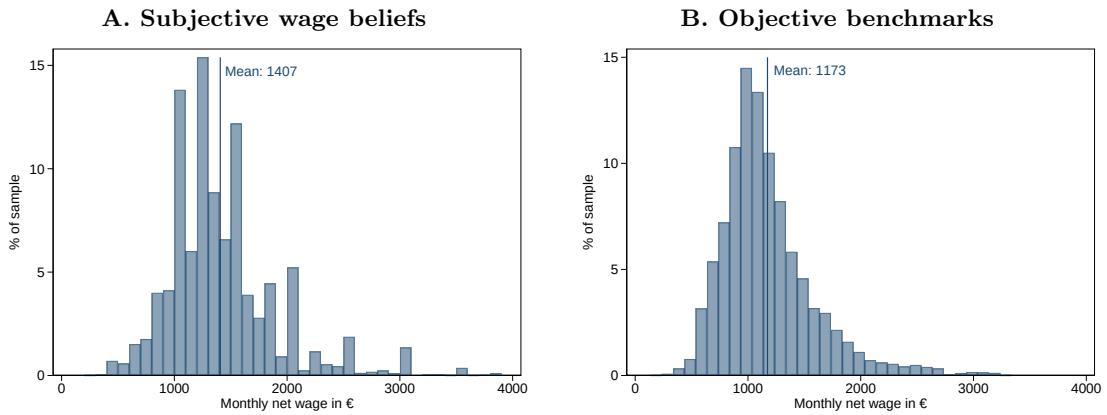
⁶Specifically, we utilize wages of individuals reemployed within nine months of unemployment, which is, on average, six months after the initial interview. This is motivated by the fact that job seekers answered the question about their wage expectations shortly after discussing their anticipated likelihood of finding a job during the next six months, suggesting a consistent time frame for wage expectations.

survey respondents’ realized wages compared to their own subjective wage expectations.

2.2 Summary statistics

Figure 1 shows the distributions of subjective wage expectations and objective benchmarks. The average expected net income is € 1,407 per month, which is substantially greater than the average income that workers could reasonably expect. For the average job seeker in our sample, the objective benchmarks suggest a monthly net wage of only € 1,173. This closely aligns with the average realized wage of € 1,190 per month that we observe among the survey respondents (see Panel A of Appendix Table B.1).

Figure 1: Distribution of subjective wage beliefs and objective benchmarks



Note: The figure shows the distribution of subjective beliefs (Panel A) and objective benchmarks (Panel B) for individuals’ monthly net income upon reemployment among the sample of survey respondents ($N = 5,376$). Objective benchmarks are generated from realized outcomes of similar individuals observed in the administrative records (see Section 2.1 for details). Panel A excludes individuals with an expected reemployment wage greater than 4,000€ (< 1% of sample).

In addition to job seekers’ wage expectations, we also explore information on individuals’ perceived and actual job finding prospects. The perceived chances of reemployment are elicited over a six-month horizon and responses are provided using four options: “very likely”, “likely”, “unlikely”, or “very unlikely”.⁷ Overall, unemployed workers in our survey sample tend to be remarkably optimistic about their reemployment prospects. In particular, 89% of the survey population consider themselves “likely” or “very likely” to find a job within six months, while only 56% actually do so (see Panel B of Appendix Table B.1). This observation is in line with existing evidence from, e.g., [Spinnewijn \(2015\)](#), [Balleer *et al.* \(2021\)](#), and [Mueller *et al.* \(2021\)](#), suggesting that a majority of job seekers hold overly optimistic beliefs about their job finding probabilities.

⁷Specifically, survey respondents answer the following question: “When you think of the future, how likely is it from your perspective that you will find a job within the next six months?”

3 Theoretical Considerations

Before presenting the results of our empirical analysis, we illustrate some of the theoretical issues related to the accuracy of job seekers' wage expectations. To do so, we sketch a random job search framework in which job seekers face uncertainty about their labor market prospects. While individuals are unemployed, they receive a flow of benefits, b . In each period t , they make decisions about the number of job applications they send out, s_t , and their reservation wage, ϕ_t . The probability of a successful job application, resulting in a job offer, is denoted by λ_t , while the effort costs incurred during the job search are captured by the increasing and convex function $\gamma(s_t)$. Each job offer is associated with a wage, denoted by w , which is a random draw from the wage offer distribution $F(w)$. Upon receiving multiple job offers in a given period, individuals accept the highest wage offer $y = \max\{w_1, w_2, \dots, w_n\}$ if it exceeds their reservation wage. The distribution of this maximum offer can be described as $F_{yt}(y) = F(y)^{n_t}$, where $n_t = \lambda_t s_t$ represents the total number of job offers received in period t .

Inspired by [Mueller and Spinnewijn \(2023\)](#), we assume that job seekers hold subjective beliefs about their success probability, $\hat{\lambda}_t$, and the wage distribution, $\hat{F}(w)$, which may differ from the true functions. When choosing their search strategy, individuals maximize their perceived present value of income in period t :

$$U_t = \max_{s_t, \phi_t} b - \gamma(s_t) + \rho \left\{ EU_{t+1} + \left[1 - (1 - \hat{\lambda}_t)^{s_t} \right] \int_{\phi}^{\infty} (EV_{t+1}(y) - EU_{t+1}) d\hat{F}_{yt}(y) \right\} \quad (1)$$

where future income is discounted at rate ρ and V_{t+1} denotes the value of being employed at wage y when a job is found in the future. The corresponding uncertainty is captured by the expectation operator E . The reservation wage and the optimal search effort can be expressed as functions of the (perceived) model primitives:

$$\phi_t = \phi_t[b, \gamma(\cdot), \hat{\lambda}_t, \hat{F}(\cdot), V_{t+1}(\cdot)]$$

$$s_t^* = s_t^*[b, \gamma(\cdot), \hat{\lambda}_t, \hat{F}(\cdot), V_{t+1}(\cdot)]$$

At their reservation wage, ϕ_t , job seekers are indifferent between accepting a job and remaining unemployed, $U_{t+1} = V_{t+1}(\phi_t)$, while they choose the optimal effort level, s_t^* , trading off the cost of search and the perceived returns to search.

Accuracy of wage expectations: Within this framework, the object of our empirical analysis, the accuracy of job seekers' wage expectations, is characterized by the difference between the perceived and actual expected maximum of all wage offers that the worker receives in a

given period:

$$E\widehat{F}_{yt}(y) - EF_{yt}(y). \quad (2)$$

This illustrates that disparities between job seekers' subjective beliefs and objective benchmarks can have different origins. It is straightforward that workers may hold overly optimistic wage expectations due to misperceptions about the distribution of wage offers, $F(w)$. Specifically, overly optimistic workers may perceive the wage offer distribution as shifted toward higher values compared to the actual distribution, or they may perceive the distribution to be more dispersed than it truly is. The latter can induce optimistic beliefs because job seekers are inclined to accept the offer with the highest pay. On the other hand, overestimating the success probability of an application can also induce wage optimism because it may lead job seekers to overestimate their prospects of attracting offers that come with particularly high wages (i.e. overestimating n_t causes individuals to perceive a higher expected maximum offer).

Anchoring and belief updating: Workers who have incomplete information, for instance, about the statistical properties of the wage offer distribution have to form their beliefs based on the signals they have received. A signal that typically comes at no cost and is at their disposal is the wage job seekers earned in their prior job. This can lead individuals to anchor their wage expectations to their previous salary (see, e.g., [Jäger *et al.*, 2023](#), for a formal illustration). As a consequence, workers who should reasonably anticipate a wage decrease (increase) relative to their pre-unemployment wage would overestimate (underestimate) their reemployment wages relative to the objective benchmarks.

At the same time, individuals may acquire additional signals about their objective earnings potential over the course of their job search from the job offers they receive (see, e.g., [Burdett and Vishwanath, 1988](#); [Gonzalez and Shi, 2010](#); [Conlon *et al.*, 2018](#)). This should enable them to adjust their wage expectations accordingly as time progresses. In situations involving Bayesian learning, the beliefs of job seekers who receive repeated feedback are anticipated to converge toward the actual mean of the wage distribution.

Conversely, when individuals hold motivated beliefs, they may want to believe that they can earn a particular wage, possibly driven by motivational reasons ([Bénabou and Tirole, 2002](#)) or ego-related satisfaction ([Kőszegi, 2006](#)). In such instances, individuals may selectively process available signals, such as their prior salary and incoming wage offers, and thus deceive themselves ([Tversky and Kahneman, 1973](#); [Gennaioli and Shleifer, 2010](#); [Bordalo *et al.*, 2021](#)). Therefore, it is conceivable that the anchoring and updating of beliefs is skewed toward excessively optimistic

expectations (see, e.g., [Heidhues et al., 2018](#); [Zimmermann, 2020](#); [Huffman et al., 2022](#)).

The role of extrinsic incentives: Clearly, job seekers' beliefs can also be influenced by their own actions. For example, unemployed individuals who engage in a more intensive job search may gather a greater amount of information, effectively increasing the number of signals they receive about their potential earnings. As a result, a higher search intensity could lead to more accurate wage expectations. Concurrently, by submitting a larger number of job applications, job seekers expand the pool of available offers, denoted as n_t , within a given period. This wider array of opportunities increases their chances of receiving a particularly well-paying offer, which makes it reasonable to anticipate higher wages. Against this backdrop, we expect that variations in job search incentives – such as differing benefit levels b or benefit payments conditioned on a minimum effort level – will also impact the accuracy of job seekers' wage expectations. Furthermore, individuals who adopt beliefs that enhance their effort motivation may become more optimistic when confronted with extrinsic incentives to intensify their job search.

Labor market implications: Lastly, it is evident that the beliefs held by job seekers play a significant role in shaping their decisions, ultimately influencing their integration into the labor market. For instance, if individuals are optimistic regarding their chances of attracting a well-paying job offer, they perceive particularly high returns to search. As a result, optimistic workers might be willing to exert more effort during job search, potentially enhancing their actual job finding prospects. On the other hand, optimistic workers may set higher reservation wages, leading them to be more inclined to reject job opportunities offering comparatively lower salaries. This in turn could lead to extended periods of unemployment compared to utility-maximizing job seekers with accurate wage expectations. In addition, this mechanism can result in job seekers who have overly optimistic wage expectations also overestimating their actual job finding rates (see, e.g. [Dubra, 2004](#); [Conlon et al., 2018](#); [Mueller et al., 2021](#)).

4 Empirical Evidence on the Accuracy of Wage Expectations

In this section, we compare job seekers' subjective wage expectations to the objective benchmarks. This enables us to uncover heterogeneity in the accuracy of job seekers' wage expectations, taking into account their objective earnings potential (see Section 4.1) and individual background characteristics (see Section 4.2). In this context, we place particular emphasis on investigating the influence of job seekers' pre-unemployment wages to understand the extent to which they anchor their wage expectations to their previous salary and whether such anchoring is justified (see Section 4.3). Moreover, we leverage the longitudinal nature of our data by

examining repeatedly elicited wage expectations from job seekers who are still in search of employment approximately one year after becoming unemployed. This allows us to investigate how job seekers revise their subjective expectations over the course of their unemployment spell (see Section 4.4). We also take into consideration the interdependence between job seekers’ beliefs and their actions. To that end, we exploit exogenous variation in individuals’ job search incentives and study the consequences for the accuracy of their wage expectations (see Section 4.5). Finally, we present descriptive evidence on the labor market implications of inaccurate beliefs (Section 4.6) and discuss how our results speak to different theoretical mechanisms related to job seekers’ belief formation (see Section 4.7).

4.1 Heterogeneity by objective earnings potential

To begin with, we consider the relationship between subjective expectations and objective benchmarks based on the following regression model (see Jäger *et al.*, 2023):

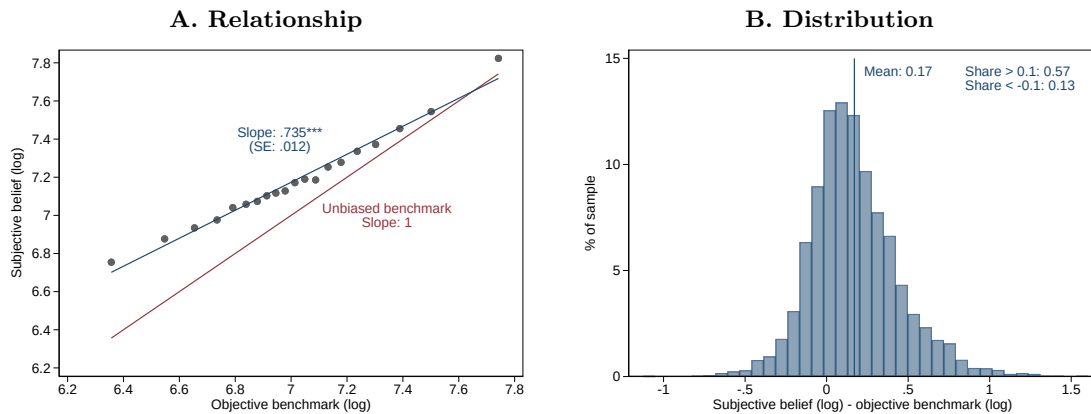
$$S_i = \beta_0 + \beta_1 \widehat{O}_i + \epsilon_i \quad (3)$$

where S_i denotes the subjective belief of job seeker i about their reemployment wage and \widehat{O}_i refers to the corresponding objective prediction. The intercept β_0 captures biases in beliefs that are common to all job seekers, while the slope parameter β_1 describes how strongly beliefs respond to variation in objective benchmarks. In this context, we can think about different scenarios depending on the values of β_0 and β_1 .

First, when $\beta_1 = 1$ and $\beta_0 = 0$, individuals’ expectations perfectly correspond to the objective benchmark, which indicates *unbiased beliefs* throughout the distribution. Second, when $\beta_1 = 1$ and $\beta_0 \neq 0$, job seekers’ beliefs are subject to *homogeneous biases*, that is, individuals are overly optimistic ($\beta_0 > 0$) or pessimistic ($\beta_0 < 0$), but job seekers with different objective predictions share the same degree of bias. Lastly, when $\beta_1 \neq 1$, beliefs do not exhibit a one-to-one response to objective variation, resulting in *heterogeneous biases*. In particular, $\beta_1 < 1$ means that beliefs do not adjust sufficiently strongly to changes in objective predictions, which implies that overoptimism is more pronounced among job seekers with a relatively low objective wage potential.

