Biased Expectations and Labor Market Outcomes: Evidence from German Survey Data and Implications for the East-West Wage Gap

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Abstract

Using a large and representative panel survey of German households, we document sizable and persistent biases in workers' expectations regarding job stability and job finding. Workers in East Germany are substantially more pessimistic than workers in West Germany. Motivated by this evidence, we incorporate biased expectations into a frictional labor market model and analytically study their implications for wage bargaining, equilibrium unemployment and vacancies, and welfare. We explicitly model the duration of wage contracts and show that this contract length plays a crucial role in shaping how expectation biases affect wages and equilibrium outcomes. Using a calibrated version of the model, we show that expectation biases at West German levels would increase wages and expected lifetime income in East Germany and lead to a substantial reduction in the East-West German wage gap.

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1 Introduction

It is generally believed that economic agents form expectations about future labor market outcomes and that these expectations, in turn, shape their current economic decision making. A common assumption in the literature is that agents have rational expectations, that is, they correctly perceive that specific labor market transitions, such as finding or losing a job, may occur. In this paper, we document systematic differences between perceived and actual labor market transition rates among workers using a long panel data set for Germany. We then extend an equilibrium labor market model by allowing workers' expectations of labor market transition rates to differ from actual rates, and we use this framework to theoretically and quantitatively explore the following questions: (1) How do biased expectations of workers about job finding and job separation shape the labor market equilibrium and wages? (2) Are differences in expectation biases across workers a quantitatively important driving force of wage differentials?

For our empirical analysis, we use the German Socio-Economic Panel (SOEP) which regularly collects individuals' perceived probabilities to separate from a job when employed or to find a job when unemployed. Based on realized labor market transitions, we statistically predict transition probabilities for narrowly defined worker groups, that is, conditional on a large set of demographic, job-related and information on other characteristics available at the time of the elicitation of expectations. We refer to this prediction as the actual (statistical) individual labor market transition rate. A bias in labor market expectations arises when individuals' perceived probabilities of a given labor market transition systematically differ from the corresponding actual probabilities on average.

We find that, on average, workers in Germany are pessimistic regarding job stability, as they significantly overestimate the risk of separating from their job within two years by about 7 percentage points (48 percent). In contrast, unemployed individuals in Germany are, on average, optimistic, as they significantly overestimate the probability of finding a job within two years by about 8 percentage points (16 percent). A striking finding is that East Germans are substantially more pessimistic than West Germans, both in terms of job stability and job finding prospects. This pattern holds even after accounting for compositional differences between East and West Germany. We establish that these differences in biases between East and West Germany are largely driven by cohorts who were already in the labor market at the time of German reunification. Moreover, we uncover a number of additional insights. For example, we find that individuals update their perceived transition rates over time (through learning), but the biases remain sizable and do not vanish. Furthermore, we establish that individual deviations between perceived and actual transition rates do not help predict subsequent outcomes, indicating that potentially rational individual information does not play a significant role in the biases we measure.

For the theoretical and quantitative analyses, we extend the workhorse Diamond-Mortensen-Pissarides (DMP) framework of frictional labor markets in two ways: First, we assume that workers base their valuations of labor market states and job matches, and consequently

their decisions, on their perceived labor market transition probabilities rather than actual probabilities. We assume common knowledge in the bargaining process, meaning that workers and firms truthfully report their (perceived) values of the job match and their outside options and agree to disagree. Our model is not meant to explain the origins of biased expectations, but rather focuses on their consequences for the labor market equilibrium. Second, we depart from the conventional assumption that wages are bargained every period. Instead, in our framework, workers and firms bargain over a wage that is paid for T periods. If the match continues beyond that, the parties rebargain the wage. A job match thus consists of consecutive wage contracts of length T. Importantly, we establish that the contract length T is crucial for how workers' job separation expectations affect the wage.

In our theoretical analysis, we show that optimistic job finding expectations induce workers to attribute a higher value to the state of unemployment. This leads to a higher (perceived) outside option in the bargaining process, which increases the reservation wage and the negotiated wage. We also show that pessimistic job separation expectations induce workers to discount future payoffs more strongly. This affects the bargained wage via two opposing channels: On the one hand, workers discount future wage payments within the current contract more strongly, leading them to accept a lower wage. On the other hand, workers discount the continuation value of future contracts more strongly, requiring a higher wage in order for them to stay in the match. For short contract durations (low T), the second effect dominates, implying a higher wage for more pessimistic job separation expectations. Conversely, when the contract is sufficiently long (large T), the first effect dominates, implying that more pessimistic job separation expectations lead to a lower wage.

Using the model, we conduct a quantitative analysis in order to assess how workers' expectation biases affect wages and the labor market equilibrium. Of particular interest in this analysis is the question of how the East-West differences in expectation biases can contribute to the observed sizable gap in wages between East and West Germany. We first calibrate the model to the East German economy. Then, in a counterfactual exercise, we assign to workers in the model the job separation and job finding biases that we measure for West Germany. That is, we counterfactually make East German workers less pessimistic about job separation and more optimistic about job finding. As a key result, we establish that both, the smaller pessimistic job separation bias and the larger optimistic job finding bias lead to a substantial increase in wages in East Germany. According to our analysis, with West-German expectation biases, the observed conditional wage gap between East and West Germany of 23 percent would decrease by 4.6 to 10.6 percent. Even though the increase in wages would induce higher equilibrium unemployment, East German workers would be better off and enjoy 0.7 to 1.9 percent higher expected lifetime income if their expectation biases were at West German levels.

Our study relates to a growing literature on the effect of biased labor market beliefs on individual-level and macroeconomic outcomes. One strand of the literature studies house-

holds' expectations about aggregate labor market outcomes, such as the unemployment rate (e.g. Souleles, 2004), and relates these expectations to individual choices, such as savings decisions (e.g. Den Haan et al., 2017, or Broer et al., 2021). In contrast, we study households' expectations about individual-level outcomes, which captures both aggregate and idiosyncratic risk and may provide a better reflection of the risk that households face in the labor market. Mueller and Spinnewijn (2023) contains a recent and comprehensive overview of the literature on individual bias in labor market expectations. This literature typically documents an optimistic bias of job seekers in various countries, including the U.S. and the U.K. (e.g. Mueller et al., 2021, or Conlon et al., 2018). This is consistent with our results for Germany. Emmler and Fitzenberger (2022) use early waves of the SOEP and document convergence in pessimism in job loss expectations between East and West Germany in the period following the German reunification. We also show pessimism with respect to job stability based on a different measure of the bias, and we likewise document convergence in our measure between East and West Germany, but refer to a later time period. However, our study is more comprehensive as it addresses bias in both job finding and job separation while also theoretically and quantitatively examining the implications of these biases in a frictional labor market model.

While most of the literature on frictional labor markets relies on the assumption of rational expectations, there are a few notable exceptions which relate to our work. Kennan (2010) and Menzio (2023) propose non-rational expectations as a mechanism to endogenously generate wage rigidity and thereby improve the model's ability to explain fluctuations of unemployment and vacancies over the business cycle. Kennan (2010) introduces private information, while Menzio (2023) assumes that workers have biased beliefs about the aggregate state of the economy. Our paper does not address aggregate fluctuations, but studies biased expectations in a stationary environment with a focus on wage bargaining outcomes. While we depart from rational expectations, we assume public information, and therefore use the concept of generalized Nash bargaining. Our study is the only one to examine the link between bias in job separation rates and the length of wage contracts.

The theoretical analysis of our model provides insights into how biased expectations about job finding and job separation rates affect wages. Two earlier empirical studies have explored the relationship between perceived job separation risk and wages or earnings, typically finding a negative correlation (see Campbell et al., 2007, or Hübler and Hübler, 2006). The literature on bias in job finding mostly investigates the relationship with job search behavior, linking optimism to higher reservation wages (see Mueller and Spinnewijn, 2023, or Conlon et al., 2018). In line with these results, Drahs et al. (2018) show that job seekers overestimate their future re-employment wage. Jäger et al. (2024) investigate bias in beliefs about outside wage options and argue that these beliefs shape current wage outcomes. These findings are consistent with our model. In addition, we provide evidence on the link between biased expectations about labor market transition rates, wages, and reservation wages in our sample.

We relate differences in expectation bias between groups to wage differentials. Only Cortés et al. (2023) address a similar question and discuss the relationship between optimism about post-graduation earnings and the gender earnings gap. By examining differences between East and West Germany, our study also links to the literature addressing factors such as human capital or mobility costs (Fuchs-Schündeln and Izem, 2012) or productivity differences and worker representation (Bachmann et al., 2022) as potential drivers of the East-West German wage gap.

The paper is organized as follows. Section 2 introduces the data, discusses measurement, and presents the facts about labor market expectations. Section 3 presents the model and derives the effect of biased expectations on wage bargaining outcomes and the labor market equilibrium. Section 4 calibrates the model to the East German economy and quantifies how biased expectations affect wages and the East-West German wage differential. Section 5 concludes.

2 Data and measurement

The goal of this section is to empirically study the expectations of German workers regarding individual labor market transitions and to compare these expectations with actual transition rates. In our empirical analysis, we use individual-level data taken from the German Socio-Economic Panel (SOEP) which is an annual nationally representative longitudinal survey of private households in Germany.[1] The SOEP started in 1984 in West Germany and was enlarged in 1990 to include a representative sample of households from East Germany. In each survey wave, around 30,000 participants are interviewed to provide detailed individual-level information about a wide range of topics including demographic characteristics, housing, education, health, family composition, as well as economic and labor market outcomes.

2.1 Expected and actual labor market transitions

Since 1999, respondents in the SOEP are asked biennially to report their expectations about various future labor market transitions. In particular, employed workers are asked about their expectation of separating from their current job, while non-employed individuals are asked about their expectation of finding a job. The specific question in the survey asked to employed workers is: *"How likely is it that you will experience the following career changes within the next two years?"*, upon which respondents are asked to provide their perceived probabilities, expressed in percent, associated with the following events (i) *losing the current job*, (ii) *seeking a new job at own initiative*, and (iii) *receiving a promotion at the current employer*.[2] We use the respondents' answer to (i) as our measure of an

[1] See Goebel et al. (2019) for an introduction to the SOEP. The SOEP data are available to researchers upon application from `https://www.diw.de/en/diw_01.c.601584.en/data_access.html`

[2] Figures A.1 and A.2 in Appendix A show the original question text in the survey questionnaire.

individual's perceived job separation probability. Answers are given on a scale from 0 to 100 percent (in steps of 10 percentage points). In this context, it should be noted that the term "job loss" in the survey question may not be entirely unambiguous. Respondents might interpret it narrowly as an involuntary job termination or more broadly as any job separation leading to a transition from employment to non-employment. We address this potential ambiguity below when comparing job separation expectations and realizations by considering different definitions of job separation.

Regarding job finding, the non-working respondents in the survey (i.e., those who are unemployed or out of the labor force) are asked the question: *"How likely is it that one or more of the following occupational changes will take place in your life within the next two years?"*, upon which the respondents are asked to specify the probabilities associated with (i) *taking up a paid job*, (ii) *become self-employed*, and (iii) *attend additional qualifications or training*. Again, answers are given on a scale from 0 to 100 percent (in steps of 10 percentage points). We use the answer to (i) as our measure of an individual's perceived job finding probability.

We restrict the sample of individuals to the working-age population (25 to 65 years old) and consider the period from 1999 to 2017. This gives us the responses of a total of the nine survey waves 1999, 2001, 2003, 2005, 2007, 2009, 2011, 2013, and 2015.[3] We do not consider the waves prior to 1999 since in the early years the survey has used a qualitative question format and this prevents a meaningful aggregation of responses across individuals.[4]

We aggregate the individual responses and report the average job finding and job separation expectations in the first row of Table 1. In the full sample (the column labeled "All") we find that, on average, employed workers expect to separate from their current job with a 19.8 percent probability within two years, whereas unemployed workers expect to find a job with a probability of 57%. These averages mask a substantial amount of heterogeneity in expectations across individuals and between regions.[5] Importantly, when splitting the sample by region, we find that expectations differ substantially between East and West Germany. As can be seen in Table 1, workers in East Germany have much higher job separation expectations and lower job finding expectations than workers in West-Germany.

Given the focus of our analysis, we are primarily interested in how individuals' job finding and job separation expectations compare to their actual transition probabilities. Therefore, in the next step, we compute measures of actual job finding and job separation probabilities. For this purpose, we exploit the panel structure of the SOEP data to identify actual job separation and job finding events of the individuals in our sample within

[3] The 2011 survey contains the question about job finding but not about job separation.

[4] We do not use the responses of the 2018 wave, since the 2-year period over which we compute realized labor market transitions includes the onset of the Covid-pandemic – which we consider a very particular type of unforeseen worldwide disruption over and above a typical economic downturn.

[5] Figure A.3 in Appendix A shows histograms for perceived job separation and job finding expectations.

a period of two years following their interview.[6] We identify job separations from the participants' responses to the retrospective question whether they have left their job since end of December two years before the survey year and, if so, in what month and for what reason. Our baseline measure of job separation includes all separations irrespective of the reason for the ending of an employment relation. We refer to this measure as *General*. We consider alternative and more narrow definitions of job separation in the robustness analysis below.

Table 1: Perceived and actual labor market transition probabilities

	Job separation			*Job finding*		
	All	East	West	All	East	West
Perceived	19.8	27.2	17.5	57.0	51.9	60.8
Actual	13.3	15.1	12.8	48.8	49.9	47.9
Bias	6.4***	12.1***	4.7***	8.2***	2.0***	12.9***
Obs.	67,772	15,653	52,119	6,423	2,717	3,706

Notes. Perceived: Expectations of employed workers (job separation) and unemployed individuals (job finding). Actual: Probit predicted transition probabilities. Bias = Perceived – Actual (up to rounding). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ refer to t-test of mean bias equal to zero.

To identify job finding, we use information on labor market spells contained in the so-called activity calendar in the SOEP. The activity calendar for a given respondent records the respondents' labor market state (employment, unemployment, out of the labor force) for each month since the last survey.[7] Using these spell data, we measure job finding as an individual experiencing at least one transition into employment within 24 months after the interview. As our baseline measure, we consider the job finding transitions of unemployed respondents, and explore the robustness to including also respondents who are out of the labor force.

It is important to notice that the sample means of the realized job separation and job finding transitions do not reflect the actual labor market transition probabilities at the time of the interview. Instead, they might contain various reasons for transitions that have been realized in the 24 months after the interview. In addition, transition rates vary substantially across population groups (see e.g. Hall and Schulhofer-Wohl, 2018, among many others). For these reasons, we estimate probit models that allow us to predict individual transition probabilities within narrowly defined groups, based on observed individual characteristics and job attributes at the time of the interview.

[6] See Appendix A for descriptive statistics of the data.

[7] Our definition of employment (E) includes: full-time, part-time and marginal employment, short-time work, second job and mini-job, as well as vocational training, first job training and apprenticeship. Unemployment (U) includes individuals registered as unemployed. Out of the labor force (O) includes individuals in retirement, on parental leave, taking care of the household or attending school or college. In case of multiple spells within a given month, we apply the ranking $E > U > O$ and assign to each individual/month observation the highest ranking labor market state.

Concretely, we estimate a probit model to separately predict the job separation probabilities for employed workers and the job finding probabilities for unemployed individuals. In each of the models, we include a large number of individual and job characteristics as well as survey-year indicators. In the case of predicting job separations, we also add employer characteristics. Our choice of model specification aims at maximizing the predictive power of the models according to a range of information criteria.[8] Since the perceived probabilities in the data are measured on a discrete scale, we also round the predicted probabilities to the nearest decile on the probability scale (0%, 10%, 20%, ...). We discuss the robustness with respect to rounding below.

To ensure consistency, we estimate each probit model on the same sample of individuals for which we computed the expected transition probabilities above. Using the estimated probit coefficients, we then calculate for each individual in the sample the predicted actual job separation and job finding probability. Table 1 reports the sample averages of these probabilities in the row labeled "Actual". In addition, we compute for each individual in the sample the difference between perceived and actual transition rates. A bias in expectations occurs when deviations at the individual level between perceived and actual rates do not average out in the population or are systematically different between groups of individuals in the population.

The results in Table 1 show that in the full sample, employed workers substantially overestimate, on average, the probability of job separation. According to our findings, workers expect to separate from their job within two years with a probability of 19.8 percent, while the (predicted) actual probability of separation is 13.3 percent, on average. The difference of 6.4 percentage points is statistically significant and we refer to it as a pessimistic bias in individuals' job separation expectations. In contrast, our results indicate that unemployed individuals have a substantial optimistic bias in their job finding expectation. Specifically, we find that unemployed individuals expect to find a job within two years with a 57 percent probability, overestimating the actual probability by 8.2 percentage points on average.[9]

Table 1 documents substantial differences in both expectation biases between East and West Germany.[10] While the actual job separation probabilities are relatively similar in

[8] Covariates in job separation probit model include: age, gender, relationship status, children under 16 in household, East Germany, born in Germany, education group, unemployment experience, tenure in firm, working in occupation trained for, new job since last year, work satisfaction, industry, firm size, survey year. Covariates in job finding probit model include: age, gender, relationship status, East Germany, born in Germany, German citizenship, education group, health status, unemployment experience, work experience (full/part time), survey year. Information criteria used are both likelihood based (McFadden's pseudo-R^2), or report explained variation (McKelvey and Zavoina's R^2, AIC). Tables A.3 to A.6 in Appendix A provide summary statistics for the covariates. Regression results are in Tables A.8 and A.9.

[9] Table A.2 in Appendix A shows quarterly job separation and job finding rates corresponding to our baseline measures. On average, 1.5 percent of employed workers separate from their job due to general reasons, and 18 percent of unemployed workers find a job within one quarter. Klinger and Rothe (2012), Hochmuth et al. (2021), or Hartung et al. (2018) span a range of quarterly job separation rates from 1.4 percent to 4.7 percent and quarterly job finding rates from 16.9 percent to 40.7 percent. Hence, our sample reflects rates at the lower bound of rates from administrative data sources that are documented in the literature.

[10] There exist also differences in expectation biases between many other demographic, industry or occupational groups in our sample that we will not explore further here but document in Tables A.10 and A.11 in Appendix A.

both regions – with 15.1 percent in the East and 12.8 percent in the West – workers in East Germany have substantially higher job separation expectations than workers in the West. As a results, the pessimistic bias in the job separation expectation is much higher in the East with 12.1 percent compared to 4.7 percent in West Germany.