Panel A of Figure 2 displays a binned scatter plot based on Equation (3). It illustrates the prevalence of overoptimism regarding reemployment wages across all levels of the corresponding objective distribution. In each of the 20 bins, the average expected wage exceeds the corresponding objective benchmark. In other words, both job seekers with low and high objective earnings potential tend to overestimate their reemployment wage compared to our

Figure 2: Comparison of subjective beliefs and objective benchmarks



Note: The figure compares subjective beliefs and objective benchmarks for reemployment wages among the sample of survey respondents ($N = 5,376$). Panel A illustrates Equation (3) by plotting individuals' subjective beliefs against objective benchmarks (each of the 20 dots represents a ventile of the distribution) and the red line represents the unbiased benchmark if subjective expectations were to equal objective predictions. Panel B illustrates the distribution of individual-level log differences between subjective and objective benchmarks.

objective benchmarks. At the same time, the magnitude of job seekers' optimism varies across the objective distribution. Our analysis reveals a slope coefficient of $\hat{\beta}_1 = 0.74$ (SE: 0.01) compared to an objective benchmark slope of one. This suggests that beliefs do not adequately respond to variations in the objective wage potential. As a result, job seekers with lower predicted wages exhibit a greater tendency to overestimate their earnings potential compared to those with higher objective predictions. To be precise, individuals within the bottom decile of the objective benchmark distribution overestimate their earnings potential by approximately 36%, whereas the overoptimism is only about 6% among individuals in the top decile of the distribution.

Robustness: A series of robustness checks confirms our result that job seekers with lower objective earnings potential exhibit the highest levels of optimism. First, we vary the sample used to estimate the objective benchmark based on the administrative records. In particular, we rely on alternative training data including individuals who became unemployed in 2007 and 2008 (i.e. the same time period during which the survey was conducted), and we only include job seekers who find a job within nine rather than 24 months. Second, we address concerns that the estimated slope coefficients may suffer from attenuation bias due to measurement error in the objective predictions. Therefore, we conduct an instrumental variable (IV) regression, where we use objective predictions from the alternative training data as an instrument for objective predictions from our baseline training data. This approach is similar to a split-sample IV measurement error correction (see, e.g., [Drenik et al., 2020](#); [Jäger et al., 2023](#)). Third, we impose two additional restrictions on the survey sample, considering only (i) individuals who

search for and expect to find a full-time job and (ii) unmarried individuals. This enables us to examine whether differences in expected working hours (full-time) and measurement error arising from the conversion of gross to net wages (unmarried individuals) affect our estimates. As summarized in Appendix Table B.2, we obtain similar slope coefficients between 0.64 and 0.75 across the various specifications.

4.2 Determinants of optimism and pessimism

Another way to illustrate heterogeneity in the accuracy of beliefs is to consider deviations between subjective beliefs and objective benchmarks: $S_i - O_i$. Panel B of Figure 2 shows the resulting distribution. We see that job seekers overestimate their wage potential, on average, by about 17%. While a majority of about 57% of the survey respondents expect their wage to be at least 10% higher than the objective prediction, only 13% underestimate their wage potential by more than 10%.⁸

Building upon this individual-level measure, we can explore correlations between the accuracy of beliefs and job seekers' characteristics. To that end, we first regress subjective wage expectations on a set of covariates without accounting for the objective predictions (column 1 of Table 1). In a second step, we analyze to what extent these differences in expectations are justified by heterogeneity in job seekers' actual wage potential. Therefore, we regress the deviation between subjective beliefs and objective predictions, $S_i - O_i$, on the objective benchmarks and the same set of individual-level characteristics (column 2).⁹ Lastly, in columns (3) and (4), we distinguish between individuals who overestimate and underestimate their wage potential.¹⁰

Overall, we observe intuitive correlations between the accuracy of job seekers' beliefs and their background characteristics. For instance, it can be seen in column (1) that women expect to earn about 17% less than men upon reemployment. This is in line with existing evidence that men generally have higher levels of self-confidence (Barber and Odean, 2001; Cortés *et al.*, 2022) and set higher reservation wages (Caliendo *et al.*, 2017) than women. When we take into account the heterogeneity in job seekers' objective wage potential in column (2), the gender gap remains negative. In particular, the difference between the subjective wage expectation and the objective prediction is about 9 percentage points lower for women than for men. Comparing these estimates suggests that about half of the gender gap in wage expectations is due to the

⁸In Appendix Table B.2, we report the mean bias and the share of job seekers who over- and underestimate their wage potential for the alternative specifications explained above. Across all specifications, we find that overly optimistic wage expectations are widespread among unemployed workers.

⁹One should note that the covariates included in the regression model represent a subset of all individual-level characteristics that are explored to generate the objective benchmarks. This means the estimated correlations cannot be explained by heterogeneity in rational expectations.

¹⁰In particular, we consider the deviation between S_i and O_i and set negative (positive) values to zero and thus only exploit variation in positive (negative) deviations.

Table 1: Determinants of optimism and pessimism

	S_i	$S_i - O_i$	$S_i - O_i$	$S_i - O_i$	$S_i - O_i$	$S_i - O_i$
	(1)	(2)	Pos. values	Neg. values	Pos. values	Neg. values
	(1)	(2)	(3)	(4)	(5)	(6)
Socio-demographic characteristics						
Female	-0.172*** (0.008)	-0.086*** (0.007)	-0.067*** (0.006)	-0.019*** (0.003)	-0.064*** (0.006)	-0.018*** (0.003)
Age (ref. 16-24 years)						
25 - 34 years	0.039*** (0.011)	0.022** (0.010)	0.012 (0.008)	0.010** (0.004)	0.014* (0.008)	0.011** (0.004)
35 - 44 years	0.057*** (0.011)	0.014 (0.010)	0.005 (0.008)	0.009** (0.004)	0.011 (0.009)	0.010** (0.005)
45 - 55 years	0.072*** (0.012)	0.027** (0.011)	0.016* (0.009)	0.012*** (0.004)	0.026*** (0.009)	0.015*** (0.005)
German citizen	-0.026* (0.016)	-0.046*** (0.014)	-0.032*** (0.012)	-0.014*** (0.005)	-0.037*** (0.012)	-0.014*** (0.005)
Educational level (ref. no higher education)						
Vocational certificate	0.055*** (0.013)	0.018 (0.012)	0.003 (0.010)	0.015** (0.006)	-0.003 (0.010)	0.014** (0.006)
University degree	0.266*** (0.016)	0.135*** (0.016)	0.118*** (0.013)	0.017*** (0.007)	0.106*** (0.013)	0.017** (0.007)
Married	-0.022*** (0.008)	0.002 (0.008)	0.015** (0.007)	-0.013*** (0.003)	0.017** (0.007)	-0.012*** (0.003)
Any children	-0.026*** (0.009)	-0.012 (0.008)	-0.004 (0.007)	-0.007** (0.003)	-0.003 (0.007)	-0.007** (0.003)
East Germany	-0.081*** (0.008)	-0.015* (0.008)	-0.012* (0.007)	-0.003 (0.003)	-0.010 (0.007)	-0.002 (0.003)
Labor market history						
Last wage (ln)	0.325*** (0.013)	0.212*** (0.013)	0.176*** (0.011)	0.036*** (0.004)	0.169*** (0.011)	0.035*** (0.004)
Last job was quit	-0.025 (0.018)	-0.003 (0.016)	0.004 (0.013)	-0.007 (0.006)	0.001 (0.013)	-0.007 (0.006)
Number of unemployment spells in last 2 years (ref. 0 spells)						
1 spell	0.032*** (0.010)	-0.015 (0.009)	-0.017** (0.008)	0.002 (0.003)	-0.019** (0.008)	0.002 (0.003)
2 spells	0.011 (0.010)	-0.025*** (0.009)	-0.031*** (0.008)	0.005 (0.003)	-0.030*** (0.008)	0.006* (0.003)
≥ 3 spells	0.011 (0.011)	-0.024** (0.010)	-0.027*** (0.008)	0.003 (0.004)	-0.028*** (0.008)	0.003 (0.004)
Last unemployment duration	-0.001* (0.001)	0.001** (0.001)	0.001 (0.000)	0.001*** (0.000)	0.001* (0.000)	0.001*** (0.000)
Personality traits						
Internal locus of control					0.010*** (0.003)	0.001 (0.001)
Conscientiousness					-0.008** (0.003)	0.000 (0.001)
Openness					0.017*** (0.003)	0.000 (0.001)
Extraversion					0.006* (0.003)	0.003** (0.001)
Neuroticism					-0.009*** (0.003)	-0.002 (0.001)
Caseworker counseling						
Number of caseworker meetings (ref. 0 - 2 meetings)						
3 - 5 meetings					-0.015** (0.006)	-0.003 (0.003)
≥ 6 meetings					-0.004 (0.009)	0.001 (0.004)
Number of vacancy referrals					0.001 (0.006)	0.008*** (0.003)
Objective benchmark O_i		-0.544*** (0.019)	-0.456*** (0.016)	-0.088*** (0.007)	-0.456*** (0.016)	-0.088*** (0.007)
No. of observations	5,376	5,376	5,376	5,376	5,200	5,200
R^2	0.458	0.239	0.248	0.067	0.258	0.070
Mean dep. variable	7.183	0.170	0.205	-0.035	0.205	-0.036

Note: The table reports the results of OLS regressions. In column (1), the dependent variable is individuals' subjective belief S_i about their net monthly reemployment wage (in log). In column (2), we consider the log difference between the subjective belief S_i and the objective benchmark O_i . In columns (3) and (5), we set negative values to zero and thus only exploit variation in positive deviations ("optimism"), while in columns (4) and (6), we set positive values to zero and thus only exploit variation in negative deviations ("pessimism"). Robust standard errors are shown in parentheses. ***/**/* indicate statistical significance at the 1%/5%/10%-level.

fact that men actually earn higher wages than women and it is therefore rational that men have also higher wage expectations. At the same time, the other half of the gender gap in wage expectations cannot be explained by the objective predictions suggesting that men tend to be more confident even in comparison to the rational benchmark. Considering the decomposition of results for optimistic and pessimistic beliefs in column (3) and column (4), we find that the gender differences are mainly driven by men exhibiting more overly optimistic beliefs rather than women being too pessimistic.

Moreover, we observe several other noteworthy correlations. First, it may not be surprising that German citizens have more accurate beliefs compared to foreigners, as they may possess a better understanding of the German labor market dynamics. Second, high-skilled workers, specifically those with a university degree, exhibit a greater tendency toward overoptimism regarding their wage potential compared to low-skilled workers. Quantitatively, job seekers with a university degree tend to overestimate their earnings potential by approximately 12 percentage points more compared to those without any higher education. This result is in line with earlier findings that higher levels of education are associated with individuals being more overconfident about their investment decisions (Bhandari and Deaves, 2006; Trejos *et al.*, 2019). This pattern could reflect that individuals' beliefs about their abilities (Stinebrickner and Stinebrickner, 2012; Wiswall and Zafar, 2015) or about the returns to schooling (Jensen, 2010; Attanasio and Kaufmann, 2014) affect educational or occupational choices early on in their careers.¹¹ Lastly, we find that wage optimism tends to be less pronounced among job seekers who have experienced more frequent periods of unemployment in the past. This observation aligns with the notion that individuals with greater job search experience may have accumulated more accurate information about their potential earnings.

In addition to the covariates that we use to estimate the objective benchmarks based on the administrative records, the survey provides information on a variety of other worker characteristics that are typically related to their labor market integration. In specifications (5) and (6), we additionally account for personality traits and caseworkers' counseling activities. Notably, we find that job seekers who hold an internal locus of control, believing that their life outcomes are primarily determined by their own actions rather than external factors, tend to hold more optimistic beliefs about their future wages.¹² At the same time, higher levels of openness and

¹¹Note that, at first glance, this finding contradicts recent evidence from Balleer *et al.* (2021) who find that overconfidence among job seekers in the U.S. decreases with their skill level. However, it should be noted that we condition on the level of objective predictions and various other covariates. This allows us to disentangle the effect of education from differential misperceptions along other characteristics that are correlated with job seekers' education.

¹²This finding aligns with previous studies by Caliendo *et al.* (2015) and McGee (2015), who show that individuals with a more internal locus of control exert more search effort and tend to have higher reservation wages.

extraversion, as well as lower levels of neuroticism, are associated with greater optimism among job seekers. Furthermore, we find that job seekers who have had several meetings with their caseworker since becoming unemployed tend to exhibit less optimistic beliefs. On the other hand, a higher number of vacancy referrals, where caseworkers direct unemployed workers toward specific job postings, comes with less pessimistic wage expectations.

While the observed patterns appear intuitive, it is essential to acknowledge that the disparity between subjective wage expectations and objective benchmarks might be partly attributed to job seekers having private information about their personal situations. Since our prediction model does not account for individuals' personality traits and caseworkers' counseling activities, it remains uncertain whether the observed patterns regarding these factors truly indicate heterogeneity in misperceptions about workers' earnings potential. In particular, if job seekers understand that they exhibit certain traits that come with higher earnings, it would be reasonable for them to adjust their wage expectations accordingly.¹³

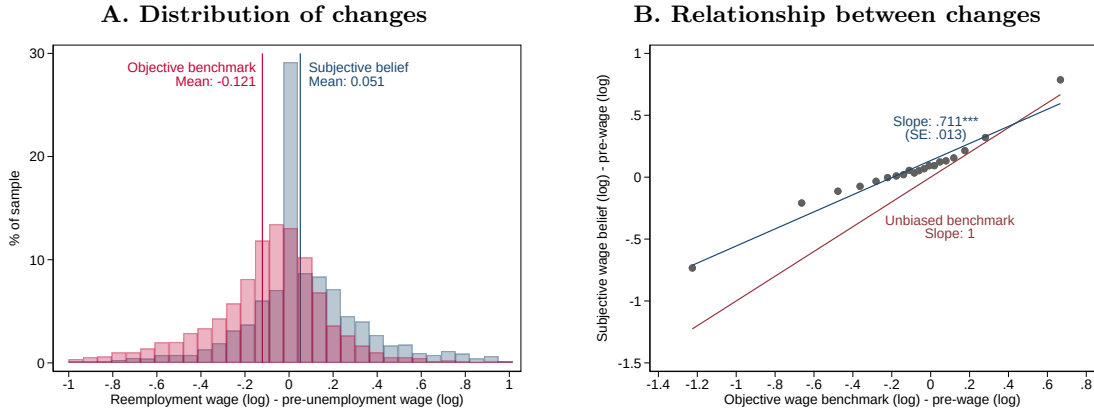
4.3 Anchoring of beliefs to pre-unemployment wages

Various studies indicate that individuals often rely on anchoring heuristics (Kahneman *et al.*, 1982) when forming their expectations. Closely related to our setting, it is commonly observed that unemployed job seekers anchor their reservation wages to their previous salary before becoming unemployed (see, e.g., Feldstein and Poterba, 1984; Krueger and Mueller, 2016; Le Barbanchon *et al.*, 2019; Koenig *et al.*, 2021). However, due to the absence of objective benchmarks in the previous literature, it is challenging to determine the extent to which this type of anchoring is justified. In light of this, we now compare both job seekers' subjective wage expectations and the objective predictions to their pre-unemployment wages.

To begin with, Panel A of Figure 3 shows the distributions of the subjective beliefs and objective predictions relative to pre-unemployment wages. It turns out that job seekers overestimate their wage potential not only relative to the objective benchmarks generated from wages of similar workers, but also in comparison to their own previous salary. On average, job seekers anticipate a 5.1% increase in salary compared to their last job, whereas objective predictions indicate an average decrease of approximately 12.1% in actual wages compared to the pre-unemployment wage. While periods of unemployment often come with wage penalties upon reemployment (Arulampalam, 2001; Gregory and Jukes, 2001), it appears that job seekers, on

¹³For example, several studies document statistically significant correlations between workers' personality traits and their earnings (e.g. Andrisani, 1977; Heckman *et al.*, 2006; Mueller and Plug, 2006; Semykina and Linz, 2007; Heineck and Anger, 2010). Similarly, previous research has demonstrated that caseworker counseling plays a substantial role in the labor integration of unemployed workers (see, e.g., Behncke *et al.*, 2010; Schiprowski, 2020).

Figure 3: Subjective beliefs and objective benchmarks relative to pre-unemployment wages



Note: Panel A shows a histogram of individuals' subjectively expected reemployment wage changes and objectively predicted reemployment wage changes (i.e. both in comparison to their pre-unemployment wages). Panel B depicts a binned scatter plot (with 20 bins) for the individual-level relation between the two variables. $N = 5,376$.

average, do not account for these adverse effects of unemployment when forming their wage expectations.

Moreover, the distribution of expected wage changes is much more compressed around zero compared to the distribution of changes in objective predictions. This suggests that job seekers anchor their wage expectations more strongly to their past wage than is objectively justified. Panel B of Figure 3 further illustrates this trend by showcasing the relationship between job seekers' subjectively expected wage growth and the objectively predicted wage growth. The estimated slope coefficient of 0.71 (SE: 0.02), which is significantly smaller than the objective benchmark slope of one, indicates that job seekers perceive their reemployment wage to be closer to their pre-unemployment wage than it actually is. In particular, when job seekers should reasonably anticipate a 10 percentage point larger wage decline, they expect the wage decrease to be, on average, only 7.1 percentage points larger. That is, they tend to anchor their beliefs too strongly to their pre-unemployment salary.

Lastly, we find that the anchoring to the pre-unemployment salary is asymmetric, as further illustrated in Appendix Figure B.1. Here, we depict differential slope coefficients for positive and negative variations in objective wage changes. The beliefs of job seekers who can reasonably expect a wage increase compared to their previous salary are relatively accurate, as indicated by the slope coefficient of 1.07 (SE: 0.03). Conversely, among individuals who are predicted to face a wage penalty compared to their previous wage, we estimate a slope coefficient of 0.66 (SE: 0.02). This finding suggests that this particular group of workers tends to hold overly optimistic beliefs and anchors their wage expectations too strongly to their pre-unemployment salaries.

We can directly compare our results on the wage expectations of unemployed job seekers with the estimates of Jäger *et al.* (2023), who analyze beliefs of employed workers regarding

their outside options, that is, the wages they could earn with other employers. [Jäger *et al.* \(2023\)](#) estimate a slope coefficient of 0.089 for the relationship between workers' subjectively expected wage changes and an objective benchmark for their actual wage changes (generated from observed wage changes of their coworkers). This coefficient is almost an order of magnitude lower than our corresponding estimate for the reemployment wages of unemployed workers. This indicates that the distorting effects of anchoring might be less severe for wage beliefs of unemployed job seekers compared to employed workers. A potential explanation might be that unemployed job seekers possess more knowledge about their earnings potential than employed workers, perhaps because they have already gathered information during their current or previous spells of unemployment.

4.4 Belief updating over the unemployment spell

To further explore the idea that job seekers acquire relevant information during the job search process and update their beliefs accordingly (see, e.g., [Burdett and Vishwanath, 1988](#); [Gonzalez and Shi, 2010](#); [Conlon *et al.*, 2018](#), for learning models of the labor market), we now investigate the evolution of job seekers' beliefs throughout their unemployment spell. Therefore, we utilize wage expectations that were repeatedly elicited during the first and second survey waves. We observe this information for 459 individuals who were still unemployed and actively searching for a job at the time of the follow-up interview, conducted one year after entry into unemployment.

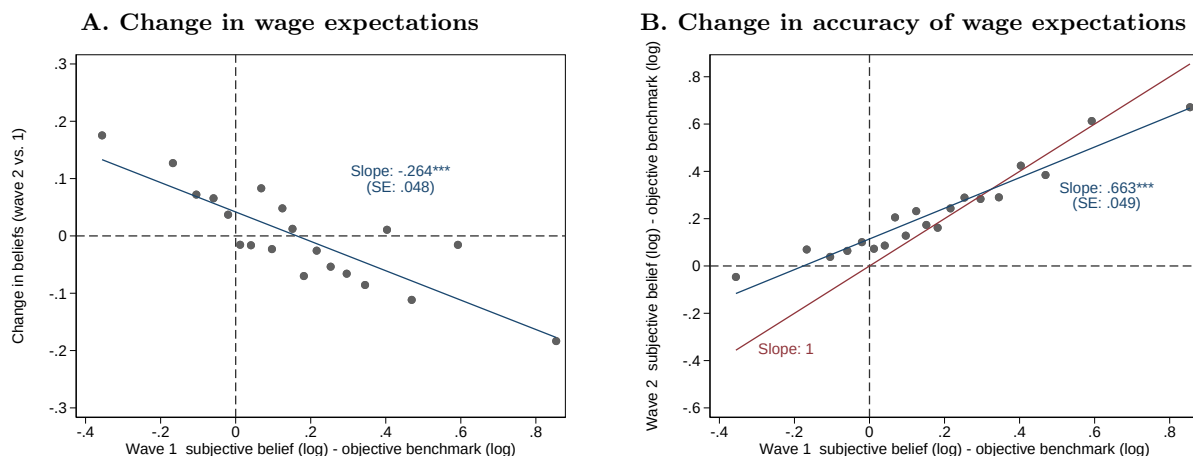
Appendix Figure [B.2](#) compares the distributions of wage expectations over time. Consistent with the patterns observed by [Krueger and Mueller \(2016\)](#) and [Mueller *et al.* \(2021\)](#), job seekers' wage expectations remain remarkably stable throughout their unemployment spell. More specifically, we find no statistically significant changes in the distribution of wage expectations between the two waves ($p = 0.872$ based on a Kolmogorov-Smirnov test for equal distributions in both waves).¹⁴

Having established objective benchmarks, we can also examine whether there is a systematic relationship between job seekers' initial level of wage optimism or pessimism and the way they update their wage expectations over time. To that end, Panel A of Figure [4](#) illustrates the change in respondents' expectations from the first to the second interview against the deviation between their subjective expectations and the objective benchmark as measured during the first interview. The estimated slope coefficient of -0.26 indicates that beliefs are not updated perfectly. Specifically, job seekers who initially overestimate their reemployment wage by an

¹⁴Additionally, Appendix Figure [B.3](#) depicts variation in the accuracy of wage expectations with respect to the timing of the first survey interview. In line with our results based on the second survey wave, we find no evidence for systematic differences across job seekers interviewed at different points of their unemployment spell (between seven and 14 weeks after becoming unemployed).

additional 10% only decrease their wage expectations by 2.6% more during the course of their unemployment spell.¹⁵ Additionally, we observe that only job seekers who exhibit significant initial wage optimism in the first interview revise their wage expectations downwards. Conversely, job seekers who overestimate their wage potential by up to 17% actually increase their wage expectations over time. These individuals most likely have received negative feedback from the jobs they encountered during their job search, yet they appear to resist updating their wage expectations accordingly.

Figure 4: Belief updating over the unemployment spell



Note: The figure depicts binned scatter plots of individuals' change in wage beliefs between waves 1 and 2 (Panel A) and wage overconfidence in wave 2 (Panel B) against the overconfidence in wave 1. Wave 1 was conducted 7 - 14 weeks after unemployment entry and wave 2 was collected 12 months after entry. The sample only includes individuals who are still in the same unemployment spell in wave 2. $N = 459$.

Finally, we account for changes in objective benchmarks over time by predicting the reemployment wages of job seekers who remain unemployed for at least 12 months following their entry into unemployment, as observed in the administrative data. Previous research shows that job seekers' reemployment prospects (Kroft *et al.*, 2013; Eriksson and Rooth, 2014) and the quality of wage offers (Schmieder *et al.*, 2016) decrease with prolonged unemployment spells. Consistent with this notion of negative duration dependence, we find that the objectively predicted wage for respondents who are still unemployed at the second interview decreases, on average, by about 6% over the course of one year. Combining the observation that many job seekers are reluctant to revise their wage expectations downward with the decline in the objective earnings potential during the unemployment spell, it becomes apparent that a majority of job seekers who remain unemployed display an even greater degree of overoptimism as time progresses. This trend is illustrated in Panel B of Figure 4, which showcases the relationship be-

¹⁵It is worth noting that the estimated negative slope may be influenced to some extent by statistical mean reversion resulting from measurement error in belief elicitation, which suggests that the estimated slope coefficient might represent a lower bound for the true relationship.

tween the deviations of subjective beliefs and objective benchmarks during the first and second interview waves. Specifically, the estimates suggest that the degree of wage optimism increases for job seekers who initially overestimate their wage potential by up to 34% (i.e. the intersection of the red and blue lines in Panel B of Figure 4) and only decreases for those who exhibit an even higher level of optimism during the first interview.

Taken together, our results suggest that job seekers' overoptimism remains persistent throughout the unemployment spell and they update their wage expectations only to a very limited extent in response to the feedback received during the search process. In this context, it is important to note that the group of individuals who are still unemployed during the second interview after one year consists of job seekers with poor overall labor market prospects (reflecting dynamic selection over the unemployment spell). It appears plausible that their reluctance to revise their wage expectations is one factor that hinders the labor market integration of these job seekers, ultimately contributing to their extended unemployment spell. On the flip side, it is possible that job seekers who revised their wage expectations as time progressed may have successfully found employment before the second interview, making it difficult to draw conclusions as to how their beliefs were updated over time.

4.5 How do search incentives shape job seekers' beliefs?

Next, we study how the accuracy of job seekers' wage expectations depends on their search behavior. This analysis is subject to a non-trivial identification problem, because individuals' choices might be influenced by their subjective beliefs. To address this concern, we explore exogenous variation in the incentives of unemployed workers to search for jobs and analyze their impact on job seekers' wage optimism or pessimism. We exploit regional variation in the risk that job seekers will be subject to punitive sanctions along the administrative borders of local employment agency (LEA) districts. These sanctions involve temporary reductions in unemployment benefit payments and are imposed by caseworkers when they detect that job seekers are not complying with job search requirements.¹⁶ The regional variation arises because LEAs have autonomy in deciding about the local policy style (see, e.g., [Fertig et al., 2006](#); [Boockmann et al., 2014](#); [Doerr and Kruppe, 2015](#)), including how strictly they punish job seekers for inadequate search behavior.

As a result, caseworkers in LEA districts with higher sanction intensities may exert greater pressure on job seekers, leading them to perceive stronger incentives to apply for and accept jobs. This can yield different implications for job seekers' wage expectations. On the one hand, an

¹⁶Instances of non-compliance include insufficient job applications, rejecting job offers from the employment agency, and voluntary termination of employment.

enhanced sanction risk may prompt job seekers to reduce their selectivity, leading them to lower their wage expectations. On the other hand, job seekers intensifying their search activities can induce indirect effects fostering heightened levels of optimism. For example, a larger number of applications may increase the probability of encountering job offers with particularly high wages. Alternatively, job seekers might adopt more optimistic beliefs in order to motivate themselves.

4.5.1 Econometric strategy

To capture variations in the local sanction regime, we utilize regional data on the annual number of benefit sanctions imposed in each of the 178 LEA districts (indexed by j) and normalize this information by the average annual stock of unemployed workers in each LEA district. The resulting sanction intensity, SI_j , can be linked to the administrative and survey data, as explained in Section 2, both of which include identifiers for job seekers' place of residence.¹⁷ To ensure that our estimation sample does not contribute to the sanction intensity measure, we rely on the corresponding numbers as observed in the year before a job seeker entered unemployment. In the Appendix, we illustrate the distribution of the sanction intensity across survey respondents (see Figure B.4), as well as LEA districts in Germany (see Figure B.5).