The difference is even stronger for job finding. According to our results, the actual job finding probability differs by only 2 percentage points between East and West Germany. However, West German workers overestimate the job finding probability by a large margin whereas the expectations of workers in the East are close to their actual probability. As a result, the optimistic bias in the job finding expectation is substantially more pronounced in the West with 12.9 percent compared to 2.0 percent in the East. Overall, our findings suggest that East Germans are generally more pessimistic about future labor market transitions than West Germans as they are more pessimistic about job separation and less optimistic about job finding.

Given the striking difference in labor market expectations between East and West Germany, the question naturally arises as to what can explain the relatively greater pessimism of East German workers. Our data does not allow for a deeper and perhaps even causal analysis of the mechanisms driving the differential expectation structure between the two regions. Nevertheless, we aim to shed some light on this question by conducting a simple cohort analysis. The purpose of this analysis to explore the extent to which the larger pessimism in East Germany may be related to the previous exposure of workers in the East to a communist system. This analysis is inspired by the findings of a large literature exploring the long lasting effects of communism and the shocks related to the reunification (see, for example, Fuchs-Schündeln and Schündeln 2020 or Laudenbach et al. 2020). Importantly, we find that there are substantial differences in the bias across birth cohorts in East Germany (while controlling for age, demographic and economic characteristics).[11] Relative to the oldest cohorts in the sample, i.e. those born before 1950, the pessimistic bias in job separation first increases and then decreases for later born cohorts. That is, the pessimism is substantially more pronounced among cohorts born in the 1950's and 1960's which have actively experienced life in the communist German Democratic Republic as well as the reunification with West Germany. Moreover, the job finding bias in East Germany is comparable in size among the cohorts born in the 1960's and earlier, but it becomes significantly more optimistic for later born cohorts. Overall, the results indicate that younger cohorts in East Germany tend to be less pessimistic about job separation and more optimistic about job finding than older cohorts.

2.2 Robustness and discussion

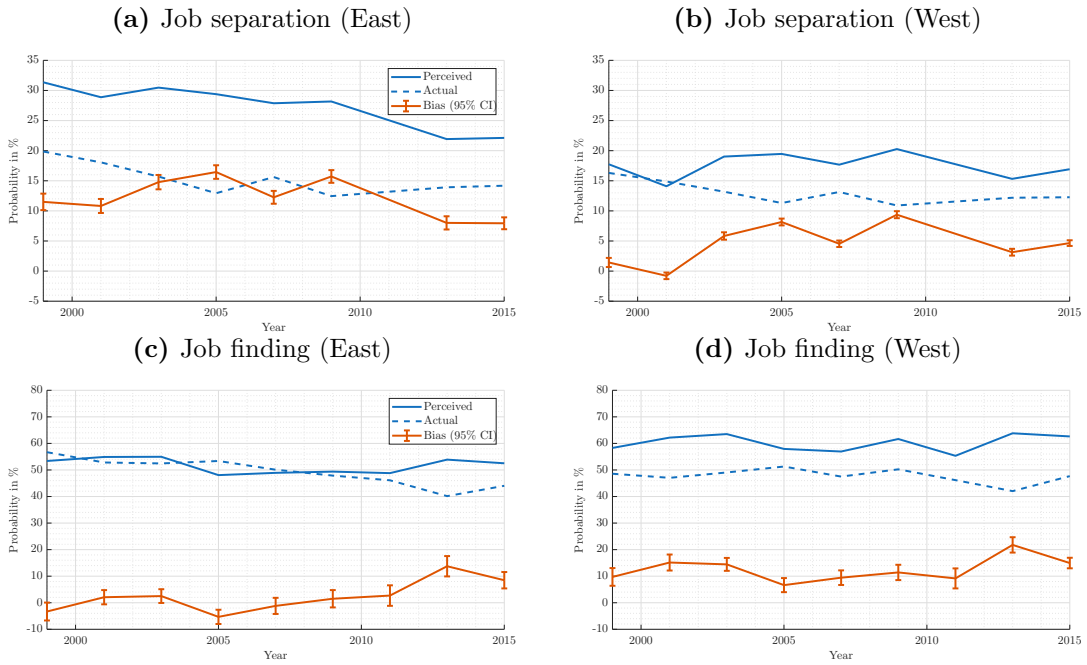
The purpose of this section is to examine the robustness of our baseline results across time periods and for alternative definitions of job separation and job finding. Moreover, we address the question of individual learning and potential concerns related to private

[11] For detailed results, see Tables A.12, A.13, A.14 and A.15 in Appendix A.

information, rounding of responses and outliers.

First, we analyze the extent to which the expectation biases in East and West Germany are stable over the period of observation. For this purpose, we show the perceived and actual job separation and finding rates for each survey wave and compute the corresponding biases separately for each wave. Figure 1 shows the results for both regions. The vertical bars in the figure represent the two standard errors of the year-specific biases. As shown in the figure, the expectation biases tend to be stable over time with no clear-cut trend during the sample period. Interestingly, the actual transition rates all follow a downward trend, especially, the job separation rate and more moderately also the job finding rate.[12] However, the expectations move almost in parallel with the actual rates leading to a remarkably stable path for the expectation biases. Also remarkable is the consistently small value of the optimistic job finding bias in the East indicating that workers in East Germany tend to have relatively accurate perceptions about job finding.[13]

Figure 1: Bias in labor market expectations over time



Notes: Panels show average perceived (solid) and actual (dashed) job separation and job finding rates for East and West Germany at each survey date. Red dashed lines show average difference between perceived and actual together with two standard errors of the respective annual mean (vertical bars). Figures A.4 and A.5 show the corresponding graphs for all measures of job separation and job finding.

Our baseline measure of actual job separation includes all separations irrespective of the

[12] This pattern reflects an overall downward trend in the German unemployment rate over the sample period, which is well documented in the literature. See e.g. Hochmuth et al. (2021) or Hartung et al. (2018).

[13] Emmler and Fitzenberger (2022) use the SOEP to document "overpessimism" with respect to job loss in East relative to West Germany in 1991 that substantially declines a decade later. They define a binary indicator of expected job loss (indicated as "definite" or "probable", and above 60 percent in the later sample) which they compare to actual later job loss events, not to predictions measured at the time of the interview. Their measure is, therefore, related more closely to the precision of expectations and less to the definition of biased expectations in the behavioral economics literature. It can also not directly be mapped to the model we present here.

reason for the ending of an employment relation (voluntary and involuntary). However, the survey question in the SOEP asks respondents about future job loss. As discussed previously, the term "job loss" may be interpreted by the respondent as reflecting an involuntary termination of employment. Therefore, we examine in the next step the robustness of the results to two alternative and more narrow definitions of job separation. In each wave, respondents are asked retrospectively whether they left their previous job and, if so, for what reason. The list of possible reasons for having left a job, includes: (1) Place of Work Closed, (2) Resigned, (3) Dismissed by Employer, (4) Mutual Agreement, (5) Temporary Employment Ended, (6) Reached Retirement Age, (7) Leave of Absence, Maternity/Parental Leave, (8) Gave Up Self-Employment. As an alternative to our baseline measure, we first consider a very narrow definition of job separation which includes only separations due to (1) Place of Work Closed, and (3) Dismissed by Employer. These two reasons are most closely related to involuntary job loss. We will refer to this type of job separations as *Dismissals*. Moreover, we also consider a slightly broader definition which, in addition to (1) and (3) also includes (4) Mutual Agreement and (5) Temporary Employment Ended. Although not involuntary, these reasons could be included in an individual's assessment of future job separation. We refer to this measure as *Selected*.

Table 2 presents the results for these two alternative measures of job separation (rows labeled "Dismissals" and "Selected"). The more narrow definitions of job separation naturally imply lower actual transition probabilities and, hence the difference between the perceived and the actual job separation probabilities are larger than in the baseline case. However, the pessimistic bias remains larger in the East also for both alternative definitions of job separation parallel to our baseline results.

Next, we consider an alternative approach to computing job separation. First, we use information on labor market spells provided through the respondent's monthly activity calendars. Using these spell data, we measure job separation as an individual experiencing at least one transition from employment to unemployment within 24 months after the interview. The results are in Table 2 in the row labeled "Spell". Unsurprisingly, the implied actual job separation probability is substantially lower than the baseline measure since we consider only transitions from employment into unemployment. Hence, this measure disregards, for example, job separations which are followed by an immediate transition to a new employer. However, importantly, we find a more pronounced pessimistic job separation bias in East Germany which is consistent with the baseline results.

In the next step, we turn to the job finding probability and examine the robustness of our baseline measure to alternative definitions. In the baseline, we use the sample of unemployed individuals to compute perceived and actual job finding rates (*out of U*). This approach disregards the transitions and expectations of individuals who are out of the labor force at the time of the interview. Now, we relax this sample restriction and consider a broader measure of job finding which is based on all non-employed individuals irrespective of whether they are unemployed or out of the labor force (*out of U or O*).

The results can be found in the respective rows in Table 2. Interestingly, the perceived job finding rate obtained through this measure is more similar between East and West-Germany implying a smaller but still sizable difference in the optimistic gap between both regions.

Table 2: Robustness

		Job separation			*Job finding*		
		All	East	West	All	East	West
	Perceived	19.8	27.2	17.5	57.0	51.9	60.8
Baseline	Actual	13.3	15.1	12.8	48.8	49.9	47.9
	Bias	6.4***	12.1***	4.7***	8.2***	2.0***	12.9***
Dismissal	Actual	2.8	4.7	2.2			
	Bias	17.0***	22.5***	15.3***			
Selected	Actual	5.4	8.3	4.5			
	Bias	14.4***	18.9***	13.0***			
Spell	Actual	4.2	7.4	3.3			
	Bias	15.5***	19.8***	14.2***			
out of U or O	Perceived				54.3	53.5	54.6
	Actual				43.3	45.3	42.5
	Bias				11.0***	8.2***	12.1***
Trimmed	Perceived	31.8	34.8	30.6	49.1	45.8	51.8
	Actual	14.4	15.4	14.0	46.3	48.2	44.7
	Bias	17.4***	19.3***	16.6***	2.8***	-2.4***	7.1***
Rounded up	Perceived	19.8	27.2	17.5	57.0	51.9	60.8
	Actual	18.3	20.0	17.8	53.8	54.9	53.0
	Bias	1.4***	7.2***	-0.3**	3.2***	-3.0***	7.8***

Notes: The Baseline measure refers to the General measure of job separation and the measure out of U of job finding rates, respectively. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ refer to t-test of mean bias equal to zero. Means of perceived job finding are different across measures due to differences in the respective sample. All values are rounded. Tables A.16, A.17, A.18, A.19, A.20, and A.21 in Appendix A contain full results.

An important concern relates to the presence of measurement error in the responses to the expectation questions. We address this concern by considering two common types of measurement error: extreme response bias and response rounding. An extreme response bias occurs when participants consistently choose the most extreme options irrespective of their actual perception. In our case, this bias would likely result in the maximum or minimum values for the reported expectations such as 0 percent or 100 percent. We account for this by removing observations at the minimum and maximum value for both job loss and job finding expectations from our sample.[14] As can be seen from the row *"Trimmed"* in Table 2, this adjustment leads to an increase in the separation bias in

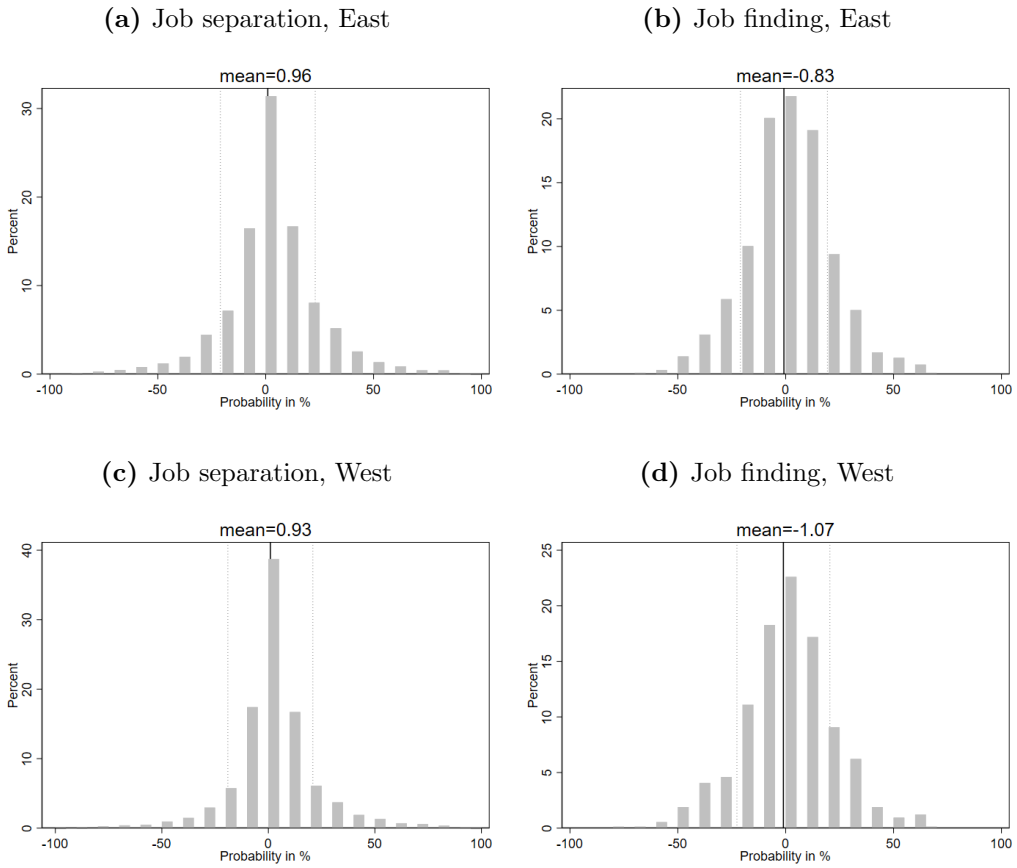
[14] 0 percent corresponds to the 25th percentile and 100 percent to the 99th percentile of the distribution of the baseline measure of job loss expectations. 0 percent corresponds to the 5th percentile and 100 percent to the 90th percentile of the distribution of the baseline measure of job finding expectations.

the full sample but also across regions. However, the difference between East and West Germany declines. This means that low (and less biased) job separation expectations in the West relative to the East are important to understand the East-West difference. The job finding bias decreases in value relative to the baseline, but the difference between regions is preserved.

As is well know, the rounding of responses to probabilistic expectations questions is a common practice in surveys – see Manski (2023) and Manski and Molinari (2010). The question design in the SOEP to some extent mitigates this issue because all respondents are asked to report their expectations in steps of 10 percentage points (on a scale from 0% to 100%). Hence, all respondents are required to report their rounded expectation. Importantly, for consistency, we account for this practice when calculating the predicted (actual) transition probabilities. That is, we round the probit predicted probabilities to the nearest decile on the probability scale (0%, 10%, 20%, ...). However, a remaining concern is that respondents do not round to the nearest decile but instead round in one direction (up or down). For example, systematic rounding up can occur when individuals tend to overstate the perceived transition probabilities. To account for this possibility, we round the probit predicted labor market transition probabilities up to the next (and not to the nearest) decile. The results are in the row labeled *"Rounded up"* in Table 2. As expected, this rounding method affects the magnitude of the expectation bias, but reassuringly, the East-West differences in the bias remain robust.

An important question is whether individuals learn over time, leading to increasingly accurate labor market expectations. To address this question, we exploit the panel dimension of the survey and examine the extent to which the difference between perceived and actual transition probabilities changes over time at the individual level. Concretely, we select the sample of individuals responding to the expectation questions in two consecutive survey waves and compute for each of the two waves the absolute value of the individual-level difference between perceived and actual job separation or job finding probabilities. We interpret the absolute value of the individual-level difference as a measure of the accuracy of individuals' expectations and the change between two consecutive waves as representing the extent of individuals' learning over time. The histogram in Figure 2 depicts these individual-level changes for East and West Germany. Positive values indicate that the individual-level difference between perceived and actual probabilities has increased between two consecutive survey waves, whereas negative values indicate that the difference has diminished and, thus, expectations have become more accurate. The vertical solid line in each panel represents the mean and the dotted lines indicate the standard deviation. The histograms in Figure 2 display a substantial degree of dispersion across individuals but no systematic pattern. While the individual-level difference increases over time for some individuals, it decreases for others. Interestingly, the mean values in each panel are close to zero, indicating that employed and unemployed individuals in both, East and West Germany do not systematically learn and form increasingly accurate expectations about labor market transitions.

Figure 2: Learning about transition probabilities



Notes: Panels show the change in the (absolute value of the) individual-level difference between perceived and actual job separation or job finding probabilities in East and West Germany. Vertical solid lines: means; dotted lines: standard deviation. Figures A.6 and A.7 show the corresponding graphs for all measures of job separation and job finding.

Relatedly, we also examine how the expectation bias is related in the cross section to individuals' age, job tenure and unemployment experience.[15] Overall, we find that the biases in job separation and job finding decrease with age, on average, but these changes are barely significant and economically small. Moreover, we find that the pessimistic job separation bias decreases with job tenure and increases with unemployment experience. Lastly, our results indicate that individuals with more unemployment experience have a lower optimistic bias regarding job finding. However, as before, the relationship is quantitatively weak.

Subgroup comparisons provide plausibility checks to our measures of biased expectations. We expect the bias in job separation rates to be smaller in occupations with high job security such as civil servants or employees in the public administration as well as employees with long tenure. We expect the bias to be small for persons who do not generally worry about their job insecurity. This is indeed the case. Persons with higher predicted job separation risk have a smaller job separation bias (are less pessimistic) on average. This indicates that, even though the bias exists, individuals are aware of (relative) job secu-

[15] See Tables A.10 and A.11 in Appendix A for the empirical results.

rity and take this into account when assessing their job separation probabilities. Similar patterns emerge with respect to the optimistic bias in job finding. Persons with higher predicted job finding chance have smaller optimistic bias on average.

Lastly, we address the concern that individual-level differences between the perceived and the actual transition probability are not due to a bias in expectations but may result from private information not accounted for in the statistical prediction of the actual transition probability. If private information was an important factor, then the observed deviations at the individual level between actual and perceived transition probabilities should have predictive power for subsequent labor market transitions. In order to investigate this further, we add the observed individual-level deviations as an additional explanatory variable in the probit models from above to predict job separation and job finding events. We find that for both models, the estimated coefficients on the individual-level deviations are positive and statistically significant.[16] However, the estimated effects are extremely small and the implied relationship is quantitative weak. For example, a 1 percentage point higher expected job separation probability is associated with a 0.001 percentage point higher probability to separate within two years after the interview. At the same time, a 1 percentage point higher expected job finding probability is associated with a 0.002 percentage point higher probability to find a job within two years. These results suggest that while individual private information is to some extent predictive of subsequent transition rates, its quantitative role is negligible.

3 A labor market model with biased expectations

In this section, we present a general equilibrium labor market model in which workers have biased expectations about labor market transition rates. We use this framework to analytically and quantitatively study the implications of biased expectations for wage bargaining, equilibrium unemployment and vacancies, and expected lifetime income. Our model builds on the workhorse Diamond-Mortensen-Pissarides (DMP) framework of frictional labor markets widely used in the literature.[17] Crucially, we depart from the conventional assumption of rational expectations and, consistent with our empirical findings, allow workers in the model to hold biased expectations about future realizations of individual labor market transitions. This includes the transition from unemployment to employment (job finding) and the transition from employment to unemployment (job separation). Additionally, we explicitly model the duration of wage contracts within a job match and show that this contract length shapes the propagation mechanism through which expectation biases affect the bargained wage and equilibrium outcomes.

[16] See Tables A.22 and A.23 in Appendix A for the results.
[17] See Diamond (1981) and Mortensen and Pissarides (1994) or Pissarides (2000), Chapter 1.

3.1 Setup

Time is discrete. The economy is populated by a measure one of workers and a continuum of active firms. Workers are homogeneous, risk-neutral, and infinitely lived, and receive a period wage ω when employed and income $b \geq 0$ when unemployed. Each active firm has one job that can be vacant or filled with a worker. A vacant job costs $\kappa > 0$ per period and a filled job produces output $z > b$ per period.

Unemployed workers and firms with vacant jobs are randomly matched according to an aggregate matching function, denoted by $M(u, v)$, where u is the measure of unemployed workers and v is the measure of vacant jobs. We refer to $\theta \equiv v/u$ as the labor market tightness.[18] The probability of an unemployed worker to match with a vacant job is defined as $p(\theta) \equiv M(u, v)/u$, and the probability of a vacancy to match with an unemployed worker as $q(\theta) \equiv M(u, v)/v = p(\theta)/\theta$. Existing worker-firm matches separate each period with exogenous probability $0 < \sigma < 1$.

The common approach in the literature is to assume that firms and workers have rational expectations about the underlying matching and separation probabilities. In line with the empirical findings presented in Section 2, we depart from this assumption by allowing workers to have biased expectations about the job finding and job separation probabilities.[19] Concretely, we assume that workers expect to find a job with probability $\lambda_w(\theta)$ when unemployed, and to separate from their job with probability σ_w when employed.[20] If $\lambda_w(\theta) = p(\theta)$ and $\sigma_w = \sigma$, workers have rational expectations. Instead, when $\lambda_w(\theta) > p(\theta)$, workers have an optimistic bias in their job finding expectations, as they expect to find a new job with a higher probability than the actual job finding probability. Conversely, the case $\sigma_w > \sigma$ reflects a pessimistic job separation bias, as workers expect to separate from their job with a higher probability than the actual job separation probability. We assume that there is no heterogeneity across workers in the magnitude of the bias, and that the expectation biases are constant over time. We leave it to future work to relax these assumptions and study the case where workers are heterogeneous in their biases, and learn about actual transition probabilities over time.

As in the canonical DMP model, we assume that the wage ω is determined by generalized Nash bargaining between the firm and the worker. However, we depart from the conventional assumption that wages are bargained every period. Instead, in our framework, workers and firms bargain over a wage that is paid for $T \geq 1$ periods. After that, if the match continues to hold, the parties re-bargain. Thus, a job match consists of a sequence of consecutive wage contracts of length T.[21] Despite the similarity in wording, our contracts do not impose wage rigidity in the model as, for example, in Gertler and Trigari

[18] As is standard, we assume that $M(\cdot, \cdot)$ is homogeneous of degree 1, increasing and concave in both arguments, continuously differentiable, and satisfies $M(0, u) = M(v, 0) = 0$ and $M(u, v) \leq \min[u, v]$.

[19] See Section B.4 for an extension of the model where workers and also firms have biased expectations.

[20] Concretely, we use $\lambda_w(\theta) = (1 + \Delta_\lambda)p(\theta)$ and $\sigma_w = (1 + \Delta_\sigma)\sigma$, with $\Delta_\lambda, \Delta_\sigma \in (-1, 1)$.

[21] One can think of a job match as a series of temporary, fixed-term contracts between the same employer and employee. A job match with a very long contract length would reflect a permanent job.

(2009). In our framework, firm productivity z is constant over time and so is the wage. However, an extension allowing for productivity changes would condition a wage schedule on realizations of productivity, and thereby allow wages to change within a given contract.

Our representation of wage bargaining nests, as a special case, the conventional specification in which the firm and the worker negotiate the wage every period. This case, referred to as period-by-period bargaining, is obtained for $T = 1$ and is often used in quantitative models of frictional labor markets. A limiting case is $T = \infty$, which means that the contract runs for the duration of the match.

3.2 Value functions

The value to the worker of a job paying wage ω for a contract of length T is given by

$$E(\omega) = \big(\omega + \beta\sigma_w U\big) \sum_{t=1}^{T} \big[\beta(1-\sigma_w)\big]^{t-1} + \big[\beta(1-\sigma_w)\big]^{T} E(\omega') \ , \tag{1}$$

where $\beta \in (0,1)$ is the discount factor. With probability σ_w, the worker expects to separate from the job and receive the value of unemployment, U, next period. If the match persists after T periods, the wage is renegotiated. Let ω' denote the wage in the next contract within the match, and let $E(\omega')$ represent the corresponding job value.[22]

The value of unemployment for a jobless worker is given by

$$U = b + \beta\lambda_w E(\omega') + \beta(1-\lambda_w)U \ . \tag{2}$$

Henceforth, we use λ_w instead of $\lambda_w(\theta)$ for ease of notation. With probability λ_w, an unemployed worker expects to be matched with a vacant job. Once matched, the firm and the worker bargain over the wage ω'. Importantly, E and U are the workers' perceived values of employment and unemployment. With biased expectations, E and U can differ from the actual values.

We can use Equation (1) to express the match surplus to a worker as

$$E(\omega) - U = \underbrace{[\omega - (1-\beta)U] \sum_{t=1}^{T} [\beta(1-\sigma_w)]^{t-1}}_{\text{Discounted sum of period surplus}} + \underbrace{[\beta(1-\sigma_w)]^{T} \left[E(\omega') - U\right]}_{\text{Discounted continuation value}} . \tag{3}$$

The worker obtains a given wage ω for a total of T periods. Thus, the first term represents the discounted sum of period surplus, $\omega-(1-\beta)U$, that accrues from these wage payments. The second term reflects the discounted future surplus of the match that the worker obtains

[22] Equation (1) can be expanded to show the value of being employed every period: $E(\omega) = \omega+\beta\sigma_w U+\omega\beta(1-\sigma_w)+\beta^2(1-\sigma_w)\sigma_w U+ \ \ldots \ +\omega\left(\beta(1-\sigma_w)\right)^{T-1}+\left(\beta(1-\sigma_w)\right)^{T-1}\beta\sigma_w U+\left[\beta(1-\sigma_w)\right]^{T} E(\omega')$. Alternatively, one can sort the summands into wage payments during the contract, the value of unemployment if the match breaks up during the duration of the contract and the continuation value of being employed or unemployed after the contract ends: $E(\omega) = \omega \sum_{t=1}^{T} \left[\beta(1-\sigma_w)\right]^{t-1} + \sum_{t=2}^{T} \left[\beta(1-\sigma_w)\right]^{t} \beta\sigma_w U + \beta^{T}(1-\sigma_w)^{T-1}\left[(1-\sigma_w)E(\omega') + \sigma_w U\right]$.

from a new contract with ω' starting in $T+1$. It is straightforward to see that when $T=1$, the worker obtains the period surplus only for one period and the continuation value of the new contract thereafter. In the limiting case, when $T \to \infty$, the wage is fixed for the duration of the job match, and thus, the continuation value vanishes, since $\lim_{T\to\infty} [\beta(1-\sigma_w)]^T = 0$. It is important to note that the worker discounts future payoffs using the effective discount factor $\beta(1-\sigma_w)$. The sooner the worker expects to separate from the job (higher σ_w), the more heavily future payoffs are discounted.

By setting $E(\omega)-U=0$ in the previous expression, we can derive the worker's reservation wage, $\underline{\omega}$, in the standard way as the wage for which the worker is indifferent between working and being unemployed. It follows that

$$\underline{\omega} = (1-\beta)U - \frac{[\beta(1-\sigma_w)]^T [E(\omega')-U]}{\sum_{t=1}^{T} [\beta(1-\sigma_w)]^{t-1}} \ . \tag{4}$$

The worker's reservation wage has two terms: the per-period value of unemployment, $(1-\beta)U$, and the expected net surplus from continuing the match with a new contract. It is straightforward to see that the reservation wage increases if the worker becomes more pessimistic about job stability (for given values of E and U). This is intuitive as for higher values of σ_w the worker expects a shorter duration of the current job and thus, the expected net surplus from continuing the match with a new contract is lower. Moreover, the longer the contract length T, the less important the continuation value becomes for the reservation wage.[23] The worker's job separation expectations also affect the reservation wage indirectly through the effect on the value of unemployment U. In particular, a pessimistic worker considers future employment less attractive, which lowers U and implies a lower reservation wage. Hence, the effect of σ_w on the reservation wage depends on the relative importance of the value of unemployment and the continuation value of the match.

Furthermore, the worker's job finding expectation, λ_w, affects the reservation wage through its effect on the value of unemployment U. An optimistic bias in the job finding rate leads unemployed workers to attribute a higher value to U as they expect to leave unemployment earlier. A higher value of unemployment then increases the reservation wage.

Next, we define the value to a firm of a match with wage ω and contract length of T periods as

$$J(\omega) = [z-\omega+\beta\sigma V] \sum_{t=1}^{T} [\beta(1-\sigma)]^{t-1} + [\beta(1-\sigma)]^T J(\omega') \ , \tag{5}$$

where z is match output. The match dissolves with probability σ, in which case the firm obtains the value of a vacant job denoted by V. The latter is defined as

$$V = -\kappa + \beta q(\theta) J(\omega') + \beta(1-q(\theta))V \ . \tag{6}$$

[23] For $T=1$: $\underline{\omega} = (1-\beta)U - \beta(1-\sigma_w)\big(E(\omega')-U\big)$. For $T=\infty$: $\underline{\omega} = (1-\beta)U$.

We combine the worker's and the firm's value functions (1), (2), (5), and (6) to define the joint surplus of the match as $S(\omega) \equiv J(\omega) - V + E(\omega) - U$. Importantly, and unlike in the canonical DMP-framework, in this model the wage ω not only divides the joint surplus between the firm and the worker, but also determines the size of the joint surplus. To understand this relationship, consider a marginal change in the wage and note that this change has a differential impact on the worker's and the firm's surplus as long as $T > 1$ and $\sigma_w \neq \sigma$. For example, when the worker has pessimistic job separation expectations ($\sigma_w > \sigma$), the joint surplus is negatively related to the wage:

$$\frac{\partial S(\omega)}{\partial \omega} = \frac{\partial J(\omega)}{\partial \omega} + \frac{\partial E(\omega)}{\partial \omega} = -\sum_{t=1}^{T} \Big(\beta(1-\sigma)\Big)^{t-1} + \sum_{t=1}^{T} \Big(\beta(1-\sigma_w)\Big)^{t-1} < 0 \ . \quad (7)$$

That is, a marginal increase in the wage ω raises the worker's value $E(\omega)$ by less than it decreases the firm's value $J(\omega)$. This is because the separation probability determines the expected duration for which the wage is paid. Thus, if the worker expects a shorter duration than the firm, then the perceived gain for the worker from a higher wage is smaller than the loss for the firm. This relationship will be key in understanding how the worker's expectation bias affects the wage bargaining. Note that for this relationship to hold, firms do not need to have rational expectations. In an extension to the model, we show that if the firm also has biased separation expectations, then the relationship holds as long as the firm's bias is smaller than worker's bias.[24]

3.3 Wage determination

The period wage ω that a worker receives in a contract of length T is determined by (generalized) Nash bargaining between the worker and the firm and solves

$$\omega = \arg\max \big[E(\omega) - U\big]^{\gamma} \big[J(\omega) - V\big]^{1-\gamma} \ , \quad (8)$$

where $\gamma \in (0,1)$ denotes the worker's bargaining power. Regarding the bargaining procedure, we assume that the respective job values, $E(\omega)$ and $J(\omega)$, and of the outside options, U and V, are known to and accepted by both parties (common knowledge). This means that the worker and the firm know each other's perceived values and agree to disagree.[25]

The optimality condition associated with the maximization problem in (8) is given by

$$\gamma\Big[J(\omega) - V\Big] \underbrace{\frac{\partial E(\omega)}{\partial \omega}}_{\sum_{t=1}^{T}[\beta(1-\sigma_w)]^{t-1}} + (1-\gamma)\Big[E(\omega) - U\Big] \underbrace{\frac{\partial J(\omega)}{\partial \omega}}_{-\sum_{t=1}^{T}[\beta(1-\sigma)]^{t-1}} = 0 \ . \quad (9)$$

If $T > 1$, two important observations follow. First, the derivatives of the worker's and the

[24] See Appendix B.4 for the model extension.

[25] Although workers do not form rational expectations, there is no private information in our model. Under these conditions, the alternating-offer bargaining protocol of Binmore et al. (1986) yields the same solution as Nash bargaining, thus offering a micro foundation of the bargaining procedure also in our setting. See Section B.3 in the Appendix for the derivations.

firm's value functions with respect to the wage are larger than unity (in absolute value). This is because a marginal change in ω affects not only the current period value of the match (as with period-by-period bargaining), but also future values. Second, as mentioned before, if $\sigma_w \neq \sigma$, then a marginal change in the wage affects the worker's value differently than the firm's value. For example, a pessimistic worker (with $\sigma_w > \sigma$) discounts future wage payments more than the firm does, and thus the worker gains less from an increase in the wage than the firm loses. This is also reflected in the implied surplus sharing rule which can be obtained by rearranging the optimality condition (9).

$$\frac{E(\omega) - U}{J(\omega) - V} = \frac{\gamma}{1-\gamma} \frac{\sum_{t=1}^{T} \left[\beta(1-\sigma_w)\right]^{t-1}}{\sum_{t=1}^{T} \left[\beta(1-\sigma)\right]^{t-1}} \ . \tag{10}$$

The worker's share of the total surplus depends not only on the bargaining weight γ, as in the standard DMP model, but also on the worker's separation expectations. As can be seen from the previous expression, the worker's share of the surplus is equal to γ when $\sigma_w = \sigma$, but less than γ when the worker is pessimistic about the duration of the match.

3.4 Labor market equilibrium

In the next step, we derive two conditions that jointly characterize the equilibrium of the model: the job creation condition and the wage curve. First, we combine the firm's value functions (5) and (6), and use free entry (implying that $V = 0$) together with the fact that in a stationary equilibrium $J(\omega) = J(\omega')$ to obtain the job creation condition:

$$\frac{z - \omega}{1 - \beta(1-\sigma)} = \frac{\kappa}{\beta q(\theta)} \ . \tag{11}$$

Equation (11) is identical to the job creation condition in the model with rational expectations: The left-hand side represents the present discounted value of the future stream of period profits, while the right-hand side represents the firm's expected hiring costs. In equilibrium, the firm's expected profits and expected costs are equalized, so that an entering firm expects to earn zero profits.

Second, combining the optimality condition (9) with the worker's and the firm's value functions (1), (2), (5) and (6), and accounting for the fact that $V = 0$ in equilibrium yields the wage equation:

$$\omega = b + \gamma \left[z - b + \kappa \frac{\theta}{p(\theta)} \left(\underbrace{\frac{\sum_{t=1}^{T} \left[\beta(1-\sigma_w)\right]^{t-1}}{\sum_{t=1}^{T} \left[\beta(1-\sigma)\right]^{t-1}}}_{\frac{\partial \cdot}{\partial \sigma_w} \leq 0} \lambda_w(\theta) + \beta^{T-1} \underbrace{\frac{(1-\sigma)^T - (1-\sigma_w)^T}{\sum_{t=1}^{T} \left[\beta(1-\sigma)\right]^{t-1}}}_{\frac{\partial \cdot}{\partial \sigma_w} > 0} \right) \right] . \tag{12}$$

It is straightforward to verify that, in the absence of expectation biases, (12) is identical to the familiar rational expectations solution, $\omega = b + \gamma(z - b + \kappa\theta)$, which is independent

of the contract length T.

The equilibrium of the model is described by the pair (ω, θ) that jointly solves the job creation condition (11) and the wage equation (12). The equilibrium unemployment rate is given by the standard expression for the Beveridge curve, $u = \frac{\sigma}{\sigma + p(\theta)}$. Whether an equilibrium exists and is unique depends, unlike in the standard model, on the length of the wage contract (T) and on the workers' job finding and separation expectations, (λ_w, σ_w). The following proposition makes a formal statement about the existence and uniqueness of equilibrium.[26]

Proposition 1 *In the presence of biased expectations and wage contracts of length $T \geq 1$, an interior equilibrium with $\theta > 0$ exists if and only if the condition*

$$-\beta^{T-1}\left[(1-\gamma)(1-\sigma)^T + \gamma(1-\sigma_w)^T\right] \leq (1-\gamma)\frac{z-b}{\kappa}\sum_{t=1}^{T}\left[\beta(1-\sigma)\right]^{t-1} - \frac{1}{\beta}$$

(i) holds with strict inequality, or
(ii) holds with equality and $\gamma\lambda_w/p(\theta) = \gamma(1+\Delta_\lambda) = 0$ and $\lim_{\theta\to 0^+}\theta p'(\theta) = 0$.