While the local sanction intensity serves as a proxy for the personal risk of being exposed to a benefit sanction, LEA districts imposing more sanctions might face a different composition of the unemployed workforce. This makes it unlikely that a simple regression of job seekers' outcomes on the local sanction intensity will identify the causal effect of job seekers' personal sanction risk. Therefore, we exploit discontinuities with respect to the sanction intensity along the administrative borders of the LEA districts (similar to Dube *et al.*, 2010; Caliendo *et al.*, 2022). Specifically, we estimate border-pair fixed-effects models of the following form:

$$Y_{ijb} = \alpha + \delta SI_j + \beta X_i + \phi R_j + \kappa_b + \varepsilon_{ijb}, \quad (4)$$

where i denotes the individual job seeker, j the LEA district in which the individual is located at the beginning of the unemployment spell, and b a pair of bordering LEA districts such that κ_b denotes the border-pair fixed effects for any combination of two neighboring LEA districts. Since one LEA district usually has several neighboring districts, an individual living in region j can belong to different sets of boarder pairs b and therefore enters the estimation multiple

¹⁷Due to data security restrictions, we are unable to utilize regional identifiers for the linked survey-administrative data in our analysis. Consequently, in this section, we rely on the survey and administrative data without linking them at the individual level. This requires us to re-estimate the objective benchmarks using a reduced set of covariates available in both the survey and administrative records. This includes socio-demographic characteristics, previous wage, regional information, and month of entry into unemployment. Despite this adjustment, our model demonstrates strong out-of-sample predictive power (with an R^2 of 0.39), and the re-estimated objective predictions closely align with the measure employed in the previous sections ($\rho = 0.75$).

times (depending on the number of neighboring regions). Therefore, we use sampling weights referring to the inverse of the number of neighboring LEA districts. The parameter of interest δ identifies the effect of sanction intensity on the outcome variables Y by comparing individuals living in similar, neighboring LEA districts but facing varying risks of being sanctioned. Moreover, R_j captures regional characteristics including the local unemployment rate, vacancy rate, gross domestic product, industry structure, and federal state fixed effects, and X_i accounts for individual-level characteristics. Standard errors are clustered at the LEA district level.

4.5.2 Validity of the empirical approach

The underlying assumption of this approach is that two LEA districts with a common border are similar in all relevant characteristics except the sanction intensity. LEA districts represent relatively small geographical entities and delineations of functional local labor markets in Germany typically result in larger geographical entities (see, e.g., [Kropp and Schwengler, 2016](#), who identify 50 local labor market regions, compared to 178 LEA districts). For example, the two largest metropolitan areas in Germany – the Rhine-Ruhr region and the Berlin-Brandenburg area – are home to approximately 10.9 million and 6.2 million residents, respectively. At the same time, they encompass 13 and eight distinct LEA districts each. Multiple LEA districts being part of larger local labor markets makes it likely that bordering LEA districts will exhibit similar characteristics. To empirically support this premise, [Table B.3](#) contrasts disparities in regional labor market indicators – such as unemployment rates, vacancy rates, GDP, etc. – within 487 pairs of neighboring LEAs with differences in randomly selected LEA district pairs (see also [Caliendo *et al.*, 2022](#)). For instance, the average disparity in unemployment rates between two randomly chosen LEA districts is approximately 4.0 percentage points. In contrast, when examining pairs of LEAs that share a common border, this disparity is markedly reduced by about 70%, resulting in a mere 1.2 percentage point difference.

Moreover, we conduct balancing tests regressing the local sanction intensity on a rich set of individual-level characteristics to further examine the validity of our approach. As in our main analysis, we condition on border-pair fixed effects, as well as the set of regional characteristics, and we explore the predictive power of socio-demographic characteristics, labor market histories and personality traits, all variables that have been proven to be important for individuals' labor market success. As shown in [Appendix Table B.4](#), we find very little evidence that individual characteristics as observed in our data are correlated with the conditional sanction intensity (i.e. see p -values at the bottom of [Table B.4](#)).

Another concern relates to the possibility that LEAs with more restrictive sanction regimes also adjust other dimensions of their policy style. In that case, any effect of the sanction intensity

could possibly reflect changes in the usage of other policy instruments rather than sanctions. To test this, we exploit survey data on various dimensions of caseworkers’ counseling activities including notifications about labor market programs (i.e. training, workfare programs, job creation schemes, and start-up subsidies), the number of caseworker meetings, and the provision of vacancy referrals. These variables are the most direct measures of the LEA’s policy style, since they reflect the caseworkers’ information strategy. The findings presented in Appendix Table B.5 provide no evidence that the sanction intensity is related to caseworkers’ counseling activities.

4.5.3 Effect of sanction risk on behavior and beliefs

Table 2 shows the effect of the sanction risk on job seekers’ search effort, wage expectations, and realized wages. In line with standard search-theoretical arguments, a stricter sanction regime seems to motivate unemployed workers to exert more search effort. Specifically, as shown in column (1) of Table 2, a 10 percentage point higher sanction intensity – equivalent to an increase of approximately one standard deviation – raises the number of weekly job applications by about 9.8% ($p = 0.016$). At the same time, the estimates in column (2) reveal that a stricter sanction regime fosters greater optimism among job seekers regarding their earnings potential. Raising the sanction intensity by 10 percentage points increases job seekers’ wage expectations relative to the objective benchmark by about 1.8% ($p = 0.006$). When we differentiate between individuals who overestimate and underestimate the potential wages they could earn, we observe that the sanction intensity impacts both dimensions. Specifically, it significantly enhances optimism (as indicated in column (3)) while concurrently reducing pessimism (as shown in column (4)).

Table 2: Effect of sanction risk on search behavior and accuracy of wage expectations

Dependent variable	Log no. of job applications (1)	Accuracy of wage expectations ^(a)			Log realized net monthly wage ^(b) (5)
		$S_i - O_i$ (2)	$S_i - O_i$ Pos. values (3)	$S_i - O_i$ Neg. values (4)	
Effect of sanction intensity	0.098** (0.040)	0.018*** (0.007)	0.011** (0.005)	0.007*** (0.003)	-0.009 (0.008)
No. of observations	5,669	5,669	5,669	5,669	17,973
Mean dep. variable	1.716	0.125	0.167	-0.042	7.001

Note: The table reports the effect of the local sanction intensity (measured in 10%-points) on job seekers’ search effort (column 1), their subjective wage expectations (columns 2-4), and realized wages (column 5). In all specification, we account for socio-demographic and regional characteristics, as well as border-pair fixed effects. Standard errors clustered at the LEA district level are shown in parentheses. ***/**/* indicate statistical significance at the 1%/5%/10%-level.

^(a) In column (2), the dependent variable is the log difference between subjective belief S_i and objective benchmark O_i . In column (3), we set negative values to zero and thus only exploit variation in positive deviations (“optimism”), while in column (4), we set positive values to zero and thus only exploit variation in negative deviations (“pessimism”).

^(b) In column (5), the dependent variable is the log realized wage of individuals observed in the administrative sample who start regular employment within 24 months after entry into unemployment.

At first glance, these findings may appear somewhat surprising, as an enhanced sanction risk would be presumed to directly influence job seekers to become less selective, leading them to reduce their wage expectations. However, the increased incentives to search can induce indirect effects that foster heightened levels of wage optimism. For example, by submitting a greater number of job applications, job seekers enhance their prospects of attracting job offers that come with particularly higher wages. Moreover, this effect might be reinforced in the presence of negative duration dependence, e.g., due to skill depreciation during the unemployment spell. Job seekers who anticipate finding a job after a shorter period of unemployment due to their intensified search efforts may also anticipate receiving more favorable job offers, since their skills are perceived to have depreciated at a lesser rate (see, e.g., [Nekoei and Weber, 2017](#)). Lastly, it is often emphasized that confidence can be valuable, as it enhances an individual’s motivation to exert effort (see, e.g., [Bénabou and Tirole, 2002](#)). In our context, it is conceivable that job seekers who perceive increased pressure from their caseworkers to submit a greater number of job applications may adjust their perception of the returns from this strategy, thereby holding more optimistic expectations about their potential earnings. This mechanism also aligns with the observation that a greater sanction risk increases job seekers’ wage optimism, yet does not translate into higher realized wages for them.¹⁸ On the contrary, as shown in column (5) of [Table 2](#), realized wages upon reemployment tend to be (insignificantly) lower when job seekers are subject to a more restrictive sanction regime. Therefore, it is possible that job seekers exposed to an increased risk of sanctions only revise their wage expectations as time progresses.

4.6 Labor market implications: descriptive evidence

In the final part of our analysis, we take a closer look at the potential labor market implications of wage optimism. As elaborated upon in [Section 3](#), inaccurate beliefs can yield different consequences for the labor market integration of unemployed workers. On the one hand, optimistic wage expectations can motivate job seekers to exert more effort, thereby facilitating job finding. On the other hand, unemployed individuals who possess unrealistically optimistic wage expectations might exhibit an excessive degree of selectivity and reject job offers more frequently than justified. This in turn may lead to higher realized wages, but may prolong unemployment and cause job seekers to overestimate their reemployment prospects. In what follows, we present descriptive evidence illustrating the empirical significance of these mechanisms. As previously discussed, individuals’ search behavior and their beliefs are closely intertwined, making

¹⁸Note that the effects of the sanction intensity on realized wages are estimated based on a larger sample of job seekers as observed in the administrative records. This is because we cannot utilize regional identifiers for job seekers’ LEA district and therefore do not observe the local sanction intensity when analyzing the linked survey-administrative data (see also [footnote 17](#)).

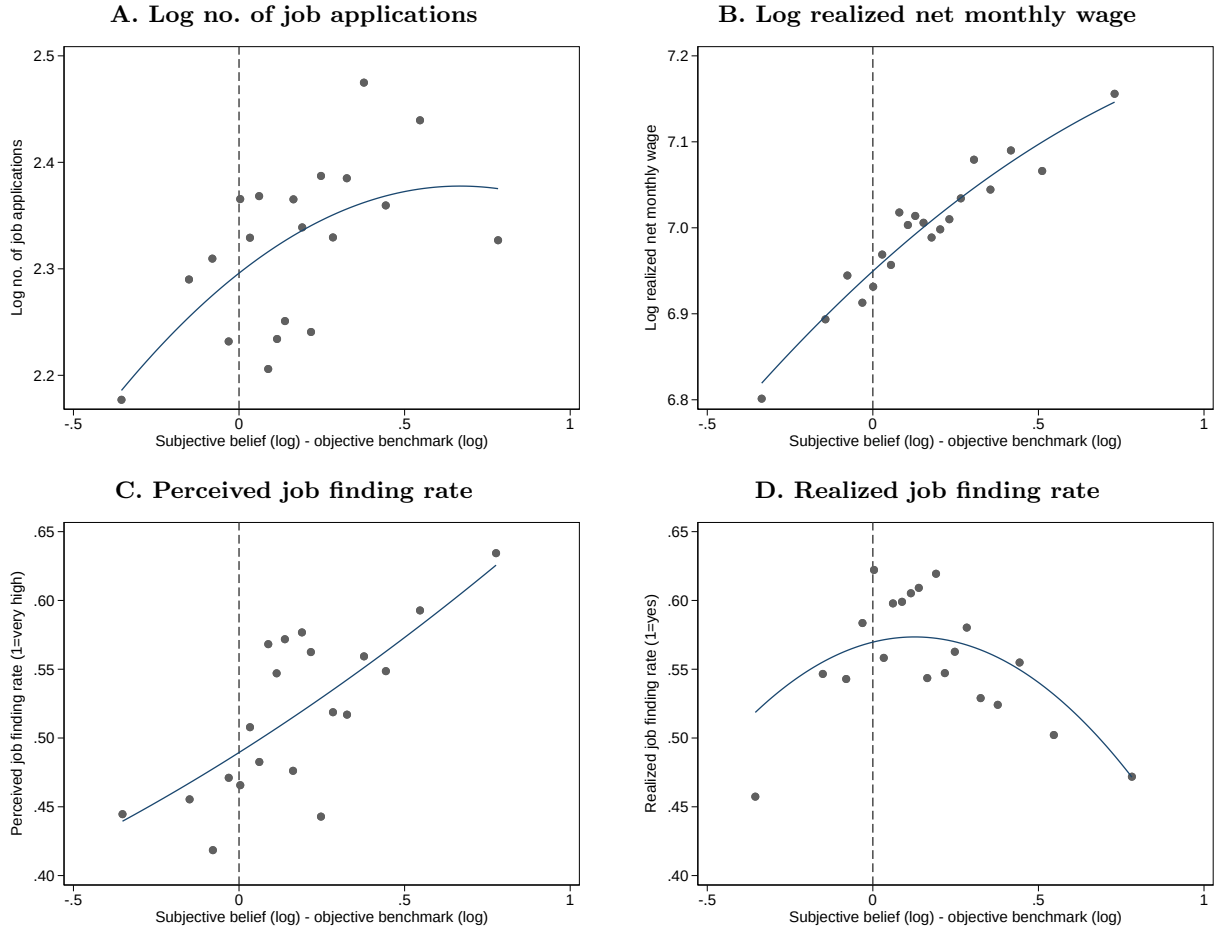
it notoriously challenging to identify the causal effects of optimistic wage expectations on job seekers' search and labor market outcomes. Nonetheless, as we shall see, the data patterns reveal insightful perspectives regarding the importance of the distinct mechanisms at play.

Figure 5 illustrates correlations of job seekers' wage optimism or pessimism with their search effort, realized wages, and perceived and realized job finding rates. Specifically, we depict binned scatter plots conditioning on socio-demographic characteristics and objective benchmarks (Appendix Table B.6 reports the corresponding regression results). We find that the level of wage optimism is positively related to the number of job applications (see Panel A of Figure 5). In particular, job seekers who overestimate their wage by an additional 10% sent out, on average, 1.6% more job applications ($p = 0.001$). Moreover, it turns out that workers who exhibit a greater level of optimism also earn higher wages upon finding a job within two years after the start of the unemployment spell (see Panel B of Figure 5). A wage expectation that is inflated by 10% comes along with approximately 3.1% higher monthly wages ($p < 0.001$) in comparison to individuals who provide an accurate assessment of their earnings potential.

Finally, we examine the relationship between the accuracy of job seekers' wage expectations and their perceived and actual job finding rates, both measured over a period of six months following the interview. This comparison reveals a remarkable pattern. On the one hand, as illustrated in Panel C of Figure 5, there is a positive and almost linear relationship between wage optimism and the perceived job finding probability. This suggests that job seekers who are most optimistic about their reemployment wages also report the highest perceived chances of finding a job. On the other hand, Panel D of Figure 5 shows a non-linear connection between the accuracy of individuals' wage expectations and their actual job finding rates. Specifically, job seekers who hold relatively accurate beliefs about their reemployment wage have the highest likelihood of finding a job within six months, whereas those who over- or underestimate their earnings potential face reduced reemployment rates. Consequently, our results suggest that the more optimistic workers are about the wages they can earn upon reemployment, the higher the likelihood that they will overestimate their prospects of finding a job.