If (i) holds and $\gamma\lambda_w/p(\theta) > 0$ or $p(\theta)/\theta$ is strictly decreasing, then the equilibrium is unique.

Next, we conduct comparative statics analyses to build intuition for how workers' expectation biases affect equilibrium outcomes. First, consider the job finding bias. An optimistic unemployed worker, with $\lambda_w > p(\theta)$, overestimates the probability of finding a job. Thus, according to Equation (2), the value of unemployment, U, as perceived by the worker is higher than without the optimistic bias. With a more valuable outside option in the bargaining process, both the worker's reservation wage and the bargained wage are higher (compared to the rational expectations case). This situation is depicted in Panel (a) of Figure (3) by an upward-rotation of the wage curve. Since the job creation condition is unaffected by workers' expectations, the optimistic job finding bias leads to a higher equilibrium wage ω, a lower market tightness θ, a higher unemployment rate u, and a longer average duration of unemployment $1/p(\theta)$.

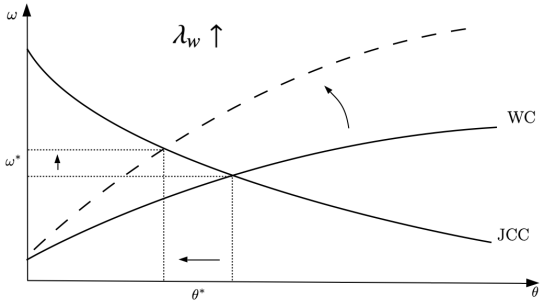
Next, consider the job separation bias. As can be seen from the wage curve in (12), the overall effect of the separation bias on the wage depends on two opposing effects, represented by the two terms inside the parentheses. The first term is negatively related to the bias. The intuition is as follows: A pessimistic worker, with $\sigma_w > \sigma$, expects the match to dissolve sooner than the firm does. Therefore, the worker discounts future wages paid in the current contract more heavily than the firm does. Consequently, the worker is willing to accept a lower wage. In contrast, the second term inside the parentheses is positively related to the bias. A pessimistic worker discounts the continuation value

[26] The proof of Proposition 1 is in Section B.1 in the Appendix.

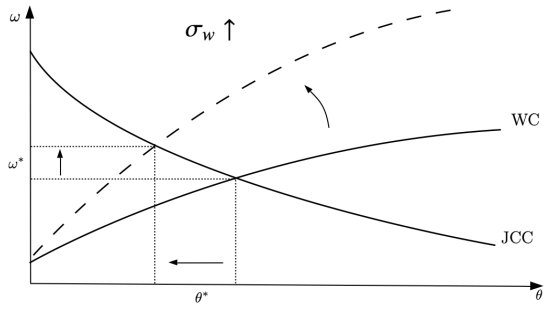
associated with a future contract more heavily than the firm. Thus, it is less attractive for the worker to stay in the match. As a result, the firm must offer a higher wage to keep the worker in the match.

Crucially, the length of the wage contract T determines the relative strength of these two effects. For low values of T, the current wage is paid for only a few periods, and hence the differential discounting of the current contract plays a minor role. In this case, the positive effect dominates and, thus, the wage increases in the pessimistic bias, $\frac{\partial \omega}{\partial \sigma_w} > 0$. This situation is depicted in Panel (b) of Figure 3 by an upward-rotation of the wage curve. As the contract length T increases, the current wage is paid for a longer period of time, and therefore the negative effect of the separation bias on the wage becomes stronger, while the positive effect diminishes. For a sufficiently long duration of the wage contract, the derivative $\frac{\partial \omega}{\partial \sigma_w}$ becomes negative, as illustrated in Panel (c) of Figure 3.

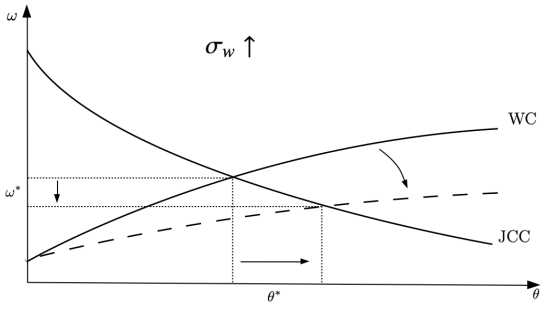
Figure 3: General equilibrium effects of bias



(a) Optimistic job finding bias



(b) Pessimistic job separation bias, $T < T^*$



(c) Pessimistic job separation bias, $T > T^*$

Notes: JCC: Job creation condition, WC: Wage curve

One can show that there exists a unique contract length T^* such that the wage increases with the separation bias for all $T < T^*$ and decreases with the bias for all $T \geq T^*$. This value is given by the smallest integer $T^* > 0$ which satisfies the following condition for a fixed θ:[27]

$$\frac{T^*}{\lambda_w(\theta)} < \beta \sum_{t=1}^{T^*-1} (T^* - t) \Big[\beta(1-\sigma_w)\Big]^{-t} . \tag{13}$$

Importantly, the job creation condition (11) is not affected by the contract length T. Thus,

[27] See Appendix B.2 for the derivation of T^*.

for $T < T^*$, a pessimistic job separation bias raises the equilibrium wage ω and lowers the market tightness θ, whereas the opposite effect occurs for $T > T^*$.

4 Quantitative analysis

In this section, we conduct a quantitative analysis in order to assess how workers' expectation biases affect wages, unemployment, and expected lifetime income. Of particular interest in this analysis is the extent to which the more pessimistic expectations of East German workers can contribute to the observed wage gap between East and West Germany. To investigate this, we first calibrate the model to match data targets for the East German economy. We then perform a counterfactual exercise where we make East German workers more optimistic by assigning to them the expectation biases of West German workers. Then, we compare the wages and other labor market outcomes of this counterfactual East-Germany to the outcomes of the baseline economy.

4.1 Calibration

In our baseline calibration, we set the model period to one quarter. The discount factor, β, is chosen to match an annual interest rate of 4 percent. Unemployment income, b, is set to match the average German replacement rate of 65 percent. For the matching process, we use the function $M(u, v) = \chi u^{\eta} v^{1-\eta}$, where the parameter η governs the elasticity of matches with respect to labor market tightness. Following the literature, set $\eta = 0.65$ (see e.g. Balleer et al., 2016, or Kohlbrecher et al., 2016). The scale parameter, χ, is calibrated to match the quarterly job-finding rate of unemployed workers, which we compute using SOEP data (see Table A.2 in Appendix A). The vacancy cost, κ, is set such that the model generates a steady-state labor market tightness of $\theta = 1$. The separation probability, σ, is set to match the quarterly separation rate (based on the general separation measure) in the SOEP. To calibrate the biases in job finding and job separation rates, we rely on our empirical findings from Section 2. Since these biases are derived from biennial data, we convert them to a quarterly frequency using the procedure outlined in Table A.2.

A key parameter in the model is the contract length T. As shown in Section 3.4, T shapes the relationship between workers' separation expectations and wages. Using the expression in (13) and the calibrated parameter values, we obtain a critical value of $T^* = 10$ quarters. When $T > T^*$, more pessimistic separation expectations lead to lower wages, whereas for $T < T^*$, they result in higher wages. To calibrate T, we use information from the data on the average length of work contracts in East Germany. Specifically, we consider the sample of employed East-German workers in the SOEP (excluding the self-employed). Among them, 88 percent hold permanent contracts, while 12 percent are in temporary contracts. Since the SOEP data does not provide information on contract lengths, we approximate it by the remaining duration of permanent contracts. We compute the remaining duration as the difference between the effective retirement age and the

worker's current age. The average effective retirement age in our sample is approximately 63 years, yielding an average remaining contract length of about 19 years.[28] For temporary contracts, we assume a duration of 1 year.[29] Using the share of permanent and temporary contracts in our sample, we compute an average contract length for East Germany of 16.8 years ($T = 67$). Since, this value exceeds the critical value T^*, our calibrated model predicts that more pessimistic workers earn lower wages. Importantly, we consider $T = 67$ a lower bound, as it is based on the remaining contract length rather than the total contract duration. To address this, we consider two alternative cases where the total length of permanent contracts is set to 30 and 45 years. These values correspond to workers entering contracts at ages 22 and 37 years, respectively, and retiring at 67. Along with a duration of 1 year for temporary contracts, these values yield average contract contract lengths of $T = 106$ and $T = 159$ quarters, respectively.

Table 3: Baseline calibration

Parameter	Description	Value	Source/Target
β	Discount factor	0.9900	Annual interest rate (4%)
η	Matching fnct elasticity	0.6500	Kohlbrecher et al. (2016)
b	Unemployment income	$[0.58, 0.63]$	Replacement rate of 65%
κ	Vacancy costs	$[0.21, 0.76]$	$\theta = 1$ (Normalization)
χ	Matching fnct efficiency	0.1850	JF rate (SOEP)
σ	Separation rate	0.0174	JS rate (SOEP)
Δ_σ	Job separation bias	0.0194	Own estimate (JS general, SOEP)
Δ_λ	Job finding bias	0.0044	Own estimate (JF out of U, SOEP)

Notes: The model is calibrated to East Germany at a quarterly frequency. JF refers to job finding out of unemployment only, JS refers to the general measure of job separation.

Another important parameter is the bargaining power of workers, γ. In much of the literature, this parameters is commonly set to 0.5 (see e.g. Balleer et al., 2016). In our model, the workers' bargaining power plays a crucial role in determining how strongly biased expectations affect wages.[30] According to Equation (12), a lower bargaining power reduces the equilibrium wage (keeping everything else equal). However, since lower wages spur job creation, the model requires a higher vacancy cost, κ, to match the empirical job-finding rate. This, in turn, increases the elasticity of wages with respect to the bias (see Equation (12)). A lower bargaining power may be a particularly realistic assumption for East Germany, where collective worker representation is significantly weaker than in West Germany (see e.g. Bachmann et al., 2022 for supporting evidence). Given the quantitative

[28] See www.demografie-portal.de. The legal retirement age is currently at 67, but was 65 for most of the sample. For older cohorts and specific occupations, lower legal retirement ages apply. In addition, early retirement is widely applied in Germany.

[29] For temporary contracts, Destatis reports that 57 percent of these contracts hold for less than a year in 2022, while 20 percent hold between 1 and 2 years, 13 percent between 2 and 3 years and about 10 percent for longer than 3 years. Destatis does not report significant differences between East and West Germany with respect to the length of temporary contracts. See https://www.destatis.de/DE/Themen/Arbeit/Arbeitsmarkt/Qualitaet-Arbeit/Dimension-4/befristet-beschaeftigte.html.

[30] More generally, the quantitative impact of biases on wages depends on the wage response to labor market tightness. It has been widely discussed that this response tends to be small in a DMP-type framework and is sensitive to the model calibration. (see e.g. Shimer, 2005, among many others).

importance of γ and T for the effects of biases on wages in our model, we consider a range of values for these parameters. Specifically, we consider $\gamma \in \{0.35, 0.50, 0.65\}$ and $T \in \{67, 106, 159\}$. For each combination of (γ, T), we calibrate unemployment income b and vacancy costs κ to match a replacement rate of 65 percent and to obtain an equilibrium tightness of $\theta = 1$. The resulting values for b range from 0.58 to 0.63, while those for κ range from 0.21 to 0.76 (see Table C.9 in Appendix C.2).

Table 3 presents the calibrated parameter values. Our calibration implies a steady-state unemployment rate of 8.6 percent for East Germany and an average unemployment duration of 5.4 quarters.[31] Using SOEP data, we can estimate the empirical relationship between individuals' job separation expectations and wages. We will not use this relationship as a calibration target, but as an additional testable implication for our model, particularly for assessing the plausibility of different combinations of T and γ. To estimate this relationship, we regress log hourly wages on the individual-level difference between perceived and actual job separation rates, controlling for various factors and including individual fixed effects. Additionally, we allow this relationship to differ between East and West Germany. Details of the estimation and results are provided in Appendix C.1. Importantly, we find that the empirical relationship between individual wages and the difference between perceived and actual job separation rates is significant and negative (and twice as negative in East Germany as in the West). Our estimates implies that if East German workers' pessimism about job separation was at the West German level, hourly wages in the East would be about 1 percent higher.[32]

4.2 Results

For each pair (γ, T), we conduct the counterfactual experiment, in which we make East German workers less pessimistic about job separation and more optimistic about job finding. Specifically, we assign to them the job separation and job finding biases that we measure for West Germany, setting Δ_σ and Δ_λ to West German levels. Importantly, in this experiment, we adjust only these bias parameters while keeping all other parameters unchanged. Thus, this experiment resembles an information treatment that informs workers about their individual labor market transition probabilities.

Table 4 presents the implied changes in log wages and expected lifetime income, for each combination of (γ, T), relative to the baseline economy.[33] Assigning West German biases

[31] According to the German Federal Employment Agency, the average annual unemployment rate between 1999 and 2015 equals 8.8 percent for Germany as a whole, while the corresponding average unemployment rate in East Germany equals 14.5 percent. The time series are publicly available on the homepage of the Federal Statistical Office of Germany (www-genesis.destatis.de), Table 13211-0001. Hence, the unemployment rate implied by transition rates in the SOEP is substantially lower than the officially reported figures. We explore robustness to setting the job separation rate in the East to a higher value in line with the officially reported unemployment rate below.

[32] Appendix C.1 also presents comparable evidence for the U.S. and examines the relationship between job-finding expectations and reservation income in Germany. Consistent with our model, greater optimism about job finding is associated with higher reservation income.

[33] Table C.10 in Appendix C.2 also report changes in unemployment and reservation wages, as well as results

to East German workers leads to an increase in East German wages ranging from 0.61 to 2.36 percent. As can been from the table, the bargaining power γ plays a crucial role in shaping the response of wages to changes in biases. For lower values of γ, wages react more strongly to changes in the bias. The predicted wage increase for $\gamma \in \{0.35, 0.5\}$ is consistent with our estimated empirical relationship, whereas it is inconsistent for $\gamma = 0.65$.[34]

In the data, the unconditional East-West German wage gap is approximately 30 percent, or 23 percent after accounting for controls (see Table A.7 in Appendix A). The predicted East German wage increases of 1.07 and 2.36 percent obtained for $\gamma \in \{0.35, 0.5\}$ imply a reduction in the unconditional wage gap by 3.6 to 7.9 percent and in the conditional wage gap by 4.6 to 10.6 percent. These findings suggests that a substantial part of the observed East-West German wage gap is due to East-West differences in expectation biases – particularly the greater pessimism among East German workers.

Table 4: Results of counterfactual experiments

		$\Delta[ln(\omega)]$			$\Delta[ln(\mathbb{E}\mathcal{I}_{W,U})]$		
		T			T		
		67	106	159	67	106	159
γ	0.35	0.0184	0.0220	0.0236	0.0144	0.0175	0.0188
	0.50	0.0107	0.0129	0.0138	0.0070	0.0086	0.0093
	0.65	0.0061	0.0073	0.0078	0.0024	0.0031	0.0035

Notes: Baseline model for East Germany calibrated to respective samples (c.f. Table 3) for different combinations of values for γ and T. Counterfactual experiment assigns Western bias in job separation and job finding rates. Model is not recalibrated. Reported numbers show log changes in equilibrium values relative to the baseline. Reported variables: wage (ω) and ex-ante unbiased expected lifetime income ($\mathbb{E}\mathcal{I}_{W,U}$).

Changing expectation biases also affects other labor market outcomes in the model economy. As shown in the theoretical analysis in Section 3.4, both an increase in the optimistic job-finding bias and a decrease in the pessimistic job-separation bias lead to an upward rotation of the wage curve. Consequently, equilibrium wages rise, but labor market tightness declines, resulting in higher equilibrium unemployment and longer unemployment duration. Our counterfactual analysis – using our preferred calibration with $\gamma \in \{0.35, 0.5\}$ – implies that with West German biases, unemployment in the East would increase by 0.70 to 1.01 percentage points This would further widen the observed East-West unemployment gap of about 7 percentage points.

Since wages and unemployment move in opposite directions, the net effect of reducing East German workers pessimism on income is ambiguous. To quantify the net effect, we compute the expected lifetime income of an individual entering the economy as:

when adjusting only one bias (job separation or job finding).

[34] Our empirical estimates isolate the effect of job separation bias on wages while ignoring that job finding bias affects the behavior of employed workers at the same time. In order to compare the wage response to assigning only the West German separation bias to East Germany, these effects need to be singled out in the model and are shown in Table C.10 in Appendix C.2 in the first row of each calibration exercise.

$$\mathbb{E}(\mathcal{I}_{W,U}) = (1-u)\mathcal{I}_W + u\mathcal{I}_U \tag{14}$$

where

$$\mathcal{I}_W = \omega + \beta(1-\sigma)\mathcal{I}_W + \beta\sigma\mathcal{I}_U \tag{15}$$

$$\mathcal{I}_U = b + \beta\big[1-\theta q(\theta)\big]\mathcal{I}_U + \beta\theta q(\theta)\mathcal{I}_W \ . \tag{16}$$

Importantly, the calculation of expected incomes is based on actual (unbiased) job separation and job finding probabilities. The results are presented in the right panel of Table 4.[35] For our preferred calibration with $\gamma \in \{0.35, 0.5\}$, expected lifetime income in East Germany increases by 0.7 to 1.88 percent. From this, we conclude that East German workers would be better off if their expectation biases were at West German levels.

We also examine the sensitivity of our baseline results to various alternative specifications, with details provided in Appendix C.2.2. One variation adopts a narrower definition of job separation, considering only dismissals, in line with the definition used in the empirical analysis. Other variations include using the East German unemployment rate (as reported by the official statistics) as a calibration target and calibrating the model at a biennial frequency. Across these cases, the results remain quantitatively similar to our baseline findings, with one exception: in the biennial calibration, wages increase much stronger – by up to 3.3 percent. In this scenario, the conditional East-West German wage gap narrows by up to 11 percent, while the unconditional wage gap declines by up to 14.3 percent. Lifetime income rises by as much as 2.23 percent.

5 Conclusion

We study how biased expectations of workers about labor market transitions affect labor market outcomes, in particular wages and wage differentials. We use survey data from the German Socio-Economic Panel (SOEP) and document systematic differences between perceived and actual job finding and job separation rates. East Germans are substantially more pessimistic regarding job stability and less optimistic regarding job finding than their Western counterparts.

We incorporate biased expectations about labor market transitions into the workhorse macroeconomic model of frictional labor markets and investigate their implications for wage bargaining and the labor market equilibrium. If workers are pessimistic regarding job stability, higher effective discounting of future wages in ongoing contracts relative to lower values of consecutive contracts within a match lead to lower wages. If workers are optimistic regarding job finding, they overestimate the value of unemployment, their reservation wages increase and they need to be compensated accordingly through higher

[35] Table C.10 in Appendix C.2 reports results for the different components of lifetime income.

wages. Low bargaining power on the side of the workers intensifies these effects.

We calibrate our model to East Germany and quantify the importance of bias differences to West Germany for the wage differential between the two regions. Less pessimism regarding job stability and more optimism regarding job finding in line with West German bias levels decrease the conditional East-West German wage gap by 4.6 to 10.3 percent and increase East German expected lifetime income by between 0.7 to 1.88 percent. Our results therefore suggest that it might be desirable to reduce pessimistic bias in expectations, e.g., through information treatment. Our analyses show that the contribution of biased expectations to wage differences is larger if the bargaining power of workers is low. Since union representation in East Germany is low, our results suggest that it might be beneficial to strengthen unions in East Germany. This is especially the case if unions are able to form more accurate expectations than individuals. This insight is related to the discussion in Bachmann et al. (2022).

Our results also suggest that policy makers need to take existing expectation biases about labor market outcomes into account when assessing the effectiveness of labor market policy. This is potentially relevant for policies that affect the reservation wage such as unemployment insurance or minimum wage, but also for policies that affect separation rates such as firing costs. The presence of biased expectations may affect the labor market equilibrium under these policies differently than under rational expectations. For example, higher firing costs can lead to an increase in equilibrium unemployment in an economy with pessimistic workers, whereas unemployment declines in an economy with optimistic workers. It will be insightful to explore the interaction of biased expectations and labor market policy in future research.

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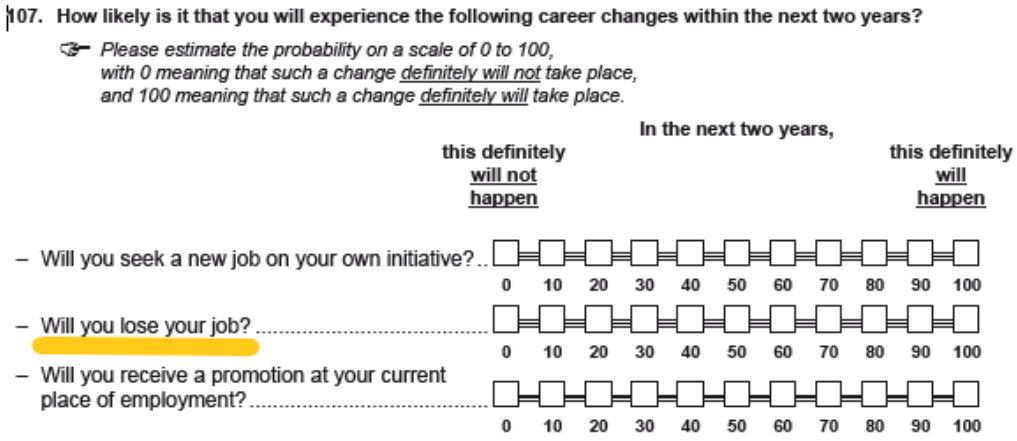
A Data appendix

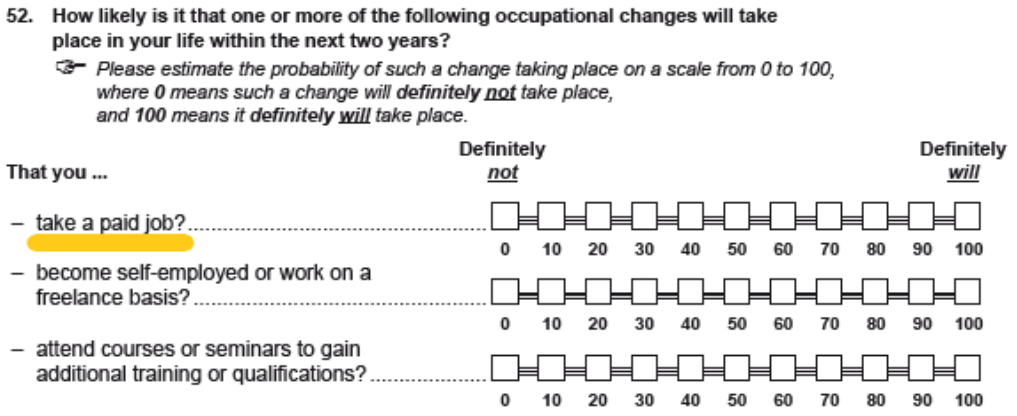
A.1 Additional graphs and tables about data

Figure A.1: Question on job separation expectations in the SOEP



Source: SOEP Group (2017)

Figure A.2: Question on job finding expectations in the SOEP



Source: SOEP Group (2017)

Figure A.3: Job separation and job finding expectations: Histograms

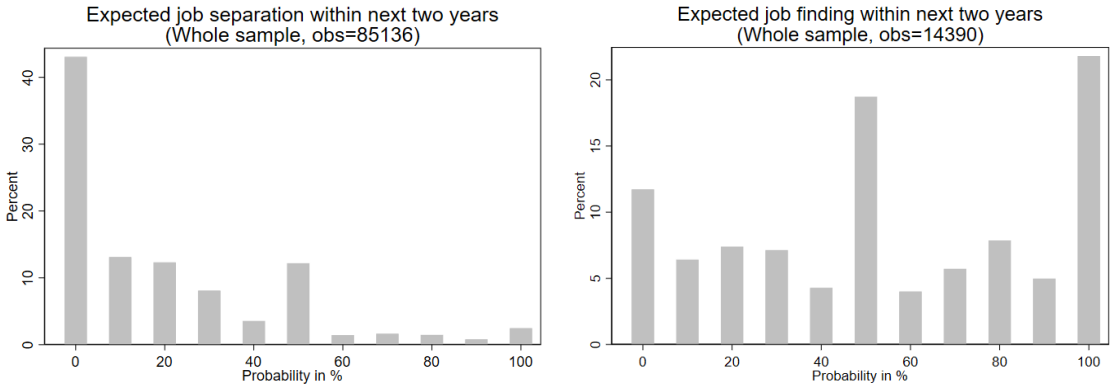


Table A.1: Employment, unemployment and out of the labor force spells in the SOEP

`spelltyp` ("Type of Event")	
1	Full-Time Employment
2	Short Work Hrs
3	Part-Time/ Marginal Employment
4	Vocational Training
5	Registered Unemployment
6	Retired
7	Maternity Leave
8	School, College
9	Military, Community Service
10	Housewife, Husband
11	Second Job
12	Other
13	First Job Training, Apprenticeship
14	Continuing Education, Retraining
15	Minijob (up to 400 Euro)
99	Gap

Table A.2: Job separation and job finding indicators: Summary statistics

	All		East		West	
Job separation biannual	Mean	Obs.	Mean	Obs.	Mean	Obs.
general	13.454	212114	15.346	45784	12.933	166330
dismissal	3.6325	212114	5.2420	45784	3.1894	166330
selected	6.2575	212114	8.8503	45784	5.5438	166330
spell	5.4881	108836	8.7205	23657	4.5903	85179
quarterly						
general	1.5618	163148	1.7387	36752	1.5103	126396
dismissal	0.5185	163148	0.6503	36752	0.4802	126396
selected	0.7876	163148	1.0639	36752	0.7073	126396
spell	0.9188	84241	1.5849	19118	0.7232	65123
Job finding biannual	Mean	Obs.	Mean	Obs.	Mean	Obs.
out of U	44.416	9616	46.596	3702	43.050	5914
out of U or O	29.967	36147	32.762	9099	29.026	27048
quarterly						
out of U	18.625	9616	18.531	3702	18.684	5914
out of U or O	12.128	36147	13.177	9099	11.775	27048

Notes: Measure of actual job separation from retrospective question two years (one quarter) after interview including all reasons (*general*), dismissal or closure (*dismissal*), dismissal or closure or mutual agreement or end of contract (*selected*), or from spell measure. Measure of actual job finding from spells two years (one quarter) after interview out of unemployed (out of U), out of unemployment or out of the labor force (out of U or O). Converting the biennial rates to a quarterly frequency by means of a geometric series ($p^{biennial} = 1 - (1 - p^{quarterly})^8$) delivers a quarterly job separation rate of 1.7 percent (general measure) and a quarterly job finding rate of 7.8 percent (out of unemployment). This suggests an evenly distributed job separation rate, while job finding probabilities decrease over time.

Table A.3: Discrete variables for employed persons: Summary statistics

	frequency	percentage	cumlative
Male	110194	51.95	51.95
Female	101920	48.05	100.00
Married, Partnered	146859	69.64	69.64
Single, Divorced, Widowed	64009	30.36	100.00
No children under 16 in household	95487	45.02	45.02
Children under 16 in household	116627	54.98	100.00
West Germany	166330	78.42	78.42
East Germany	45784	21.58	100.00
Not born in Germany	29358	13.84	13.84
Born in Germany	182756	86.16	100.00
No German citizen	29358	13.84	13.84
German citizen	182756	86.16	100.00
Low (School)	14586	6.91	6.91
Middle (Vocational Training)	138519	65.59	72.50
High (University)	58073	27.50	100.00
No new job since previous year	171287	82.88	82.88
New job since previous year	35387	17.12	100.00
Not working in occupation trained for	71961	37.18	37.18
Working in occupation trained for	121605	62.82	100.00
Permanent Job	162069	78.89	78.89
Temporary Job	17855	8.69	87.58
Self-Employed	25520	12.42	100.00
Satisfaction with work: 0 (low)	1211	0.60	0.60
Satisfaction with work: 1	1402	0.69	1.28
Satisfaction with work: 2	3602	1.77	3.05
Satisfaction with work: 3	6658	3.27	6.33
Satisfaction with work: 4	8059	3.96	10.29
Satisfaction with work: 5	20745	10.20	20.48
Satisfaction with work: 6	20635	10.14	30.63
Satisfaction with work: 7	38117	18.74	49.36
Satisfaction with work: 8	56000	27.52	76.89
Satisfaction with work: 9	29716	14.61	91.49
Satisfaction with work: 10 (high)	17307	8.51	100.00
Agriculture, etc.	3839	1.95	1.95
Industry and Manufacturing	45168	22.98	24.93
Energy and Construction	14206	7.23	32.16
Services, etc.	66226	33.69	65.85
Public administration	58239	29.63	95.48
Private households	8876	4.52	100.00
Firm size < 20	55006	28.09	28.09
Firm size $\geq 20 < 200$	54949	28.07	56.16
Firm size $\geq 200 < 2000$	40524	20.70	76.86
Firm size ≥ 2000	45308	23.14	100.00
Total	212114	100.00	

Notes: Employed persons, age 25 to 65 years, survey years 1999, 2001, 2003, 2005, 2007, 2009, 2013, 2015. Sample for observations with measured deviations of perceived versus actual job separation only. Agriculture, etc. includes Forestry, Fishery and Mining. Services, etc. includes Tourism, Trade, Business and Transport. Public administration, etc. includes Health, Social Work and Education. Private households, etc. includes Membership Organizations.

Table A.4: Continuous variables for employed persons: Summary statistics

	Mean	std.dev.	min	max	P50	Obs.
Age	43.744	9.9330	25	65	44	212114
Tenure in Firm	10.903	9.8850	0	51.600	8.1000	210317
Unemployment experience in years	0.6241	1.7042	0	34.300	0	208300
Hourly wage rate	11.025	8.0486	0	775	9.5625	205184
Net labor income	1684.0	1349.7	0	80000	1472	212112
Actual work hours	37.943	13.478	0.5000	80	40	205184

Note: Age, tenure and unemployment experience in years. Hourly wage rates refer to actual hours worked, labor income is net, in Euro and refers to main job last month, work time is actual work time per week in hours.

Table A.5: Discrete variables for unemployed persons: Summary statistics

	frequency	percentage	cumulative
Male	9039	48.11	48.11
Female	9750	51.89	100.00
Married, Partnered	10516	56.49	56.49
Single, Divorced, Widowed	8101	43.51	100.00
West Germany	11555	61.50	61.50
East Germany	7234	38.50	100.00
Not born in Germany	4626	24.62	24.62
Born in Germany	14163	75.38	100.00
No German citizen	4626	24.62	24.62
German citizen	14163	75.38	100.00
Low (School)	3939	21.19	21.19
Middle (Vocational training)	12565	67.58	88.76
High (University)	2089	11.24	100.00
Very good health	1286	6.85	6.85
Good health	5956	31.74	38.60
Satisfactory health	6152	32.79	71.38
Poor health	3880	20.68	92.06
Bad health	1490	7.94	100.00
Total	18789	100.00	

Table A.6: Continuous variables for unemployed persons: Summary statistics

	Mean	std.dev.	min	max	P50	Obs.
Age	44.702	11.068	25	65	45	18789
Unemployment experience in years	4.7444	4.5714	0	39	3.3000	18450
Work experience (full time)	14.618	12.009	0	50.100	12.300	18450
Work experience (part time)	1.9215	4.2388	0	40	0	18450
Reservation income	1212.5	532.27	1	9999	1200	10728

Note: Age, work and unemployment experience in years. Reservation income refers monthly net salary at which person would take a job and refers to unemployed persons used in reservation income regressions.

Table A.7: East-West wage differentials

	log hourly wage rate		
East dummy	-0.295***	-0.231***	-0.226***
	(0.00293)	(0.00375)	(0.00378)
N	204285	65736	65736
add. controls	No	Yes	Yes
add job separation bias	No	No	Yes

Standard errors in parentheses (not bootstrapped)

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Controls: educational degree, full time work experience, German citizenship, gender, actual hours worked, tenure industry, occupation, firm size, survey year fixed effects

A.2 Probit estimation output

Table A.8: Job separation probit estimation

	general	dismissal	selected	spell
Age	-0.00536	-0.0369***	-0.187***	-0.0320***
Age, squared	0.000149	0.000464***	0.00217***	0.000461***
Female	-0.00471	-0.0156	0.126***	-0.0198
Married, Partnered				
Single, Divorced, Widowed	0.0506*	0.0284	-0.0430**	0.118***
Children under 16 in household	-0.0211	-0.0157	-0.0620***	-0.00763
East-Germany	0.154***	0.140***	0.0135	0.184***
Born in Germany	-0.0752*	-0.00511	0.0275	-0.0810**
Tenure in Firm	-0.0439***	-0.0554***	-0.0646***	-0.0625***
Tenure in Firm, squared	0.000865***	0.00113***	0.00146***	0.00133***
Unemployment experience in years	0.0709***	0.0913***	0.0473***	0.144***
Unemployment experience in years, squared	-0.00472***	-0.00543***	-0.00308***	-0.00647***
Working in occupation trained for	-0.0260	-0.0388*	-0.0153	-0.0472*
New Job Since Previous Year	0.113***	0.242***	0.180***	0.299***
Satisfaction With Work	-0.0726***	-0.0760***	-0.0786***	-0.0946***
Low (School)				
Middle (Vocational Training)	-0.0329	-0.0407	0.0453	-0.0481
High (University)	-0.140**	-0.0139	0.125***	-0.117*
Agriculture, etc.				
Industry and Manufacturing	-0.128*	-0.242***	-0.228***	-0.330***
Energy and Construction	0.101	-0.0260	-0.0367	-0.00399
Services, etc.	-0.138*	-0.227***	-0.137**	-0.280***
Public Administration	-0.493***	-0.314***	-0.218***	-0.420***
Private Households	-0.332***	-0.243***	-0.265***	-0.340***
Apprentice/Trainee				
Manual Worker	-0.115	-0.278	0.0412	-0.536***
Self-Employed, Family Business	-0.856***	-0.990***	-0.325*	-1.141***
Free-Lance Professionals	-0.903***	-1.035***	-0.423**	-1.112***
Employees With Simple Tasks	-0.0895	-0.295*	0.0245	-0.587***
Qualified Professional/Managerial	-0.146	-0.311*	0.0583	-0.614***
Civil Service	-0.464*	-0.559***	-0.0205	-1.423***
Firm size < 20				
Firm size $\geq 20 < 200$	-0.163***	-0.114***	-0.0730***	-0.0854***
Firm size $\geq 200 < 2000$	-0.342***	-0.192***	-0.125***	-0.182***
Firm size ≥ 2000	-0.397***	-0.165***	-0.142***	-0.261***
Constant	-0.432	0.709**	3.831***	0.944***
Observations	67772	67772	67772	67772
McFadden R2	0.119	0.109	0.0961	0.181
McKelvey Zavoina R2	0.200	0.172	0.167	0.286
AIC	0.284	0.416	0.714	0.332

Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Employed persons, age 25 to 65 years, survey years 1999, 2001, 2003, 2005, 2007, 2009, 2013, 2015 (dummies included, estimated coefficients not shown here). Sample for observations with measured deviations of perceived versus actual job separation only. Measure of actual job separation from retrospective question two years after interview including all reasons (*general*), dismissal or closure (*dismissal*), dismissal or closure or mutual agreement or end of contract (*selected*), or from spell measure. Agriculture, etc. includes Forestry, Fishery and Mining. Services, etc. includes Tourism, Trade, Business and Transport. Public administration, etc. includes Health, Social Work and Education. Private households, etc. includes Membership Organizations. Age, tenure in firm, and unemployment experience measured in years, firm size in number of employees, satisfaction with work on a discrete scale from 0 (low) to 10 (high).