Taken together, the observed pattern aligns with the notion that optimistic job seekers, upon receiving wage offers they deem to be "too low", exhibit an excessive degree of selectivity. Therefore, they may earn higher wages, but prolong the duration of unemployment beyond their initial expectations, resulting in a wedge between the true and perceived job finding rates. Concurrently, wage optimism can serve as a motivation to search more intensively, potentially explaining the positive correlation between optimistic beliefs and search effort. However, it appears that the impact of heightened effort on job finding is outweighed by the increased

Figure 5: Descriptive evidence on labor market implications



Note: The figure shows binned scatter plots (with 20 bins) of individuals' search effort, realized reemployment wage, and perceived and realized six-months-ahead job finding rates against their wage belief inaccuracy (defined as the log difference between subjective belief S_i and objective benchmark O_i). The blue line shows a quadratic fit for the conditional means after residualizing against socio-demographic characteristics (gender, age categories, German citizen, education categories, married, any children, East Germany) and the objective benchmark. The corresponding regression results are reported in Appendix Table B.6.

selectivity linked to job seekers' excessive optimism.

4.7 What causes overly optimistic wage expectations?

Gaining insight into the reasons behind the observed average optimism and the heterogeneity in belief inaccuracies is essential to draw meaningful conclusions about how to assist the unemployed in making better decisions during their job search. With this in mind, we will now discuss our results against existing theoretical and empirical evidence related to job seekers' belief formation.

Limited information: While psychologists and economists offer numerous explanations for why individuals make systematic judgment errors (see, e.g. Benjamin, 2019, for an overview), it is often emphasized in the job search literature that unemployed workers may have incomplete

information about the labor market (Burdett and Vishwanath, 1988; Gonzalez and Shi, 2010). After all, job search is a complex endeavor and there is relatively little information and feedback that may help job seekers to navigate this process. Various pieces of existing evidence support the notion that information frictions about workers’ earnings potential play a significant role and may contribute to job seekers’ overly optimistic wage expectations. For example, Conlon *et al.* (2018) demonstrate that job seekers’ expectations of wage offers increase when they receive an offer exceeding their initial expectations. Additionally, information regarding the salaries of comparable individuals has been shown to impact workers’ beliefs about their outside options (Jäger *et al.*, 2023) and women’s willingness to ask for higher wages (Roussille, 2022). Related to this notion, a growing body of literature suggests that providing workers with information about the salaries of their peers narrows co-worker wage gaps (Baker *et al.*, 2023; Cullen and Pakzad-Hurson, 2023) and affects workers’ motivation (Card *et al.*, 2012; Breza *et al.*, 2018; Cullen and Perez-Truglia, 2022).

We also find evidence supporting the idea that information frictions impact the formation of beliefs among unemployed workers in our context. As discussed in Section 4.2, we observe that job seekers with greater unemployment experience and those who receive more advice from their caseworkers tend to hold more accurate earnings expectations. Moreover, the anchoring of beliefs to pre-unemployment wages, as documented in Section 4.3, may stem from workers’ having incomplete information, leading them to utilize their previous wage as a signal for their wage upon reemployment. These observations align with the notion that acquiring additional information can mitigate job seekers’ tendency to be overly optimistic. Against this backdrop, one may expect that a policy offering job seekers precise information about their potential earnings may improve the accuracy of job seekers’ beliefs.

Motivated reasoning and selective recall: An alternative explanation for the divergence between perceived and actual outcomes relates to the way individuals process the available information. It is commonly argued that subjective beliefs serve essential psychological needs (see, e.g., Bénabou and Tirole, 2016, for an overview). For instance, individuals may hold unrealistically positive beliefs because they derive direct utility from maintaining a positive self-image (Brunnermeier and Parker, 2005; Köszegi, 2006), they aim to enhance their motivation and overcome self-control problems (Bénabou and Tirole, 2002), or they use optimism as a signal to convince others about one’s abilities (Burks *et al.*, 2013). Consistent with these ideas, our findings indicate higher levels of overoptimism among job seekers with a lower objective earnings potential. It appears plausible that this specific group of unemployed workers may have a heightened desire for motivated beliefs compared to individuals who can reasonably anticipate

higher wages.

Motivated beliefs may impact not only job seekers' overall tendency to be overly optimistic, but also how they process feedback. In particular, [Bénabou and Tirole \(2002, 2004\)](#) suggest selective recall – that is, individuals deliberately managing to forget or suppress negative feedback – as a way to sustain overly optimistic beliefs even when faced with repeated negative feedback.¹⁹ In this context, two of our results are particularly noteworthy. First, especially job seekers who are predicted to experience a wage decline compared to their previous job tend to exhibit overly optimistic beliefs and anchor their wage expectations too strongly to their past salary, whereas job seekers who have reasons to anticipate a wage increase have relatively accurate expectations (see [Section 4.3](#)). Second, we find that job seekers who remain unemployed for an extended period are reluctant to revise their wage expectations downwards. Those who initially overestimate their earnings potential by up to 17% even increase their wage expectations over time (see [Section 4.4](#)). These findings are consistent with the notion that job seekers do not fully internalize the negative feedback they receive during the search process.

Lastly, the result that job seekers who perceive greater extrinsic incentives to apply for jobs hold more optimistic wage expectations (see [Section 4.5](#)), while not experiencing an increase in actual wages, can be explained by models of motivated beliefs as well. Specifically, when job seekers face an elevated risk of sanctions for non-compliance with search requirements, they may adjust their expectations about the potential returns of submitting job applications as a way to motivate themselves. In other words, they may adopt a more optimistic outlook to compensate for the expected loss in utility resulting from the threat of financial penalties.

The existence of motivated beliefs carries implications for policymakers seeking to assist job seekers in their search process. First, it is not immediately evident whether implementing policies to reduce overoptimism is advisable if optimistic beliefs help sustain high levels of motivation among job seekers. Second, interventions aiming to correct belief inaccuracies may not be effective if job seekers forget or suppress negative feedback in order to sustain optimistic beliefs. To reduce selective processing of information, it may help to provide feedback in a way that is less likely to be perceived by job seekers as “ego threatening”.

¹⁹Aligning with these theoretical ideas, [Zimmermann \(2020\)](#) demonstrates in a lab experiment that positive feedback regarding individuals' relative performance has a lasting impact on their beliefs, while negative feedback affects subjective beliefs only in the short term. Moreover, [Huffman *et al.* \(2022\)](#) provide empirical evidence, both through reduced-form analysis and structural modeling, indicating that managers who participate repeatedly in high-powered tournament incentive systems tend to make overly optimistic predictions about their future performance. These predictions are associated with an inclination toward overly positive recollections of their past performance.

5 Conclusion

Job seekers' misperceptions about the labor market can distort their decision-making and prolong unemployment. In our study, we have established objective benchmarks for the subjective wage expectations of unemployed workers, which provide intriguing insights along four important dimensions.

First, we have discovered significant variation in the levels of optimism and pessimism among different groups of unemployed individuals. Notably, those with lower objective earnings potential, particularly individuals expected to experience a wage decline compared to their previous job, tend to display remarkably overoptimistic beliefs. Second, when exploring repeatedly elicited wage expectations, we find that the overoptimism among the group of long-term unemployed workers remains persistent throughout the unemployment spell. This reluctance to adapt expectations might be one factor hindering their labor market integration. Third, our results show that unemployed workers who face greater incentives to search for and accept jobs – and who consequently increase the number of job applications – become even more optimistic about the potential wages they can earn upon reemployment. This heightened optimism potentially serves as an additional factor motivating them to intensify their job search efforts.

Finally, we have established a clear connection between overly optimistic wage expectations and job seekers' tendency to overestimate their prospects of reemployment. This finding holds significant implications for policymakers committed to preventing long-term unemployment. To be more precise, our results suggest a wedge between the perceived and actual job finding rates for increasing levels of wage optimism. This aligns with the idea that inaccurate beliefs may incur decision-making costs, because overly optimistic job seekers may prolong unemployment by being excessively selective with respect to the jobs they accept. Against this backdrop, encouraging job seekers to revise their overly ambitious aspirations could present an attractive path for labor market policy focused on enhancing the reemployment prospects of unemployed workers.

While the combination of survey data and administrative records offers valuable insights into the interrelation of individuals' beliefs, their job search behavior, and their actual labor market outcomes, it is clear that our setting does not come without limitations. First of all, it is important to note that individuals may possess private information about their earnings potential that is not accounted for in our benchmarks. This poses a significant challenge in identifying misperceptions at the individual level, and has the potential to influence the relationship between subjective beliefs and job search or labor market outcomes. The ideal survey should elicit individuals' beliefs not only about their own earnings potential, but also about primitives,

such as the perceived returns to search and the distribution of wage offers, to reduce issues of reverse causality. Moreover, one could hope to improve the accuracy of objective benchmarks by conditioning on a richer set of commonly unobserved individual characteristics. These could, for instance, include workers' personality traits, their non-cognitive skills, or their preferences over non-wage job characteristics.

Acknowledging these limitations, we consider our analysis as an important step toward opening the black box of how job seekers form their beliefs and how beliefs can affect their decisions while searching for jobs. Notably, various pieces of evidence substantiate the idea that motivated beliefs have a significant influence on job seekers' tendency to be overly optimistic about their labor market prospects. Simultaneously, we recognize that other factors, such as information frictions, may be at work as well, and untangling these distinct explanations presents an intriguing avenue for future research. For instance, it would be particularly interesting to provide a randomly selected group of job seekers with information about their objective earnings potential and analyze the consequences for their behavior and reemployment prospects. Such an approach would help to assess the significance of information frictions in influencing job seekers' decision-making and outcomes during the job search process. At the same time, analyzing how job seekers recall the provided information and update their beliefs depending on their priors could offer further insights into the role of motivated beliefs.

References

- ADAMS-PRASSL, A., BONEVA, T., GOLIN, M. and RAUH, C. (2023). Perceived returns to job search. *Labour Economics*, **80**, 102307. [1](#)
- AHRENS, A., HANSEN, C. B. and SCHAFFER, M. E. (2018). Lassopack: Stata module for lasso, square-root lasso, elastic net, ridge, adaptive lasso estimation and cross-validation. [37](#)
- , — and — (2020). lassopack: Model selection and prediction with regularized regression in stata. *Stata Journal*, **20** (1), 176–235. [37](#)
- ALTMANN, S., FALK, A., JAEGER, S. and ZIMMERMANN, F. (2018). Learning about job search: A field experiment with job seekers in germany. *Journal of Public Economics*, **164**, 33–49. [3](#)
- , GLENNY, A., MAHLSTEDT, R. and SEBALD, A. (2022). The direct and indirect effects of online job search advice. *IZA Discussion Paper No. 15830*. [3](#)
- ANDRISANI, P. J. (1977). Internal-external attitudes, personal initiative, and the labor market experience of black and white men. *Journal of Human Resources*, **12** (3), 308–328. [17](#)
- ARNI, P., CALIENDO, M., KÜNN, S. and ZIMMERMANN, K. (2014). The IZA Evaluation Dataset Survey: A Scientific Use File. *IZA Journal of European Labor Studies*, **3** (6). [5](#)
- , LALIVE, R. and VAN OURS, J. C. (2013). How effective are unemployment benefit sanctions? looking beyond unemployment exit. *Journal of Applied Econometrics*, **28** (7), 1153–1178. [5](#)
- ARULAMPALAM, W. (2001). Is unemployment really scarring? effects of unemployment experiences on wages. *The Economic Journal*, **111** (475), 585–606. [2](#), [17](#)
- ATTANASIO, O. P. and KAUFMANN, K. M. (2014). Education choices and returns to schooling: Mothers’ and youths’ subjective expectations and their role by gender. *Journal of Development Economics*, **109**, 203–216. [16](#)
- BAKER, M., HALBERSTAM, Y., KROFT, K., MAS, A. and MESSACAR, D. (2023). Pay transparency and the gender gap. *American Economic Journal: Applied Economics*, **15** (2), 157–183. [28](#)
- BALLEER, A., DUERNECKER, G., FORSTNER, S. K. and GOENSCH, J. (2021). The effects of biased labor market expectations on consumption, wealth inequality, and welfare. *CEifo Working Paper No. 9326*. [1](#), [4](#), [8](#), [16](#)
- BARBER, B. M. and ODEAN, T. (2001). Boys will be boys: Gender, overconfidence, and common stock investment. *Quarterly Journal of Economics*, **116** (1), 261–292. [14](#)
- BEHAGHEL, L., DROMUNDO MOKRANI, S., GURGAND, M., HAZARD, Y. and ZUBER, T. (2022). Encouraging and directing job search: Direct and spillover effects in a large scale experiment. *Banque de France Working Paper No. 900*. [3](#)
- BEHNCKE, S., FRÖLICH, M. and LECHNER, M. (2010). Unemployed and their caseworkers: should they be friends or foes? *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, **173** (1), 67–92. [17](#)
- BELOT, M., KIRCHER, P. and MULLER, P. (2019). Providing advice to jobseekers at low cost: An experimental study on online advice. *Review of Economic Studies*, **86** (4), 1411–1447. [1](#), [3](#)
- , — and — (2022). Do the long-term unemployed benefit from automated occupational advice during online job search? *IZA Discussion Paper No. 15452*. [3](#)
- BEN DHIA, A., CRÉPON, B., MBIH, E., PAUL-DELVAUX, L., PICARD, B. and PONS, V. (2022). Can a website bring unemployment down? experimental evidence from france. *NBER Working Paper No. 29914*. [3](#)
- BÉNABOU, R. and TIROLE, J. (2002). Self-confidence and personal motivation. *Quarterly Journal of Economics*, **117** (3), 871–915. [4](#), [10](#), [25](#), [28](#), [29](#)