Table A.9: Job finding probit estimation

	Uonly	UandO
Female	-0.128***	-0.261***
Age	0.0462**	0.0142
Age, squared	-0.000902***	-0.000643***
Married, Partnered		
Single, Divorced, Widowed	-0.00401	0.177***
Health Very Good		
Health Good	-0.000992	0.0645
Health Satisfactory	-0.106	-0.0167
Health Poor	-0.405***	-0.243***
Health Bad	-0.695***	-0.583***
East-Germany	0.00179	0.125***
Born in Germany	0.0944	0.0244
Germany		
Europe and Russia (without Germany)	-0.151*	-0.0906
America	0.0758	-0.191
Asia	-0.334***	-0.211***
Africa	-0.457	-0.0873
No nationality	-0.0216	0.316
Low (School)		
Middle (Vocational Training)	0.258***	0.150***
High (University)	0.478***	0.389***
Work experience (full time)	0.0432***	0.0506***
Work experience (full time), squared	-0.000819***	-0.000664***
Work experience (part time)	0.0481***	0.0916***
Work experience (part time), squared	-0.00165**	-0.00241***
Unemployment experience	-0.0901***	-0.0228**
Unemployment experience, squared	0.00283***	0.000213
Constant	-0.228	0.0517
Observations	6365	13935
McFadden R2	0.101	0.0744
McKelvey Zavoina R2	0.201	0.155
AIC	1.257	1.288

Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Persons unemployed or out of the labor force, age 25 to 65 years, survey years 1999, 2001, 2003, 2005, 2007, 2009, 2011, 2013, 2015 (dummies included, estimated coefficients not shown here). Sample for observations with measured deviations of perceived versus actual job finding only. Measure of actual job finding from spells one quarter after interview out of unemployed (*ouf of U*), out of unemployment or out of the labor force (*out of U or O*). Age, unemployment experience and work experience measured in years.

A.3 Additional graphs and tables about biases

Table A.10: Bias in job separation across groups

	general	dismissal	selected	spell
predicted job separation	-0.628***	-0.236***	-0.228***	-0.313***
East-Germany	7.751***	6.552***	6.203***	6.309***
Born in Germany	0.243	0.636**	-0.0472	0.632**
Female	-0.0281	0.866***	1.043***	0.947***
Tenure in Firm	-0.172***	-0.171***	-0.0676***	-0.132***
Age	-0.0320	-0.101***	-0.0662***	-0.0875***
Unemployment experience in years	0.857***	0.725***	0.329***	-0.189***
Work experience (full time)	0.0206	0.0406*	0.0324	0.0319
Work experience (part time)	0.0344	0.0432	0.0582**	0.0600**
Low (School)				
Middle (Vocational Training)	2.090***	2.595***	2.871***	3.120***
High (University)	1.907***	3.884***	3.143***	4.140***
Agriculture, etc.				
Industry and Manufacturing	4.234***	3.724***	5.388***	5.766***
Energy and Construction	2.777***	0.937	2.668***	2.664***
Services, etc.	1.765**	1.600**	3.076***	3.504***
Public Administration, etc.	-1.541**	-0.442	0.239	0.507
Private Households, etc.s	-0.0772	0.0462	0.773	1.181
Apprentice/Trainee				
Manual Worker	-11.57***	-16.85***	-6.576***	-4.088*
Self-Employed, Family Business	-20.53***	-24.77***	-12.88***	-11.91***
Free-Lance Professionals	-19.32***	-25.66***	-12.88***	-12.39***
Employees With Simple Tasks	-12.67***	-17.35***	-7.165***	-4.351*
Qualified Professional/Managerial	-13.56***	-17.79***	-7.371***	-4.958**
Civil Service	-23.09***	-28.81***	-16.72***	-15.24***
Constant	26.21***	35.05***	19.39***	18.95***
Observations	67772	67772	67772	67772

Notes: t statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Measure of actual job separation from retrospective question including all reasons (general), dismissal or closure (dismissal), mutual agreement or end of contract (selected), or from spell measure. Agriculture, etc. includes Forestry, Fishery and Mining, Services, etc. includes Tourism, Trade, Business and Transport, Public Administration, etc. includes Health, Social Work and Education, Private Households, etc. includes Membership Organizations.

Table A.11: Bias in job finding across groups

	out of U	out of U or O
predicted job finding	-0.377***	-0.312***
East-Germany	-8.262***	-2.564***
Born in Germany	-0.208	-0.224
Female	-4.405***	-4.988***
Age	-0.348***	-0.224***
Low (School)		
Middle (Vocational Training)	-1.208	-0.0718
High (University)	-2.066	0.583
Log monthly net household income	2.111***	-1.819***
Work experience (full time)	-0.0995	0.0959*
Work experience (part time)	-0.131	-0.0807
Unemployment experience in years	-0.342***	-0.621***
Constant	36.56***	52.67***
Observations	6182	13418

Note: t statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Measure of actual job finding out of unemployed (out of U), unemployment or out of the labor force (out of U or O).

Table A.12: Bias in job separation in East by age

	general	dismissal	selected	spell
East-Germany	8.843***	7.323***	6.412***	6.669***
	(9.17)	(7.56)	(6.67)	(6.93)
Age	-0.0279	-0.0977***	-0.0654***	-0.0862***
	(-1.26)	(-4.42)	(-2.99)	(-3.92)
East × Age	-0.0249	-0.0176	-0.00476	-0.00820
	(-1.16)	(-0.82)	(-0.22)	(-0.38)
Observations	67772	67772	67772	67772

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: t statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Measure of actual job separation from retrospective question including all reasons (general), dismissal or closure (dismissal), mutual agreement or end of contract (selected), or from spell measure. Regression equation is identical to output shown in Table A.10 adding interaction between East Germany indicator and age. Table shows only coefficients for East Germany, age and interaction.

Table A.13: Bias in job separation in East by cohort

	general	dismissal	selected	spell
East-Germany	6.234***	6.630***	4.994***	5.210***
	(10.07)	(10.69)	(8.09)	(8.42)
East × cohort1950	3.185***	1.197*	2.584***	2.418***
	(4.73)	(1.79)	(3.88)	(3.62)
East × cohort1960	2.978***	0.205	2.000***	1.843***
	(4.28)	(0.30)	(2.92)	(2.68)
East × cohort1970	0.136	-0.964	0.206	0.134
	(0.18)	(-1.28)	(0.28)	(0.18)
East × cohort1980	-5.210***	-3.700***	-3.196***	-3.095***
	(-5.38)	(-3.81)	(-3.31)	(-3.20)
East × cohort1990	-12.23***	-6.840	-6.778	-6.632
	(-2.79)	(-1.56)	(-1.56)	(-1.52)
Observations	67772	67772	67772	67772

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: t statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Measure of actual job separation from retrospective question including all reasons (general), dismissal or closure (dismissal), mutual agreement or end of contract (selected), or from spell measure. Regression equation is identical to output shown in Table A.10 adding interaction between East Germany indicator and cohorts born in different decades. Table shows only coefficients for East Germany and interaction terms. Coefficient for East Germany shows bias for cohorts born before 1950.

Table A.14: Bias in job finding in East by age

	out of U	out of U or O
East-Germany	-5.674*	15.91***
	(-1.83)	(6.41)
Age	-0.328***	-0.159**
	(-3.58)	(-2.18)
East × Age	-0.0597	-0.446***
	(-0.86)	(-7.73)
Observations	6182	13418

Notes: t statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Measure of actual job finding out of unemployed (out of U), unemployment or out of the labor force (out of U or O). Regression equation is identical to output shown in Table A.11 adding interaction between East Germany indicator and age. Table shows only coefficients for East Germany, age and interaction.

Table A.15: Bias in job finding in East by cohort

	out of U	out of U or O
East-Germany	-11.84***	-11.26***
	(-6.55)	(-6.54)
East × cohort1950	2.195	4.268**
	(1.17)	(2.33)
East × cohort1960	2.507	5.900***
	(1.21)	(3.03)
East × cohort1970	7.193***	15.37***
	(3.12)	(7.45)
East × cohort1980	6.658**	15.66***
	(2.45)	(6.58)
East × cohort1990	21.30**	25.16***
	(2.13)	(2.83)
Observations	6182	13418

Notes: t statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Measure of actual job finding out of unemployed (out of U), unemployment or out of the labor force (out of U or O). Regression equation is identical to output shown in Table A.11 adding interaction between East Germany indicator and cohorts born in different decades. Table shows only coefficients for East Germany and interaction terms. Coefficient for East Germany shows bias for cohorts born before 1950.

Table A.16: Job separation, all measures: Summary statistics

	Mean	Std.Dev.	Min	Max	P10	P50	P90	Obs.
				All Germany				
Perceived job separation	19.767	24.529	0	100	0	10	50	67772
Actual, general	13.329	10.385	0	70	0	10	30	67772
Bias, general	6.4376***	24.199	-70	100	-20	0	40	67772
Actual, dismissal	2.7845	5.2868	0	50	0	0	10	67772
Bias, dismissal	16.982***	23.675	-40	100	0	10	50	67772
Actual, selected	5.3814	7.3096	0	70	0	0	10	67772
Bias, selected	14.385***	23.268	-50	100	-10	10	50	67772
Actual, spell	4.2491	7.9522	0	90	0	0	10	67772
Bias, spell	15.518***	23.452	-70	100	0	10	50	67772
				East Germany				
Perceived job loss	27.208	26.171	0	100	0	20	60	15653
Actual, general	15.140	10.976	0	70	0	10	30	15653
Bias, general	12.067***	25.471	-70	100	-20	10	40	15653
Actual, dismissal	4.7339	6.7209	0	50	0	0	10	15653
Bias, dismissal	22.474***	24.987	-40	100	0	20	50	15653
Actual, selected	8.2930	8.7873	0	70	0	10	20	15653
Bias, selected	18.915***	24.559	-50	100	-10	10	50	15653
Actual, spell	7.3903	10.548	0	90	0	0	20	15653
Bias, spell	19.817***	24.787	-70	100	-10	20	50	15653
				West Germany				
Perceived job loss	17.532	23.560	0	100	0	10	50	52119
Actual, general	12.785	10.138	0	70	0	10	30	52119
Bias, general	4.7468***	23.542	-70	100	-20	0	40	52119
Actual, dismissal	2.1990	4.6147	0	40	0	0	10	52119
Bias, dismissal	15.333***	23.013	-40	100	0	10	50	52119
Actual, selected	4.5070	6.5557	0	50	0	0	10	52119
Bias, selected	13.025***	22.691	-50	100	-10	0	50	52119
Actual, spell	3.3057	6.7057	0	70	0	0	10	52119
Bias, spell	14.226***	22.879	-70	100	0	0	50	52119

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ refer to t-test of mean bias equal to zero. Measure of actual job separation from retrospective question two years after interview including all reasons (*general*), dismissal or closure (*dismissal*), dismissal or closure or mutual agreement or end of contract (*selected*), or from spell measure.

Table A.17: Job Separation, trimmed: Summary statistics

	Mean	Std.Dev.	Min	Max	P10	P50	P90	Obs.
				All Germany				
Perceived job loss	31.840	19.871	10	90	10	30	50	37574
Actual, general	14.433	10.543	0	70	0	10	30	37574
Bias, general	17.407***	20.710	-60	90	-10	10	40	37574
Actual, dismissal	3.5253	5.7421	0	50	0	0	10	37574
Bias, dismissal	28.314***	19.467	-30	90	10	20	50	37574
Actual, selected	6.6051	7.6198	0	60	0	10	20	37574
Bias, selected	25.234***	19.609	-40	90	0	20	50	37574
Actual, spell	5.2731	8.4829	0	80	0	0	20	37574
Bias, spell	26.567***	19.807	-50	90	10	20	50	37574
				East Germany				
Perceived job loss	34.810	19.676	10	90	10	30	60	10775
Actual, general	15.531	10.833	0	60	0	10	30	10775
Bias, general	19.279***	20.484	-50	90	0	20	40	10775
Actual, dismissal	5.3197	6.8468	0	50	0	0	10	10775
Bias, dismissal	29.490***	19.218	-30	90	10	30	50	10775
Actual, selected	8.9550	8.6032	0	60	0	10	20	10775
Bias, selected	25.855***	19.421	-40	90	0	20	50	10775
Actual, spell	7.9016	10.341	0	80	0	10	20	10775
Bias, spell	26.909***	19.863	-50	90	10	20	50	10775
				West Germany				
Perceived job loss	30.645	19.825	10	90	10	20	50	26799
Actual, general	13.991	10.391	0	70	0	10	30	26799
Bias, general	16.654***	20.753	-60	90	-10	10	40	26799
Actual, dismissal	2.8038	5.0563	0	40	0	0	10	26799
Bias, dismissal	27.841***	19.547	-30	90	10	20	50	26799
Actual, selected	5.6603	6.9668	0	50	0	0	10	26799
Bias, selected	24.985***	19.679	-30	90	0	20	50	26799
Actual, spell	4.2162	7.3490	0	70	0	0	10	26799
Bias, spell	26.429***	19.784	-50	90	10	20	50	26799

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ refer to t-test of mean bias equal to zero. Values are rounded. Sample excludes observations with expected job loss of 0% and 100%.

Table A.18: Job Separation, rounded up: Summary statistics

	Mean	Std.Dev.	Min	Max	P10	P50	P90	Obs.
				All Germany				
Perceived job loss	19.767	24.529	0	100	0	10	50	67772
Actual, general	18.340	10.147	10	80	10	20	30	67772
Bias, general	1.4271***	24.211	-80	90	-20	-10	40	67772
Actual, dismissal	10.939	3.3803	10	60	10	10	10	67772
Bias, dismissal	8.8275***	24.051	-40	90	-10	0	40	67772
Actual, selected	12.348	5.6270	10	70	10	10	20	67772
Bias, selected	7.4188***	23.616	-60	90	-10	0	40	67772
Actual, spell	12.175	6.3558	10	90	10	10	20	67772
Bias, spell	7.5916***	23.715	-80	90	-10	0	40	67772
				East Germany				
Perceived job loss	27.208	26.171	0	100	0	20	60	15653
Actual, general	20.048	10.975	10	70	10	20	40	15653
Bias, general	7.1596***	25.515	-70	90	-20	0	40	15653
Actual, dismissal	12.009	4.9276	10	60	10	10	20	15653
Bias, dismissal	15.199***	25.374	-40	90	-10	10	40	15653
Actual, selected	14.273	7.6393	10	70	10	10	20	15653
Bias, selected	12.935***	24.825	-60	90	-10	10	40	15653
Actual, spell	14.370	9.1817	10	90	10	10	30	15653
Bias, spell	12.837***	24.975	-80	90	-10	10	40	15653
				West Germany				
Perceived job loss	17.532	23.560	0	100	0	10	50	52119
Actual, general	17.827	9.8267	10	80	10	20	30	52119
Bias, general	-0.2945**	23.535	-80	90	-20	-10	30	52119
Actual, dismissal	10.618	2.6683	10	40	10	10	10	52119
Bias, dismissal	6.9140***	23.302	-40	90	-10	0	40	52119
Actual, selected	11.770	4.7117	10	60	10	10	20	52119
Bias, selected	5.7622***	22.984	-60	90	-10	0	40	52119
Actual, spell	11.516	5.0328	10	80	10	10	20	52119
Bias, spell	6.0162***	23.091	-70	90	-10	0	40	52119

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ refer to t-test of mean bias equal to zero. Predicted values are all rounded up to the next decile.

Table A.19: Job finding, all measures: Summary statistics

	Mean	Std.Dev.	Min	Max	P10	P50	P90	Obs.
			All Germany					
Perceived job finding	57.022	32.334	0	100	10	50	100	6423
Actual, out of U	48.800	19.551	0	90	20	50	70	6423
Bias, out of U	8.2220***	28.711	-80	100	-30	10	40	6423
Perceived job finding	54.295	34.609	0	100	0	50	100	14049
Actual, out of U or O	43.295	17.380	0	90	20	50	60	14049
Bias job, out of U or O	11.000***	31.936	-80	100	-30	10	50	14049
			East Germany					
Perceived job finding	51.855	31.998	0	100	10	50	100	2717
Actual, out of U	49.971	18.700	0	90	20	50	70	2717
Bias, out of U	1.8844***	27.649	-80	90	-30	0	40	2717
Perceived job finding	53.531	33.317	0	100	10	50	100	4109
Actual, out of U and O	45.315	17.646	0	90	20	50	70	4109
Bias, out of U and O	8.2161***	29.090	-80	90	-30	10	40	4109
			West Germany					
Perceived job finding	60.809	32.058	0	100	10	60	100	3706
Actual, out of U	47.941	20.112	0	90	20	50	70	3706
Bias, out of U	12.868***	28.590	-80	100	-20	20	50	3706
Perceived job finding	54.611	35.127	0	100	0	50	100	9940
Actual, out of U and O	42.460	17.200	0	90	20	40	60	9940
Bias, out of U and O	12.151***	32.974	-80	100	-40	10	50	9940

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ refer to t-test of mean bias equal to zero. Measure of actual job finding from spells one quarter after interview out of unemployed (*ouf of U*), out of unemployment or out of the labor force (*out of U or O*). Means of expected job finding are different across measures due to differences in sample.

Table A.20: Job finding, trimmed: Summary statistics

	Mean	Std.Dev.	Min	Max	P10	P50	P90	Obs.
			All Germany					
Perceived job finding	49.114	23.437	10	90	20	50	80	4629
Actual, out of U	46.254	18.888	0	90	20	50	70	4629
Bias, out of U	2.8602***	23.593	-70	80	-30	0	30	4629
Perceived job finding	48.838	23.855	10	90	20	50	80	9347
Actual, out of U or O	40.859	17.110	0	90	20	40	60	9347
Bias, out of U or O	7.9790***	24.028	-60	80	-20	10	40	9347
			East Germany					
Perceived job finding	45.786	23.128	10	90	10	50	80	2055
Actual, out of U	48.200	17.914	0	90	20	50	70	2055
Bias, out of U	-2.4136***	22.578	-60	80	-30	0	30	2055
Perceived job finding	46.426	23.632	10	90	10	50	80	2935
Actual, out of U or O	43.090	16.997	0	90	20	40	60	2935
Bias, out of U or O	3.3356***	22.863	-60	80	-30	0	30	2935
			West Germany					
Perceived job finding	51.772	23.347	10	90	20	50	80	2574
Actual, out of U	44.701	19.495	0	90	20	50	70	2574
Bias, out of U	7.0707***	23.544	-70	80	-20	10	40	2574
Perceived job finding	49.942	23.877	10	90	20	50	80	6412
Actual, out of U or O	39.838	17.065	0	90	20	40	60	6412
Bias, out of U or O	10.104***	24.249	-60	80	-20	10	40	6412

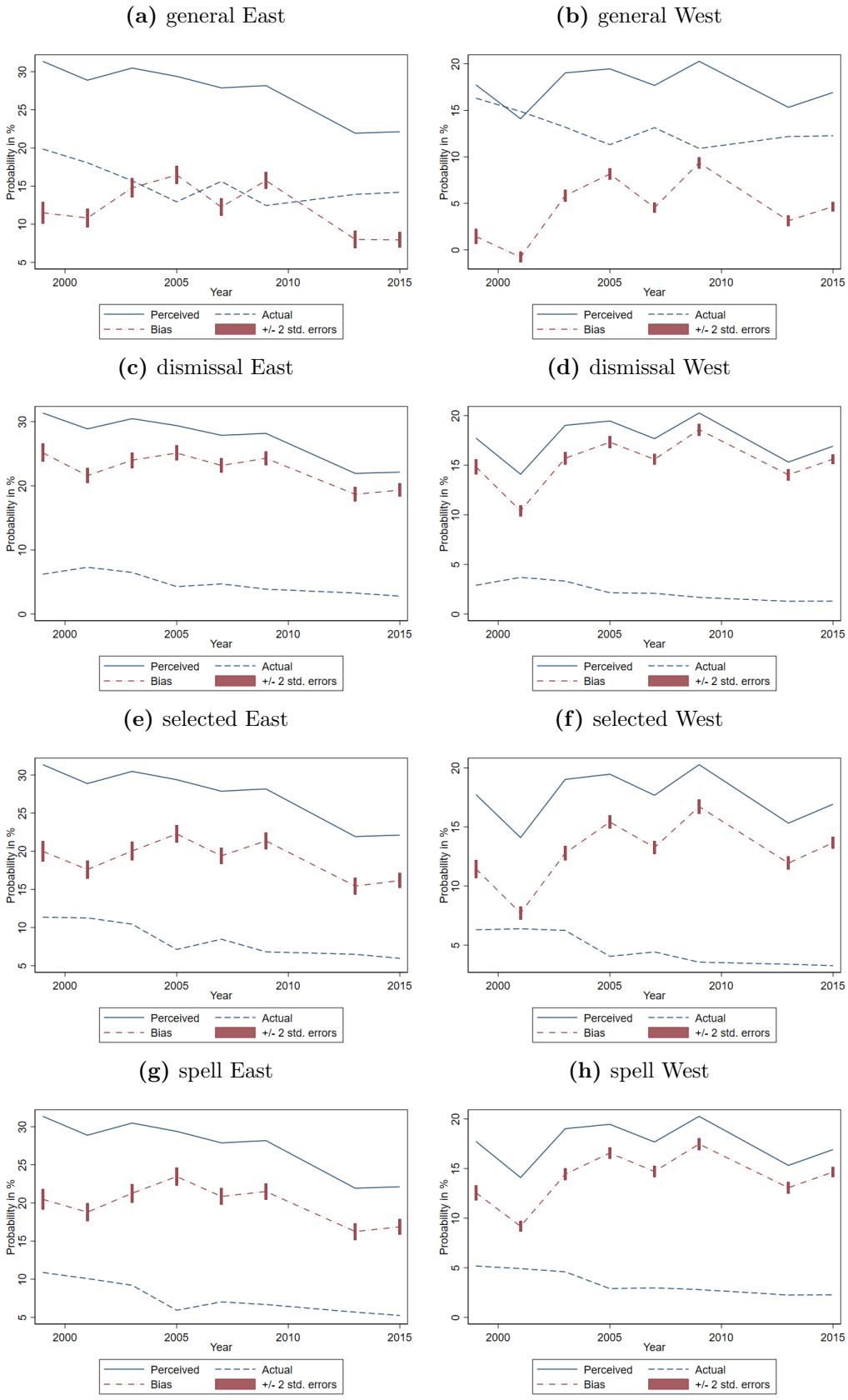
Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ refer to t-test of mean bias equal to zero. Means of expected job finding are different across measures due to differences in sample. Values are rounded. Sample excludes expected job finding of 0% and 100%.

Table A.21: Job finding, rounded up: Summary statistics

	Mean	Std.Dev.	Min	Max	P10	P50	P90	Obs.
			All Germany					
Perceived job finding	57.022	32.334	0	100	10	50	100	6423
Actual, out of U	53.804	19.470	10	90	30	60	80	6423
Bias, out of U	3.2181***	28.776	-80	90	-30	0	40	6423
Perceived job finding	54.295	34.609	0	100	0	50	100	14049
Actual, out of U or O	48.359	17.419	10	100	20	50	70	14049
Bias, out of U or O	5.9364***	31.969	-90	90	-40	10	40	14049
			East Germany					
Perceived job finding	51.855	31.998	0	100	10	50	100	2717
Actual, out of U	54.858	18.638	10	90	30	60	80	2717
Bias, out of U	-3.0033***	27.762	-80	90	-40	0	30	2717
Perceived job finding	53.531	33.317	0	100	10	50	100	4109
Actual, out of U and O	50.350	17.680	10	90	20	50	70	4109
Bias, U and O	3.1808***	29.234	-90	90	-30	0	40	4109
			West Germany					
Perceived job finding	60.809	32.058	0	100	10	60	100	3706
Actual, out of U	53.030	20.025	10	90	20	50	80	3706
Bias, out of U	7.7793***	28.655	-80	90	-30	10	40	3706
Perceived job finding	54.611	35.127	0	100	0	50	100	9940
Actual, out of U and O	47.535	17.244	10	100	20	50	70	9940
Bias, out of U and O	7.0755***	32.967	-90	90	-40	10	50	9940

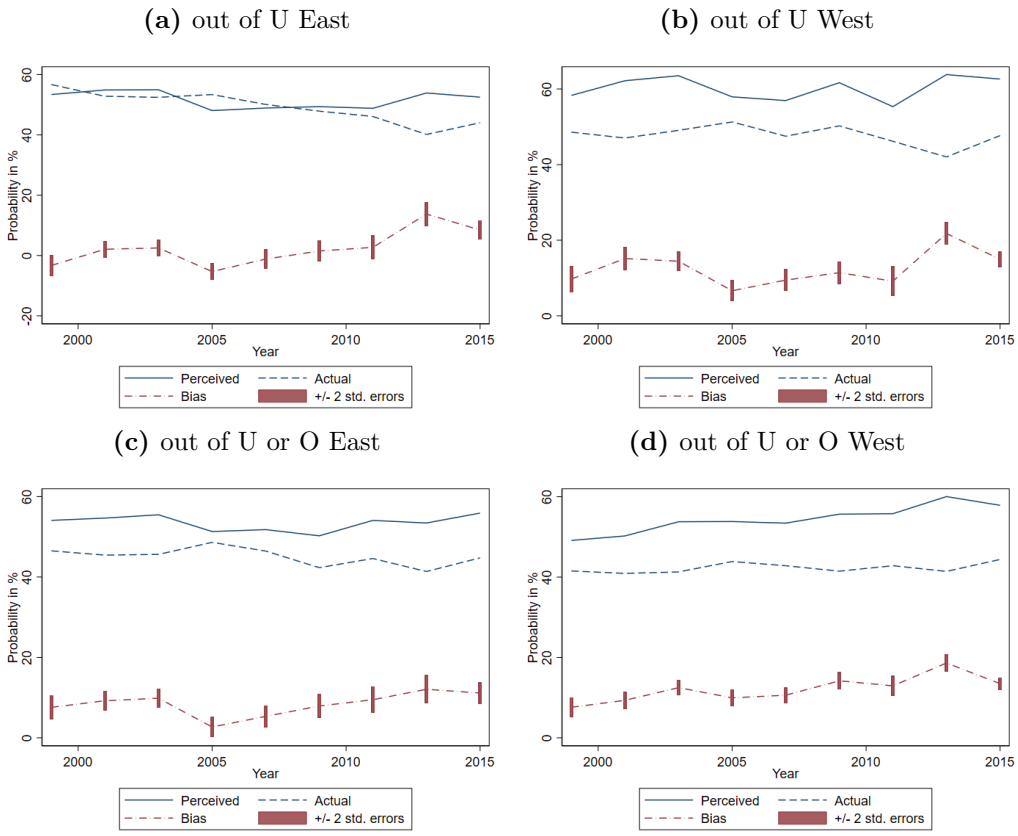
Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ refer to t-test of mean bias equal to zero. Means of expected job finding are different across measures due to differences in sample.

Figure A.4: Bias in job separation rates over time, different measures



Notes: Panels show average perceived (solid) and actual (dashed) job separation rates for East and West Germany at each survey date. Red dashed lines show average difference between perceived and actual together with two standard errors of the yearly means (vertical bars). Measure of actual job separation from retrospective question two years after interview including all reasons (*general*), dismissal or closure (*dismissal*), dismissal or closure or mutual agreement or end of contract (*selected*), or from spell measure.

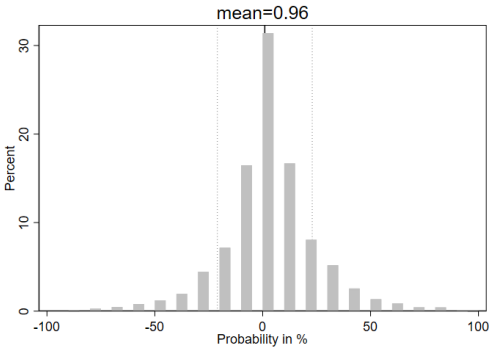
Figure A.5: Bias in job finding rates over time, different measures



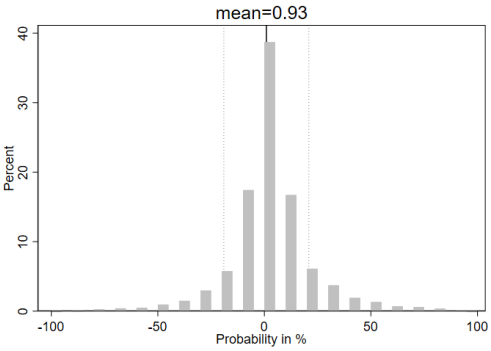
Notes: Panels show average perceived (solid) and actual (dashed) job finding rates for East and West Germany at each survey date. Red dashed lines show average difference between perceived and actual together with two standard errors of the yearly means (vertical bars). Measure of actual job finding from spells one quarter after interview out of unemployed (*ouf of U*), out of unemployment or out of the labor force (*out of U or O*).

Figure A.6: Learning about job separation probability: Different measures

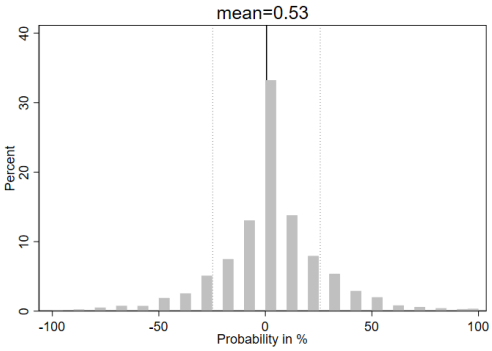
(a) general East



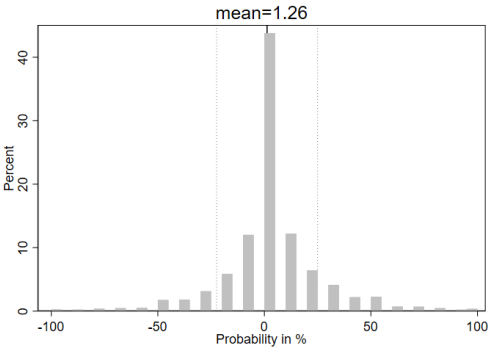
(b) general West



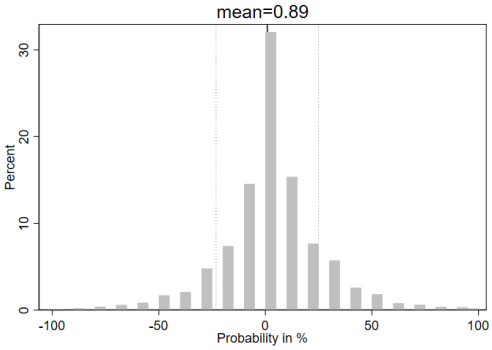
(c) dismissal East



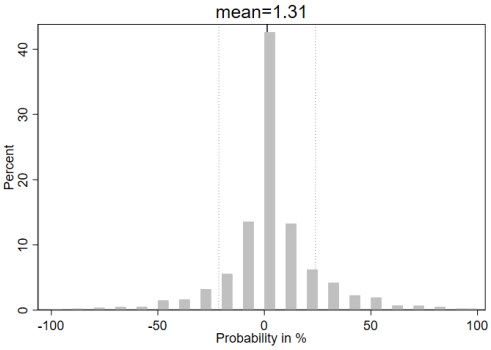
(d) dismissal West



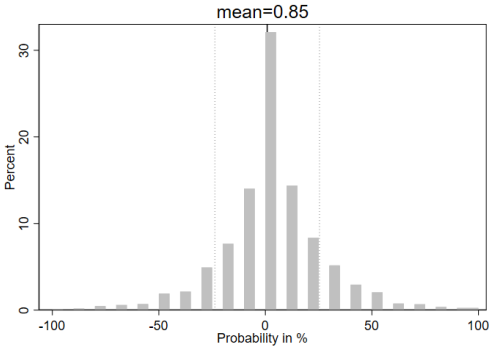
(e) selected East



(f) selected West



(g) spell East



(h) spell West

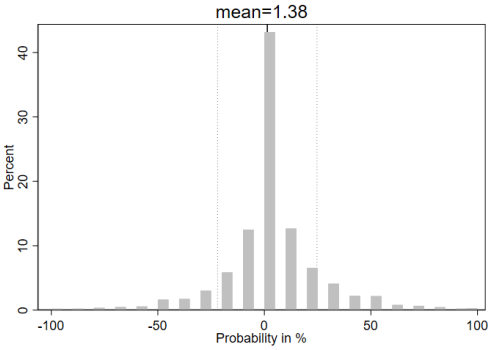
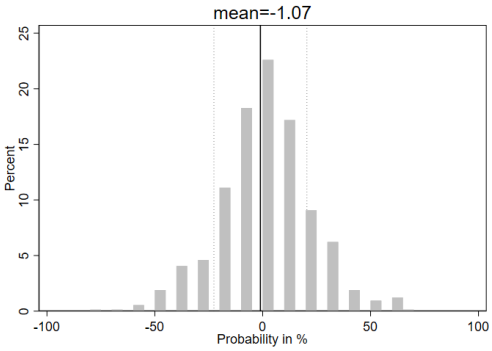
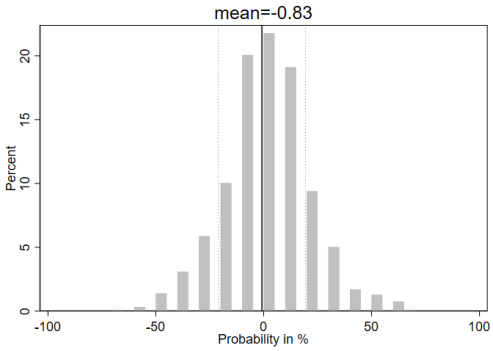


Figure A.7: Learning about job finding probability: Different measures

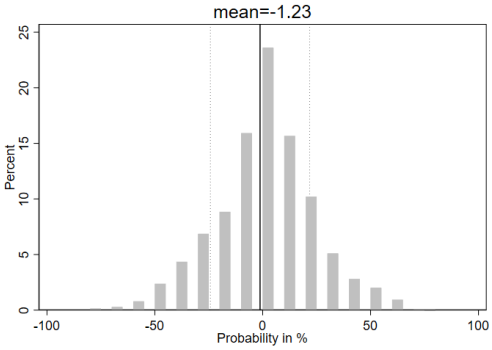
(a) out of U West



(b) out of U East



(c) out of U or O West



(d) out of U or O East

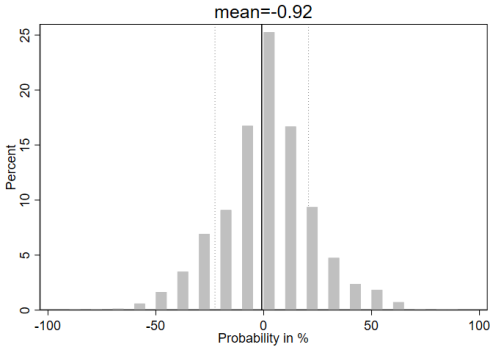


Table A.22: Job separation probit estimation with expectations

	general	dismissal	selected	spell
Perc.-Act., general	0.00117***			
Perc.-Act., dismissal		0.000581***		
Perc.-Act., selected			0.00102***	
Perc.-Act., spell				0.000828***
Observations	67772	67772	67772	67772
McFadden R2	0.142	0.140	0.106	0.214
McKelvey Zavoina R2	0.231	0.210	0.183	0.332
AIC	0.277	0.402	0.706	0.319

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. The specification is identical to Table A.8 with added measured deviations of expected to actual job separation rates. The table shows average marginal effects. Job separation outcomes, expected and predicted rates are measured between 0 and 100 percent.

Table A.23: Job finding probit estimation with expectations

	out of U	out of U or O
Perc. - Act., out of U	0.00222***	
Perc. - Act., out of U or O		0.00323***
Observations	6365	13935
McFadden R2	0.130	0.120
McKelvey Zavoina R2	0.251	0.234
AIC	1.218	1.224

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. The specification is identical to Table A.9 with added measured deviations of expected to actual job finding rates. The table shows average marginal effects. Job finding outcomes, expected and predicted rates are measured between 0 and 100 percent.

B Model appendix

B.1 Proof of Proposition 1

In this section, we prove the existence and uniqueness of an interior equilibrium with $\theta > 0$ in the presence of biased expectations and contracts of length $T \geq 1$. To do so, we proceed along the following lines: first, we rewrite the wage curve and job creation condition so that wages are a function of the market tightness. Second, we show that the difference between these two functions is (weakly) monotonically decreasing, maps to positive numbers for θ small, and maps to a negative number for $\theta \to \infty$. Then, since both functions are also continuous, by the intermediate value theorem, there has to exist at least one root to this function, which represents the equilibrium. Finally, we establish conditions under which the difference is strictly monotone and the equilibrium thereby unique.

First, we rewrite the wage curve and job creation condition, to have both in a simpler representation and the wage as a function of the tightness.