- and TIROLE, J. (2004). Willpower and personal rules. *Journal of Political Economy*, **112** (4), 848–886. [4](#), [29](#)
- and TIROLE, J. (2016). Mindful economics: The production, consumption, and value of beliefs. *Journal of Economic Perspectives*, **30** (3), 141–164. [4](#), [28](#)
- BENJAMIN, D. J. (2019). Errors in probabilistic reasoning and judgment biases. *Handbook of Behavioral Economics: Applications and Foundations 1*, **2**, 69–186. [27](#)
- BHANDARI, G. and DEAVES, R. (2006). The demographics of overconfidence. *Journal of Behavioral Finance*, **7** (1), 5–11. [16](#)
- BOOCKMANN, B., L. THOMSEN, S. and WALTER, T. (2014). Intensifying the use of benefit sanctions: an effective tool to increase employment? *IZA Journal of Labor Policy*, **3**, 1–19. [21](#)
- BORDALO, P., COFFMAN, K., GENNAIOLI, N., SCHWERTER, F. and SHLEIFER, A. (2021). Memory and representativeness. *Psychological Review*, **128** (1), 71. [4](#), [10](#)
- , GENNAIOLI, N. and SHLEIFER, A. (2020). Memory, attention, and choice. *Quarterly Journal of Economics*, **135** (3), 1399–1442. [4](#)
- BREZA, E., KAUR, S. and SHAMDASANI, Y. (2018). The morale effects of pay inequality. *Quarterly Journal of Economics*, **133** (2), 611–663. [28](#)
- BRUNNERMEIER, M. K. and PARKER, J. A. (2005). Optimal expectations. *American Economic Review*, **95** (4), 1092–1118. [28](#)
- BURDETT, K. and VISHWANATH, T. (1988). Declining reservation wages and learning. *Review of Economic Studies*, **55** (4), 655–665. [3](#), [10](#), [19](#), [28](#)
- BURKS, S. V., CARPENTER, J. P., GOETTE, L. and RUSTICHINI, A. (2013). Overconfidence and social signalling. *Review of Economic Studies*, **80** (3), 949–983. [28](#)
- CALIENDO, M., COBB-CLARK, D. and UHLENDORFF, A. (2015). Locus of control and job search strategies. *Review of Economics and Statistics*, **97** (1), 88–103. [16](#)
- , FALK, A., KAISER, L., SCHNEIDER, H., UHLENDORFF, A., VAN DEN BERG, G. and ZIMMERMANN, K. (2011). The IZA Evaluation Dataset: Towards evidence-based labor policy making. *International Journal of Manpower*, **32**, 731–752. [6](#)
- , KÜNN, S. and MAHLSTEDT, R. (2022). The intended and unintended effects of promoting labor market mobility. *IZA Discussion Paper No. 15011*. [22](#), [23](#)
- , LEE, W.-S. and MAHLSTEDT, R. (2017). The gender wage gap and the role of reservation wages: New evidence for unemployed workers. *Journal of Economic Behavior & Organization*, **136**, 161–173. [14](#)
- CARD, D., MAS, A., MORETTI, E. and SAEZ, E. (2012). Inequality at work: The effect of peer salaries on job satisfaction. *American Economic Review*, **102** (6), 2981–3003. [28](#)
- CONLON, J. J., PILOSSOPH, L., WISWALL, M. and ZAFAR, B. (2018). Labor market search with imperfect information and learning. *NBER Working Paper No. 24988*. [3](#), [4](#), [10](#), [11](#), [19](#), [28](#)
- CORTÉS, P., PAN, J., REUBEN, E., PILOSSOPH, L. and ZAFAR, B. (2022). Gender differences in job search and the earnings gap: Evidence from the field and lab. *NBER Working Paper No. 28820*. [14](#)
- CULLEN, Z. B. and PAKZAD-HURSON, B. (2023). Equilibrium effects of pay transparency. *Econometrica*, **91** (3), 765–802. [28](#)
- and PEREZ-TRUGLIA, R. (2022). How much does your boss make? the effects of salary comparisons. *Journal of Political Economy*, **130** (3), 766–822. [28](#)
- DOERR, A. and KRUPPE, T. (2015). Training vouchers, local employment agencies, and policy styles. *Journal for Labour Market Research*, **48** (1), 41–56. [21](#)

- DRAHS, S., HAYWOOD, L. and SCHIPROWSKI, A. (2018). Job search with subjective wage expectations. *DIW Discussion Papers No. 1725*. 4
- DRENIK, A., JÄGER, S., PLOTKIN, P. and SCHOEFER, B. (2020). Paying outsourced labor: Direct evidence from linked temp agency-worker-client data. *Review of Economics and Statistics*, pp. 1–28. 13
- DUBE, A., LESTER, T. W. and REICH, M. (2010). Minimum wage effects across state borders: Estimates using contiguous counties. *Review of Economics and Statistics*, **92** (4), 945–964. 22
- DUBRA, J. (2004). Optimism and overconfidence in search. *Review of Economic Dynamics*, **7** (1), 198–218. 3, 11
- EBERLE, J., MAHLSTEDT, R. and SCHMUCKER, A. (2017). *IZA/IAB Linked Evaluation Dataset 1993-2010*. FDZ-Datenreport 2/2017, Research Data Centre of the German Federal Employment Agency at the Institute for Employment Research. 6
- and SCHMUCKER, A. (2015). *IZA/IAB Administrativer Evaluationsdatensatz (AED) 1993-2010*. FDZ-Datenreport 3/2015, Research Data Centre of the German Federal Employment Agency at the Institute for Employment Research. 6
- ERIKSSON, S. and ROTH, D.-O. (2014). Do employers use unemployment as a sorting criterion when hiring? evidence from a field experiment. *American Economic Review*, **104** (3), 1014–1039. 20
- FELDSTEIN, M. and POTERBA, J. (1984). Unemployment insurance and reservation wages. *Journal of Public Economics*, **23** (1-2), 141–167. 17
- FERTIG, M., SCHMIDT, C. and SCHNEIDER, H. (2006). Active labor market policy in germany: Is there a successful policy strategy? *Regional Science and Urban Economics*, **36** (3), 399–430. 21
- GENNAIOLI, N. and SHLEIFER, A. (2010). What comes to mind. *Quarterly Journal of Economics*, **125** (4), 1399–1433. 4, 10
- GONZALEZ, F. M. and SHI, S. (2010). An equilibrium theory of learning, search, and wages. *Econometrica*, **78** (2), 509–537. 3, 10, 19, 28
- GREGORY, M. and JUKES, R. (2001). Unemployment and subsequent earnings: estimating scarring among british men 1984–94. *The Economic Journal*, **111** (475), 607–625. 2, 17
- HECKMAN, J. J., STIXRUD, J. and URZUA, S. (2006). The effects of cognitive and noncognitive abilities on labor market outcomes and social behavior. *Journal of Labor economics*, **24** (3), 411–482. 17
- HEIDHUES, P., KÓSZEGI, B. and STRACK, P. (2018). Unrealistic expectations and misguided learning. *Econometrica*, **86** (4), 1159–1214. 11
- HEINECK, G. and ANGER, S. (2010). The returns to cognitive abilities and personality traits in germany. *Labour Economics*, **17** (3), 535–546. 17
- HUFFMAN, D., RAYMOND, C. and SHVETS, J. (2022). Persistent overconfidence and biased memory: Evidence from managers. *American Economic Review*, **112** (10), 3141–75. 11, 29
- JÄGER, S., ROTH, C., ROUSSILLE, N. and SCHOEFER, B. (2023). Worker beliefs about outside options. *NBER Working Paper No. 29623*. 1, 3, 4, 10, 12, 13, 18, 19, 28
- JENSEN, R. (2010). The (perceived) returns to education and the demand for schooling. *Quarterly Journal of Economics*, **125** (2), 515–548. 16
- KAHNEMAN, D., SLOVIC, P. and TVERSKY, A. (1982). *Judgment under uncertainty: Heuristics and biases*. Cambridge university press. 17
- KOENIG, F., MANNING, A. and PETRONGOLO, B. (2021). Reservation wages and the wage flexibility puzzle. *Unpublished Manuscript*. 17

- KÖSZEGI, B. (2006). Ego utility, overconfidence, and task choice. *Journal of the European Economic Association*, **4** (4), 673–707. [10](#), [28](#)
- KROFT, K., LANGE, F. and NOTOWIDIGDO, M. J. (2013). Duration dependence and labor market conditions: Evidence from a field experiment. *Quarterly Journal of Economics*, **128** (3), 1123–1167. [20](#)
- KROPP, P. and SCHWENGLER, B. (2016). Three-step method for delineating functional labour market regions. *Regional Studies*, **50** (3), 429–445. [23](#)
- KRUEGER, A. B. and MUELLER, A. I. (2016). A contribution to the empirics of reservation wages. *American Economic Journal: Economic Policy*, **8** (1), 142–79. [1](#), [4](#), [5](#), [17](#), [19](#)
- LE BARBANCHON, T., RATHELOT, R. and ROULET, A. (2019). Unemployment insurance and reservation wages: Evidence from administrative data. *Journal of Public Economics*, **171**, 1–17. [5](#), [17](#)
- LICHTER, A. and SCHIPROWSKI, A. (2021). Benefit duration, job search behavior and re-employment. *Journal of Public Economics*, **193**, 104326. [5](#)
- MARINESCU, I. (2017). The general equilibrium impacts of unemployment insurance: Evidence from a large online job board. *Journal of Public Economics*, **150**, 14–29. [5](#)
- MCGEE, A. D. (2015). How the perception of control influences unemployed job search. *ILR Review*, **68** (1), 184–211. [16](#)
- MUELLER, A. I. and SPINNEWIJN, J. (2023). Expectations data, labor market and job search. *Handbook of Economic Expectations*, **Chapter 22**, 677–713. [1](#), [4](#), [9](#)
- , — and TOPA, G. (2021). Job seekers’ perceptions and employment prospects: Heterogeneity, duration dependence, and bias. *American Economic Review*, **111** (1), 324–63. [1](#), [3](#), [4](#), [8](#), [11](#), [19](#)
- MUELLER, G. and PLUG, E. (2006). Estimating the effect of personality on male and female earnings. *ILR Review*, pp. 3–22. [17](#)
- NEKOEI, A. and WEBER, A. (2017). Does extending unemployment benefits improve job quality? *American Economic Review*, **107** (2), 527–61. [25](#)
- ROUSSILLE, N. (2022). The central role of the ask gap in gender pay inequality. *Unpublished Manuscript*. [28](#)
- SCHIPROWSKI, A. (2020). The role of caseworkers in unemployment insurance: Evidence from unplanned absences. *Journal of Labor Economics*, **38** (4), 1189–1225. [17](#)
- SCHMIEDER, J. F., VON WACHTER, T. and BENDER, S. (2016). The effect of unemployment benefits and nonemployment durations on wages. *American Economic Review*, **106** (3), 739–777. [20](#)
- SCHNEIDER, J. (2008). The effect of unemployment benefit ii sanctions on reservation wages. *IAB Discussion Paper 19/2008*. [5](#)
- SEMYKINA, A. and LINZ, S. J. (2007). Gender differences in personality and earnings: Evidence from russia. *Journal of Economic Psychology*, **28** (3), 387–410. [17](#)
- SPINNEWIJN, J. (2015). Unemployed but optimistic: Optimal insurance design with biased beliefs. *Journal of the European Economic Association*, **13** (1), 130–167. [1](#), [4](#), [8](#)
- STINEBRICKNER, T. and STINEBRICKNER, R. (2012). Learning about academic ability and the college dropout decision. *Journal of Labor Economics*, **30** (4), 707–748. [16](#)
- TREJOS, C., VAN DEEMEN, A., RODRÍGUEZ, Y. E. and GOMEZ, J. M. (2019). Overconfidence and disposition effect in the stock market: A micro world based setting. *Journal of Behavioral and Experimental Finance*, **21**, 61–69. [16](#)

- TVERSKY, A. and KAHNEMAN, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology*, **5** (2), 207–232. [10](#)
- VAN DEN BERG, G. J., HOFMANN, B. and UHLENDORFF, A. (2019). Evaluating vacancy referrals and the roles of sanctions and sickness absence. *The Economic Journal*, **129** (624), 3292–3322. [5](#)
- , KUNASCHK, M., LANG, J., STEPHAN, G. and UHLENDORFF, A. (2023). Predicting re-employment: Machine learning versus assessments by unemployed workers and by their caseworkers. *IZA Discussion Paper No. 16426*. [4](#), [38](#)
- and VIKSTRÖM, J. (2014). Monitoring job offer decisions, punishments, exit to work, and job quality. *Scandinavian Journal of Economics*, **116** (2), 284–334. [5](#)
- WISWALL, M. and ZAFAR, B. (2015). Determinants of college major choice: Identification using an information experiment. *Review of Economic Studies*, **82** (2), 791–824. [16](#)
- ZIMMERMANN, F. (2020). The dynamics of motivated beliefs. *American Economic Review*, **110** (2), 337–61. [11](#), [29](#)

Online Appendix

A Further Details on Objective Benchmarks

In the following, we present details about the prediction of objective benchmarks for job seekers' reemployment wages.

Covariates: Monthly wages are modeled as a function of covariates which are pre-determined at the time of unemployment entry. We exploit a rich set of characteristics that are available in both the *IZA/IAB Linked Evaluation Dataset* (LED) and the *IZA/IAB Administrative Evaluation Dataset* (AED). These include sociodemographic information (e.g. gender, age, education, family status), characteristics of the last job before unemployment (wage, part- versus full-time job), detailed information on the labor market biography in the last 10 years (e.g. months employed, unemployed, and in labor market programs), and local labor market characteristics (unemployment rate, East versus West German residency). To allow for a flexible functional form, we also use third-order polynomial terms of all continuous variables and first-order interaction terms of all variables with some important characteristics (gender, age, education, East German residency, last wage). See Table A.2 for a complete list of all the 717 included covariates.

LASSO regression: To address the high-dimensional nature of the data and to avoid overfitting, we estimate LASSO regressions, which add a regularization term to the objective function and shrink some coefficients to zero. Specifically, we estimate a linear LASSO regression for wages and a logistic LASSO regression for job finding probabilities.²⁰ We optimized the regularization parameter λ using five-fold cross-validation in the training data and considering the following values for λ : 0.001, 0.01, 0.1, 1, 10, 100, 1000. In the estimated models, 66% of all covariates are selected.

Prediction quality: In Table A.3, we evaluate the out-of-sample predictive performance of the LASSO model. Results are presented for the different training samples (AED 01/2005 - 06/2007 or 80% of AED 06/2007 - 06/2008) and test samples (80% of AED 06/2007 - 06/2008 or LED). We calculate the out-of-sample R^2 obtained from a regression of realized gross wages on predicted wages in the test data. The predictions explain between 48% and 53% of the out-of-sample variation. Note that the predictive performance is similar for the two different training samples. The correlation of predictions between both samples is also very high (0.976).

²⁰We use the Stata commands `lasso2` from the `lassopack` developed by Ahrens *et al.* (2018, 2020).

Results in Table A.3 are based on gross wages. For our analyses, we convert the predicted gross wage into net terms (see procedure below). For the converted net wage predictions in the LED sample, we can compare the explanatory power of objective predictions with that of respondents' subjective beliefs. The results in Table A.4 demonstrate that our lasso model is better at predicting realized wages than job seekers themselves are: while job seekers' beliefs explain 41% of the variation in realized net wages, the objective benchmarks explain 56%.²¹

Converting gross to net wages: Wage beliefs in the survey are elicited in net terms, while the administrative data provide realized wages in gross terms. We therefore convert gross into net wages by deducting social security contributions and wage taxes.

Wage taxes are withheld by the employer and deducted from the monthly wage payment. They qualify as a pre-payment of the income tax in case the employee files an annual income tax declaration. We do not perform a complete income tax calculation since we do not have information on individual-specific deductions and other income sources. Moreover, individuals most likely think about their monthly payroll when asked about their net wage. Rather, we calculate withheld wage taxes utilizing contribution and tax schedules of 2008 and taking into account variation in rates according to partnership status, number of children, age, and East versus West German residency.

Exemption thresholds in the wage tax schedule depend on the tax class of the individual. While single individuals without children are always in class I and single parents are always in class II, married couples may choose between a combination of classes IV/IV or III/V. With IV/IV, the standard exemption threshold is applied to both spouses, whereas with III/V the higher-earning spouse obtains twice the standard exemption rate while the second earner is already taxed at lower earnings. Although we do not directly observe the chosen tax classes for married couples, we can infer them from the observed UI benefit payments.²² UI benefits are generally calculated by the following formula: $\text{Monthly benefit} = 0.6 \times (\text{Average monthly gross wage in last 12 months before unemployment} - \text{Wage tax} - \text{SolZ} - \text{Social security payment})$. Thus, the relation between previous gross wages and UI benefits depends on the chosen tax class. We exploit this relation by calculating the hypothetical benefits under tax classes III, IV, and V and then choose the tax class that minimizes the difference between the actual observed and the hypothetical benefit payments. The derived tax classes match well-known descriptives about taxation of married couples in Germany. For instance, tax class V is chosen more frequently by women than men and this type of splitting is more prevalent in West than in East Germany.

²¹This result is in line with the evidence provided by [Van den Berg *et al.* \(2023\)](#) who find that machine learning predictions have higher explanatory power for reemployment probabilities than job seekers' self assessments.

²²We thank Jacob Wegmann for this suggestion.

Table A.1: Summary statistics: LED versus AED samples

	LED	AED 01/2005 - 05/2007	AED 06/2007 - 05/2008
No. of observations	5,376	84,617	21,715
Reemployment wage (gross, per month) ^(a)	1,782	1,704	1,716
Socio-demographic characteristics			
Female	0.41	0.35	0.37
Age	36.16	35.11	34.90
School leaving degree			
lower secondary degree	0.31	0.38	0.35
middle secondary degree	0.44	0.39	0.40
upper secondary degree	0.23	0.18	0.21
Further education			
vocational certificate	0.72	0.68	0.68
university degree	0.20	0.16	0.19
German citizen	0.94	0.91	0.91
Married	0.39	0.45	0.43
Number of children			
one child	0.18	0.16	0.17
two or more children	0.12	0.14	0.13
Last job			
Wage in last job (gross, per month)	1,726	1,688	1,696
Last job was quit by individual	0.06	0.07	0.09
Labor market history			
# of employers in last 2 years	2.55	1.49	1.61
# of employers in last 10 years	4.64	3.13	3.45
# of UE spells in last 2 years	1.41	0.59	0.44
# of ALMP programs in last 2 years	0.42	0.17	0.21
Duration of last UE spell in months	5.09	5.34	5.80
# of months employed in year t-1	8.64	10.74	10.92
# of months employed in year t-2	7.86	9.27	9.14
# of months employed in year t-3	7.50	8.38	7.73
# of months employed in years t-4 to t-10	46.12	43.18	40.20
# of months unemployed in year t-1	0.79	0.86	0.61
# of months unemployed in year t-2	1.07	1.57	1.49
# of months unemployed in year t-3	1.29	1.75	2.19
# of months unemployed in years t-4 to t-10	8.81	8.37	10.42
# of months in ALMP in year t-1	0.60	0.22	0.25
# of months in ALMP in year t-2	0.68	0.53	0.57
# of months in ALMP in year t-3	0.63	0.61	0.61
# of months in ALMP in years t-4 to t-10	1.35	1.20	1.42
Average wage in year t-1 (quintiles)	3.17	3.25	3.19
Average wage in year t-2 (quintiles)	2.97	3.00	2.89
Average wage in year t-3 (quintiles)	2.78	2.81	2.59
Average wage in years t-4 to t-10 (quintiles)	17.88	17.01	16.41
Local labor market			
West, UE rate <3%	0.02	0.00	0.01
West, UE rate 3-6%	0.29	0.07	0.26
West, UE rate 6-9%	0.25	0.24	0.26
West, UE rate >9%	0.11	0.39	0.18
East, UE rate <12%	0.07	0.00	0.04
East, UE rate 12-14%	0.10	0.01	0.08
East, UE rate 14-16%	0.10	0.05	0.12
East, UE rate >16%	0.04	0.23	0.05

Note: The table compares the mean characteristics of the survey sample (LED) with those of the two administrative samples used for the prediction of objective benchmarks (AED).

^(a)Realized wages are observed for individuals who start a regular job within 24 months after unemployment entry.

Table A.2: List of covariates used to generate objective benchmarks

Type	Covariate
Socio-demographic characteristics	
Continuous	Age
Categorical	Female
	School degree (4 categories: none, lower sec. degree, middle sec. degree, upper sec. degree)
	Further education (3 categories: none, vocational certificate, university degree)
	German citizen
	Married
	# of children (3 categories: 0, 1, ≥ 2)
Last job	
Continuous	Wage in last job (gross, per month)
Categorical	Last job was quit by individual
Labor market history	
Continuous	Duration of last UE spell in months
	# of months employed in year t-1
	# of months employed in year t-2
	# of months employed in year t-3
	# of months employed in years t-4 to t-10
	# of months unemployed in year t-1
	# of months unemployed in year t-2
	# of months unemployed in year t-3
	# of months unemployed in years t-4 to t-10
	# of months in ALMP in year t-1
	# of months in ALMP in year t-2
	# of months in ALMP in year t-3
	# of months in ALMP in years t-4 to t-10
Categorical	# of employers in last 2 years (5 categories)
	# of employers in last 10 years (5 categories)
	# of UE spells in last 2 years (5 categories)
	# of ALMP programs in last 2 years (5 categories)
	Average wage in year t-1 (5 categories)
	Average wage in year t-2 (5 categories)
	Average wage in year t-3 (5 categories)
	Average wage in years t-4 to t-10 (5 categories)
	All months regularly employed in year t-1
	Zero months regularly employed in year t-2
	All months regularly employed in year t-2
	Zero months regularly employed in year t-3
	All months regularly employed in year t-3
	Zero months regularly employed in years t-4 to t-10
	All months regularly employed in years t-4 to t-10
	Zero months unemployed in year t-1
	Zero months unemployed in year t-2
	Zero months unemployed in year t-3
	Zero months unemployed in years t-4 to t-10
	Zero months in ALMP in year t-1
	Zero months in ALMP in year t-2
	Zero months in ALMP in year t-3
	Zero months in ALMP in years t-4 to t-10
Local labor market	
Categorical	Unemployment rate in employment agency district at time of UE entry (8 categories: West <3%, 3-6%, 6-9%, >9%; East <12%, 12-14%, 14-16%, >16%)
Timing of unemployment spell	
Categorical	Calendar month of entry into unemployment (12 categories)

Note: The table reports the list of covariates used in the lasso regression to predict reemployment wages. We also include second- and third-order polynomials of all continuous variables, as well as interaction terms of all variables with *female*, *age*, *upper secondary degree*, *East German residency*, and the *monthly gross wage in the last job*, yielding a total of 717 covariates included.

Table A.3: Prediction performance based on out-of-sample R^2

Training dataset ^(b)	Test dataset ^(a)			
	Administrative data		Survey data	
	Baseline	Robustness	Baseline	Robustness
Out-of-sample R^2	.525	.516	.511	.481

Note: The table reports the out-of-sample R^2 , which is obtained based on a regression of realized reemployment wages as observed in the respective test dataset on predictions of objective benchmarks generated in the training dataset.

^(a)The administrative test dataset includes a 20% sample of all entries into unemployment between June 2007 and May 2008, while the survey test dataset includes all individuals observed in the matched survey-administrative data.

^(b)The baseline training dataset includes all entries into unemployment between January 2005 and May 2007 as observed in the administrative records. As a robustness check, we use an 80% sample of all entries into unemployment between June 2007 and May 2008 (i.e. the same period during which the survey was conducted) excluding observations from the respective test dataset.

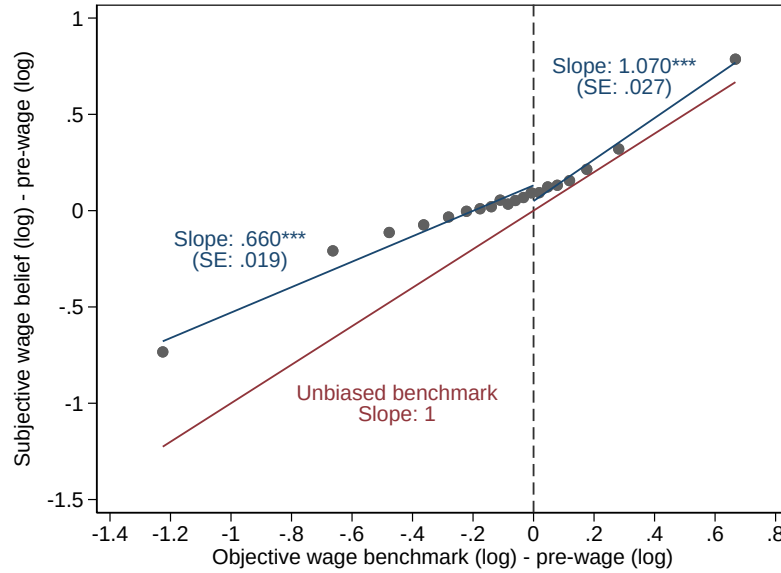
Table A.4: Predictive power of objective benchmarks and subjective beliefs

Dependent variable	Log realized net monthly wage	
	(1)	(2)
Objective benchmark (log)	0.951*** (0.016)	
Subjective belief (log)		0.602*** (0.017)
No. of observations	4,098	4,098
R^2	0.559	0.405

Note: The table reports the results of an OLS regressions of log realized reemployment wages on objective benchmarks and subjective wage expectations, respectively. The sample includes survey respondents as observed in the matched survey-administrative data who found anew job within 24 months after the beginning of the unemployment spell. Standard errors reported in parenthesis. ***/**/* indicate statistical significance at the 1%/5%/10%-level.

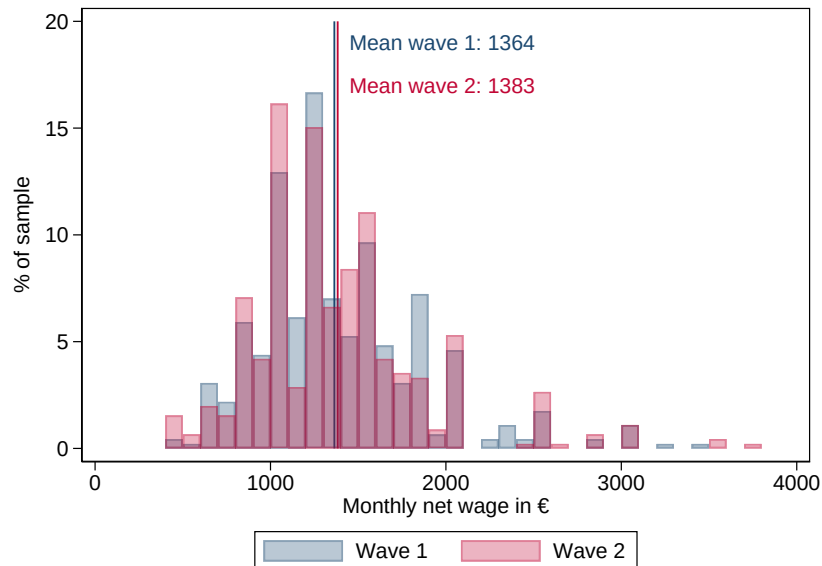
B Additional Figures and Tables

Figure B.1: Asymmetric relation between subjective beliefs and objective benchmarks for wage changes



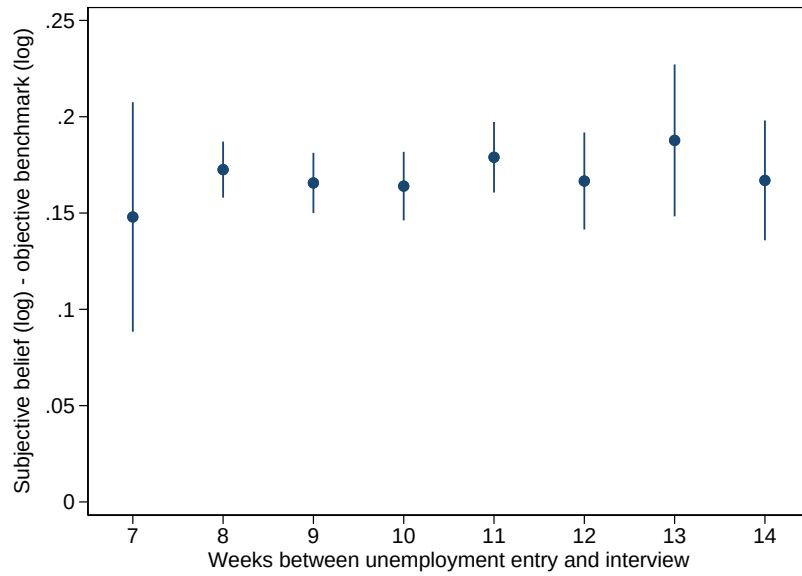
Note: The figure depicts a binned scatter plot (with 20 bins) for the relation between individuals' subjectively expected wage changes and objectively predicted wage changes (i.e. both in comparison to their pre-unemployment wages). Slope coefficients are estimated separately for positive and negative variation in objective wage changes. $N = 5,376$.

Figure B.2: Distribution of wage beliefs in survey waves 1 and 2



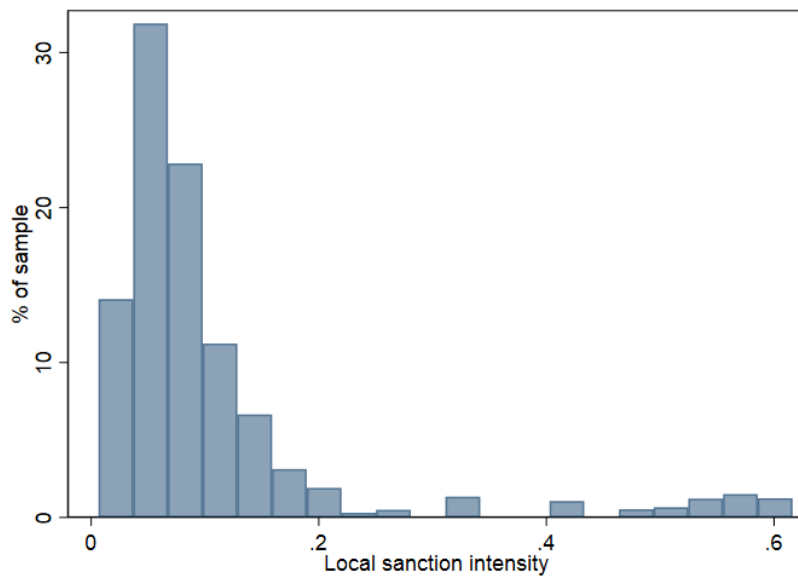
Note: The figure shows the distribution of individuals' beliefs about net monthly reemployment wages in survey waves 1 and 2. Wave 1 was conducted 7 - 14 weeks after unemployment entry and wave 2 was collected 12 months later. The sample only includes individuals who are still in the same unemployment spell in wave 2 ($N = 459$). We do not show individuals with an expected reemployment wage in wave 1 or 2 larger than 4,000€ (< 2% of sample).

Figure B.3: Wage belief inaccuracy in survey wave 1 across interview weeks



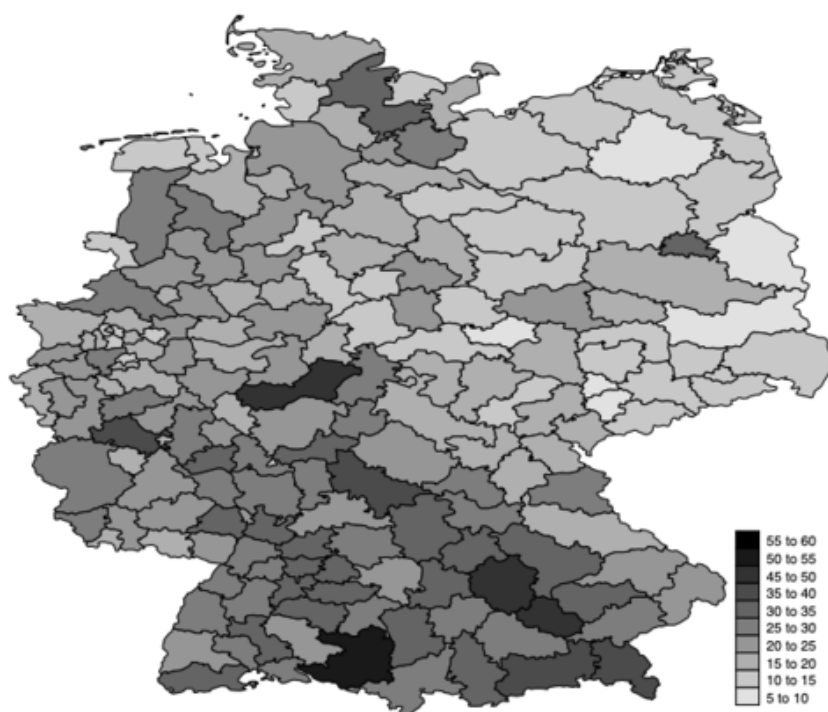
Note: The figure shows the mean wage belief inaccuracy (defined as the log difference between subjective belief S_i and objective benchmark O_i), together with 95% confidence intervals, of respondents in survey wave 1 by interview week relative to unemployment entry.

Figure B.4: Distribution of local sanction intensity across survey respondents



Note: The figure shows the distribution of local sanction intensity across all survey respondents ($N = 5,669$).

Figure B.5: Distribution of local sanction intensity across LEA districts



Note: The figure shows the geographical distribution of local sanction intensity across LEA districts in Germany.

Table B.1: Summary statistics: survey respondents

	Mean
No. of observations	5,376
A. Monthly net wage in €	
Subjective wage expectation (S_i)	1,407
Objective benchmark ^(a) (O_i)	1,173
Realized wage ^(b)	1,190
Accuracy of wage expectation: $\ln(S_i) - \ln(O_i)$	0.17
B. Job finding within six months	
Realized job finding rate	0.56
Perceived job finding rate	
Very likely	0.52
Likely	0.37
Unlikely	0.08
Very unlikely	0.03

Note: The table reports summary statistics among the sample of survey respondents.

^(a)Objective benchmarks are generated from realized outcomes of similar individuals observed in the administrative records as described in Section 2.1.

^(b)Realized wages are observed for individuals who start a regular job within 24 months after unemployment entry ($N = 4,098$).

Table B.2: Robustness: relationship between subjective beliefs and objective benchmarks

	Mean difference	Share with diff. > 0.1	Share with diff. < -0.1	$\hat{\beta}_1$	N
Baseline	0.170	0.569	0.130	0.735*** (0.012)	5,376
Prediction from alternative training data (survey period)	0.154	0.536	0.152	0.708*** (0.013)	5,376
Instrument prediction from baseline training data with prediction from alternative training data	-	-	-	0.740*** (0.013)	5,376
Wage prediction based on all individuals reentering employment within 9 months after unemployment entry	0.153	0.540	0.147	0.736*** (0.012)	5,376
Restrict to individuals searching for full-time employment	0.179	0.579	0.110	0.684*** (0.014)	4,284
Restrict to individuals expecting between 35 and 45 working hours	0.165	0.560	0.118	0.639*** (0.013)	4,396
Gross-to-net conversion: restrict to unmarried	0.155	0.566	0.117	0.747*** (0.017)	3,229

Note: Robustness tests for comparisons between subjective beliefs S_i and objective predictions O_i for net monthly reemployment wages (both in log). The table reports the mean difference between S_i and O_i , the shares of individuals who overestimate and underestimate wages by more than 10% (difference > 0.1 / < 0.1), the slope coefficient (with its robust standard error in parenthesis) from a regression of S_i on O_i , and the number of individuals in the sample. ***/**/* indicate statistical significance at the 1%/5%/10%-level.

Table B.3: Similarity of bordering regions

	Absolute difference within pair of LEA districts		%-change
	Simulated border pairs (1)	Actual border pairs (2)	Simulated - actual (3)
Unemployment rate	0.040	0.012	-70.4%
GDP per capita in € 1,000	7.576	4.948	-34.7%
Vacancy rate	0.066	0.028	-58.6%
Share of working population			
in agriculture sector	0.017	0.008	-49.6%
in manufacturing sector	0.079	0.043	-45.1%
in service sector	0.084	0.047	-43.9%
Migration rate	0.009	0.005	-36.4%
No. of LEA districts	178	178	
No. of border pairs	1,068	487	

Note: The table compares absolute differences in regional indicators within the 487 actual border pairs to a set of simulated regional pairs. Simulated regional pairs are generated by matching each LEA district to three other randomly selected LEA districts, which yields 1,068 simulated pairs. Columns (1) and (2) report absolute average differences in regional indicators across all actual and simulated pairs, respectively. Column (3) reports the %-difference between average differences reported in columns (2) and (1).

Table B.4: Balancing test of sanction intensity (survey data)

Dependent variable	Sanction intensity TI_j	
	Coef.	SE
Education		
School leaving degree (Ref.: None)	ref.	
Lower sec. degree	-0.239	(0.197)
Middle sec. degree	-0.091	(0.170)
Upper sec. degree	-0.069	(0.172)
Higher education (Ref.: None)	ref.	
Vocational training	0.243	(0.156)
University degree	0.264	(0.178)
Socio-demographic characteristics		
Female	0.010	(0.050)
Migration background	-0.031	(0.092)
Age (Ref.: 16-24 years)	ref.	
25-34 years	0.065	(0.074)
35-44 years	0.035	(0.086)
45-55 years	-0.023	(0.088)
Married	-0.071*	(0.042)
Children (Ref.: None)	ref.	
One child	0.029	(0.065)
Two or more children	0.087	(0.096)
Homeowner	0.103	(0.064)
Unemployment and labor market history		
UI Benefit recipient	-0.001	(0.071)
Level of UI benefits in €100	-0.005	(0.006)
Lifetime months in unemployment (div. by age-18)	-0.228	(0.210)
Lifetime months in employment (div. by age-18)	-0.100	(0.091)
Last hourly wage in €	0.012*	(0.006)
Employment status before UE (Ref.: Other)	ref.	
Regular employed	-0.020	(0.103)
Subsidized employed	-0.064	(0.111)
School, apprentice, military, etc.	-0.023	(0.126)
Parental leave	-0.269*	(0.143)
Time between entry into UE and interview (Ref.: 7 weeks)		
8 weeks	-0.052	(0.248)
9 weeks	-0.076	(0.278)
10 weeks	0.046	(0.274)
11 weeks	-0.005	(0.313)
12 weeks	-0.104	(0.316)
13 weeks	-0.023	(0.344)
14 weeks	-0.066	(0.344)
Personality traits^(a)		
Openness	-0.019	(0.021)
Conscientiousness	-0.023	(0.025)
Extraversion	0.044	(0.040)
Neuroticism	0.023	(0.029)
Locus of control	-0.040	(0.036)
Constant	-0.058	(0.472)
No. of observations	5,669	
Additional control variables		
Federal state fixed effects	Yes	
Basic regional characteristics	Yes	
<i>P</i> -value joint significance		
Education	0.454	
Socio-demographic characteristics	0.238	
Unemployment and labor market history	0.286	
Personality traits	0.526	

Note: The table reports the results of balancing tests regressing the local treatment intensity on individual-level characteristics. Standard errors in parenthesis are clustered at the LEA district level. ***/**/* indicate statistical significance at the 1%/5%/10%-level.

^(a)Personality traits are measured with different items on a 7-point Likert-scale and standardized to have a mean of zero and a variance of one.

Table B.5: Sanction intensity and counseling activities of caseworkers

Dependent variable	Notification about labor market programs					
	Workfare program	Job creation schemes	Training program	Start-up subsidies	Any vacancy referral	Caseworker meetings: three or more
	(1)	(2)	(3)	(4)	(5)	(6)
Sanction intensity	0.004 (0.402)	-0.054 (0.021)	0.125 (0.114)	-0.109 (0.078)	-0.083 (0.105)	0.244 (0.164)
No. of observations	5,669	5,669	5,669	5,669	5,669	5,669
Mean dep. variable	0.014	0.020	0.164	0.048	0.239	0.634

Note: The table reports the effect of the local sanction intensity on caseworkers' counseling activities. In all specifications, we account for socio-demographic and regional characteristics, as well as border-pair fixed effects. Standard errors clustered at the LEA district level are shown in parentheses. ***/**/* indicate statistical significance at the 1%/5%/10%-level.

Table B.6: Descriptive evidence on labor market implications

Dependent variable	Log no. of job applications		Log realized net monthly wage ^(a)	
	(1)	(2)	(3)	(4)
Accuracy of wage expectations: $\log(S_i) - \log(O_i)$				
linear	0.163*** (0.057)	0.249*** (0.075)	0.306*** (0.022)	0.364*** (0.030)
squared		-0.171 (0.107)		-0.129*** (0.047)
No. of observations	5,376	5,376	4,098	4,098
R^2	0.023	0.024	0.490	0.491

Dependent variable	Perceived job finding rate (1=very high) ^(b)		Realized job finding rate (1=yes) ^(c)	
	(5)	(6)	(7)	(8)
Accuracy of wage expectations: $\log(S_i) - \log(O_i)$				
linear	0.166*** (0.027)	0.158*** (0.038)	-0.046* (0.027)	0.036 (0.037)
squared		0.015 (0.055)		-0.163*** (0.053)
No. of observations	4,953	4,953	5,376	5,376
R^2	0.066	0.066	0.028	0.029

Note: The table reports the results of OLS regressions. The explanatory variable refers to the accuracy of job seekers' wage expectations defined as the log difference between the subjective belief S_i and the objective benchmark O_i . In all specifications, we control for socio-demographic characteristics and objective benchmarks. Robust standard errors are shown in parentheses. ***/**/* indicate statistical significance at the 1%/5%/10%-level.

^(a)The dependent variable refers to the first monthly net wage for individuals who start a regular job within 24 months after entry into unemployment.

^(b)The dependent variable refers to an indicator of whether the individual reports the perceived job finding rate within the next six months to be very high.

^(c)The dependent variable refers to an indicator of whether the individual actually starts a regular job within the next six months.