Notice that for $|g| < 1$, $\sum_{t=1}^{T} g^{t-1} = \frac{1-g^T}{1-g}$. Hence, we can rewrite the wage equation as follows (also using $\lambda_w = (1-\Delta_\lambda)p(\theta)$):

$$
\begin{aligned}
f(\theta) &= b + \gamma \left[z - b + \kappa \frac{\theta}{p(\theta)} \left(\frac{\frac{1-(\beta(1-\sigma_w))^T}{1-\beta(1-\sigma_w)}}{\frac{1-(\beta(1-\sigma))^T}{1-\beta(1-\sigma)}} (1+\Delta_\lambda) p(\theta) + \beta^{T-1} \frac{(1-\sigma)^T - (1-\sigma_w)^T}{\frac{1-(\beta(1-\sigma))^T}{1-\beta(1-\sigma)}} \right) \right] \\
&= b + \gamma \left[z - b + \kappa \frac{\theta}{p(\theta)} \frac{1-\beta(1-\sigma)}{1-(\beta(1-\sigma))^T} \left(\frac{1-(\beta(1-\sigma_w))^T}{1-\beta(1-\sigma_w)} (1+\Delta_\lambda) p(\theta) + \beta^{T-1} ((1-\sigma)^T - (1-\sigma_w)^T) \right) \right]
\end{aligned}
$$

Rewriting the job creation condition to isolate the wage yields

$$
g(\theta) = z - \frac{\kappa\theta}{\beta p(\theta)} (1 - \beta(1-\sigma))
$$

Define the difference of these two functions as $h(\theta) = g(\theta) - f(\theta)$. An equilibrium of this model solves $g(\theta) = f(\theta)$ or, equivalently, $h(\theta) = 0$.

Second, we establish that $\frac{\partial h(\theta)}{\partial \theta} \leq 0 \ \forall \theta > 0$ independent of the proposition's condition:

$$
\begin{aligned}
\frac{\partial h(\theta)}{\partial \theta} &= \frac{\partial}{\partial \theta}\left(-\frac{\kappa\theta}{p(\theta)}(1-\beta(1-\sigma))\left[\frac{1}{\beta}+\gamma\frac{1}{1-(\beta(1-\sigma))^T}\beta^{T-1}((1-\sigma)^T-(1-\sigma_w)^T)\right]\right.\\
&\quad \left.-\kappa\theta(1-\beta(1-\sigma))\gamma\frac{1}{1-(\beta(1-\sigma))^T}\frac{1-(\beta(1-\sigma_w))^T}{1-\beta(1-\sigma_w)}(1+\Delta_\lambda)\right)\\
&= -\kappa\frac{p(\theta)-\theta p'(\theta)}{(p(\theta))^2}(1-\beta(1-\sigma))\left[\frac{1}{\beta}+\gamma\frac{1}{1-(\beta(1-\sigma))^T}\beta^{T-1}((1-\sigma)^T-(1-\sigma_w)^T)\right]\\
&\quad -\kappa(1-\beta(1-\sigma))\gamma\frac{1}{1-(\beta(1-\sigma))^T}\frac{1-(\beta(1-\sigma_w))^T}{1-\beta(1-\sigma_w)}(1+\Delta_\lambda)\\
&= -\kappa(1-\beta(1-\sigma))\left(\frac{1-\epsilon_p(\theta)}{p(\theta)}\left[\frac{1}{\beta}+\gamma\frac{1}{1-(\beta(1-\sigma))^T}\beta^{T-1}((1-\sigma)^T-(1-\sigma_w)^T)\right]\right.\\
&\quad \left.+\gamma\frac{1}{1-(\beta(1-\sigma))^T}\frac{1-(\beta(1-\sigma_w))^T}{1-\beta(1-\sigma_w)}(1+\Delta_\lambda)\right)\\
&= -\kappa(1-\beta(1-\sigma))\left(\frac{1-\epsilon_p(\theta)}{p(\theta)}\frac{1}{1-(\beta(1-\sigma))^T}\left[\frac{1}{\beta}-\beta^{T-1}\left((1-\gamma)(1-\sigma)^T+\gamma(1-\sigma_w)^T\right)\right]\right.\\
&\quad \left.+\gamma\frac{1}{1-(\beta(1-\sigma))^T}\frac{1-(\beta(1-\sigma_w))^T}{1-\beta(1-\sigma_w)}(1+\Delta_\lambda)\right)\\
&\leq 0
\end{aligned}
$$

where $\epsilon_p(\theta) = p'(\theta)\frac{\theta}{p(\theta)}$ is the job-finding elasticity. The last inequality comes from the fact that all terms except $-\kappa$ are positive. For all except two terms, this is clearly true. So focus on these terms: $1-\beta^T\left((1-\gamma)(1-\sigma)^T+\gamma(1-\sigma_w)^T\right)$ is positive as the term in the bracket is a convex combination of numbers that are between zero and one and one is strictly below one as well. $1-\epsilon_p(\theta)$ is positive, as the elasticity is below one by the properties of the matching function, see Pissarides (2000), Chapter 1. Hence, the difference between the job creation condition and the wage curve is (weakly) monotonically decreasing.

Third, we show that for large θ, the job-creation curve is below the wage curve, i.e., $h(\theta) < 0$ for $\theta >> 0$.

$$
\begin{aligned}
\lim_{\theta\to\infty} h(\theta) &= (1-\gamma)(z-b)\\
&\quad -\lim_{\theta\to\infty}\kappa\frac{\theta}{p(\theta)}\frac{1-\beta(1-\sigma)}{1-(\beta(1-\sigma))^T}\left(\frac{1}{\beta}-\beta^{T-1}\left[(1-\gamma)(1-\sigma)^T+\gamma(1-\sigma_w)^T\right]\right)\\
&\quad -\lim_{\theta\to\infty}\gamma\kappa\theta\frac{1-\beta(1-\sigma)}{1-(\beta(1-\sigma))^T}\left(\frac{1-(\beta(1-\sigma_w))^T}{1-\beta(1-\sigma_w)}(1+\Delta_\lambda)\right)\\
&= -\infty \qquad \text{as } \lim_{\theta\to\infty} p(\theta) = 1
\end{aligned}
$$

Hence, by continuity of $h(\theta)$, there are finite θ for which $h(\theta)$ is negative.

Since $h(\theta)$ is continuous, weakly decreasing and negative for large values of θ, by the inter-

mediate value theorem, there exists $\theta > 0$ solving $h(\theta) = 0$ if and only if $\lim_{\theta\to 0^+} h(\theta) > 0$ or $\lim_{\theta\to 0^+} h(\theta) = 0$ with $\lim_{\theta\to 0} h'(\theta) = 0$.

This condition can be re-written to yield the condition from the proposition:

$$
\begin{aligned}
&\lim_{\theta\to 0^+} h(\theta) \geq 0 \\
&\iff (1-\gamma)(z-b) \geq \lim_{\theta\to 0^+} \kappa \frac{1}{q(\theta)} \frac{1-\beta(1-\sigma)}{1-(\beta(1-\sigma))^T} \left(\frac{1}{\beta} - \beta^{T-1} \left[(1-\gamma)(1-\sigma)^T + \gamma(1-\sigma_w)^T \right] \right) \\
&\qquad + \lim_{\theta\to 0^+} \gamma\kappa\theta \frac{1-\beta(1-\sigma)}{1-(\beta(1-\sigma))^T} \left(\frac{1-(\beta(1-\sigma_w))^T}{1-\beta(1-\sigma_w)} (1+\Delta_\lambda) \right) \\
&\iff (1-\gamma)(z-b) \geq \kappa \frac{1-\beta(1-\sigma)}{1-(\beta(1-\sigma))^T} \left(\frac{1}{\beta} - \beta^{T-1} \left[(1-\gamma)(1-\sigma)^T + \gamma(1-\sigma_w)^T \right] \right) \\
&\iff -\beta^{T-1} \left[(1-\gamma)(1-\sigma)^T + \gamma(1-\sigma_w)^T \right] \leq (1-\gamma) \frac{z-b}{\kappa} \frac{1-(\beta(1-\sigma))^T}{1-\beta(1-\sigma)} - \frac{1}{\beta} \\
&\iff -\beta^{T-1} \left[(1-\gamma)(1-\sigma)^T + \gamma(1-\sigma_w)^T \right] \leq (1-\gamma) \frac{z-b}{\kappa} \sum_{t=1}^{T} \left[\beta(1-\sigma) \right]^{t-1} - \frac{1}{\beta}
\end{aligned}
$$

Hence, if this condition holds strictly, there exists at least one $\theta > 0$ solving $h(\theta) = 0$. If the condition holds with equality, $\lim_{\theta\to 0^+} h'(\theta) = 0$ is additionally required, to guarantee that an interior solution exists. This condition is equivalent to

$$
\begin{aligned}
&\lim_{\theta\to 0^+} h'(\theta) = 0 \\
&\iff \lim_{\theta\to 0^+} \left[\frac{1-\epsilon_p(\theta)}{p(\theta)} \frac{1}{1-(\beta(1-\sigma))^T} \left[\frac{1}{\beta} - \beta^{T-1} \left((1-\gamma)(1-\sigma)^T + \gamma(1-\sigma_w)^T \right) \right] \right. \\
&\qquad \left. + \gamma \frac{1}{1-(\beta(1-\sigma))^T} \frac{1-(\beta(1-\sigma_w))^T}{1-\beta(1-\sigma_w)} (1+\Delta_\lambda) \right] = 0 \\
&\iff \lim_{\theta\to 0^+} \left[\frac{1-\epsilon_p(\theta)}{p(\theta)} \right] = 0 \qquad \text{and} \qquad \gamma(1+\Delta_\lambda) = 0
\end{aligned}
$$

Since we have previously established that the long term in brackets, that does not depend on θ, is always positive, the limit can only be zero if $\lim_{\theta\to 0^+} \frac{1-\epsilon_p(\theta)}{p(\theta)} = \lim_{\theta\to 0^+} \frac{p(\theta)-\theta p'(\theta)}{(p(\theta))^2} = 0$. Since $\lim_{\theta\to 0^+} p(\theta) = 0$, this can only happen if $\lim_{\theta\to 0^+} \theta p'(\theta) = 0$. Additionally, we require that either $\gamma = 0$ or $\Delta_{\lambda_w} = -1$ to nullify the last term.

Next, uniqueness of the equilibrium follows from the fact that under the additional assumptions of the proposition, $h'(\theta) < 0$ and $\lim_{\theta\to 0^+} h(\theta) > 0$, implying a unique root for $\theta > 0$.

Finally, we show that the previous candidates for equilibria are indeed admissible, as they imply a wage above b, which is not necessarily guaranteed. To show this, we assume the worst case for the wage function, i.e., $\lambda_w = 0$ (or, equivalently, $\Delta_\lambda = -1$. Under this assumption, the wage is minimized assuming $\sigma_w = 0$. Then, the wage function simplifies

to

$$\omega = b + \gamma \left[z - b + \kappa \frac{\theta}{p(\theta)} \frac{1 - \beta(1-\sigma)}{1 - (\beta(1-\sigma))^T} \beta^{T-1} ((1-\sigma)^T - 1) \right]$$

Since $z - b > 0$ and $(1-\sigma)^T - 1 > 0$, the wage is always larger than the unemployment benefits. ■

B.2 Derivation of the cutoff value T^*

First, we derive the formulation for T^* from the main text. Then, we show that T^* is unique and that the derivative $\frac{\partial \omega}{\partial \sigma_w}$ is positive for all $T < T^*$ and negative for all $T > T^*$. Assume for the remainder of this section that $\sigma_w < 1, \kappa > 0, \gamma > 0, \theta > 0$, and $p(\theta) > 0$.

To derive the formulation from the main text, consider the wage curve

$$\omega = b + \gamma \left[z - b + \kappa \frac{\theta}{p(\theta)} \left(\frac{\sum_{t=1}^{T} \left[\beta(1-\sigma_w)\right]^{t-1}}{\sum_{t=1}^{T} \left[\beta(1-\sigma)\right]^{t-1}} \lambda_w(\theta) + \beta^{T-1} \frac{(1-\sigma)^T - (1-\sigma_w)^T}{\sum_{t=1}^{T} \left[\beta(1-\sigma)\right]^{t-1}} \right) \right]$$

and take the partial derivative with respect to σ_w:

$$\begin{aligned} \frac{\partial \omega}{\partial \sigma_w} &= \gamma \kappa \frac{\theta}{p(\theta)} \left(\frac{\sum_{t=1}^{T} -(t-1)\beta \left[\beta(1-\sigma_w)\right]^{t-2}}{\sum_{t=1}^{T} \left[\beta(1-\sigma)\right]^{t-1}} \lambda_w(\theta) + \beta^{T-1} T \frac{(1-\sigma_w)^{T-1}}{\sum_{t=1}^{T} \left[\beta(1-\sigma)\right]^{t-1}} \right) \\ &= \gamma \kappa \frac{\theta}{p(\theta)} \left(-\frac{\sum_{t=0}^{T-1} t\beta^t (1-\sigma_w)^{t-1}}{\sum_{t=1}^{T} \left[\beta(1-\sigma)\right]^{t-1}} \lambda_w(\theta) + \beta^{T-1} T \frac{(1-\sigma_w)^{T-1}}{\sum_{t=1}^{T} \left[\beta(1-\sigma)\right]^{t-1}} \right) \end{aligned}$$

Next, find the root of the derivative in terms of T, i.e., the contract length where both

effects offset each other for a fixed σ_w:

$$
\begin{aligned}
0 = \frac{\partial \omega}{\partial \sigma_w} &= \gamma\kappa \frac{\theta}{p(\theta)} \left(\begin{array}{c} \sum_{t=0}^{T-1} t\beta^t (1-\sigma_w)^{t-1} \\ -\frac{\sum_{t=0}^{T-1} t\beta^t (1-\sigma_w)^{t-1}}{\sum_{t=1}^{T} \left[\beta(1-\sigma)\right]^{t-1}} \lambda_w(\theta) + \beta^{T-1} T \frac{(1-\sigma_w)^{T-1}}{\sum_{t=1}^{T} \left[\beta(1-\sigma)\right]^{t-1}} \end{array} \right) \\
&= -\sum_{t=0}^{T-1} t\beta^t (1-\sigma_w)^{t-1} \lambda_w(\theta) + \beta^{T-1} T (1-\sigma_w)^{T-1} \\
\Leftrightarrow \frac{T}{\lambda_w(\theta)} &= \frac{\sum_{t=0}^{T-1} t\beta^t (1-\sigma_w)^{t-1}}{\beta^{T-1}(1-\sigma_w)^{T-1}} \\
\Leftrightarrow \frac{T}{\lambda_w(\theta)} &= \sum_{t=0}^{T-1} t\beta^{t-T+1} (1-\sigma_w)^{t-T} \\
\Leftrightarrow \frac{T}{\lambda_w(\theta)} &= \beta \sum_{t=1}^{T-1} (T-t)\beta^{-t} (1-\sigma_w)^{-t}
\end{aligned}
$$

This equation implicitly defines all values for T as a function of $(\sigma_w, \lambda_w(\theta), \beta)$ for which the partial derivative (evaluated at the fixed σ_w) is equal to zero.

Next, we derive an alternative representation for the condition that pins down all T where the derivative is zero. This allows us to compute a "closed form" solution.

Using $\sum_{t=1}^{T} g^{t-1} = \frac{1-g^T}{1-g}$ for $|g| < 1$, we can rewrite the wage equation as follows:

$$
\begin{aligned}
\omega &= b + \gamma \left[z - b + \kappa \frac{\theta}{p(\theta)} \left(\frac{\frac{1-(\beta(1-\sigma_w))^T}{1-\beta(1-\sigma_w)}}{\frac{1-(\beta(1-\sigma))^T}{1-\beta(1-\sigma)}} \lambda_w(\theta) + \beta^{T-1} \frac{(1-\sigma)^T - (1-\sigma_w)^T}{\frac{1-(\beta(1-\sigma))^T}{1-\beta(1-\sigma)}} \right) \right] \\
&= b + \gamma \left[z - b + \kappa \frac{\theta}{p(\theta)} \frac{1-\beta(1-\sigma)}{1-(\beta(1-\sigma))^T} \left(\frac{1-(\beta(1-\sigma_w))^T}{1-\beta(1-\sigma_w)} \lambda_w(\theta) + \beta^{T-1}((1-\sigma)^T - (1-\sigma_w)^T) \right) \right]
\end{aligned}
$$

Now, the derivative of this transformed wage equation is

$$
\begin{aligned}
\frac{\partial \omega}{\partial \sigma_w} &= \gamma\kappa \frac{\theta}{p(\theta)} \frac{1-\beta(1-\sigma)}{1-(\beta(1-\sigma))^T} \\
&\quad \times \left(\beta \frac{T(1-\beta(1-\sigma_w))(\beta(1-\sigma_w))^{T-1} + (\beta(1-\sigma_w))^T - 1}{(1-\beta(1-\sigma_w))^2} \lambda_w(\theta) + \beta^{T-1} T (1-\sigma_w)^{T-1} \right)
\end{aligned}
$$

Find again all values of T where the derivative is equal to zero:

$$\begin{aligned}
0 &= \frac{\partial \omega}{\partial \sigma_w} \\
&= \beta \frac{T(1-\beta(1-\sigma_w))(\beta(1-\sigma_w))^{T-1} + (\beta(1-\sigma_w))^T - 1}{(1-\beta(1-\sigma_w))^2} \lambda_w(\theta) + \beta^{T-1} T(1-\sigma_w)^{T-1} \\
&= \beta \frac{T(1-\beta(1-\sigma_w))(\beta(1-\sigma_w))^{T-1} + (\beta(1-\sigma_w))^T - 1}{(1-\beta(1-\sigma_w))^2} \lambda_w(\theta) + T(\beta(1-\sigma_w))^{T-1} \\
&= \left[\frac{\beta(1-\beta(1-\sigma_w))}{(1-\beta(1-\sigma_w))^2} \lambda_w(\theta) + 1 \right] T(\beta(1-\sigma_w))^{T-1} - \beta \lambda_w(\theta) \frac{1-(\beta(1-\sigma_w))^T}{(1-\beta(1-\sigma_w))^2} \\
&= \left[\frac{\beta}{(1-\beta(1-\sigma_w))} \lambda_w(\theta) + 1 \right] T(\beta(1-\sigma_w))^{T-1} - \beta \lambda_w(\theta) \frac{1-(\beta(1-\sigma_w))^T}{(1-\beta(1-\sigma_w))^2}
\end{aligned}$$

To proceed, define, for a fixed θ, $r = \beta(1-\sigma_w), a = \beta/(1-r)\lambda_w(\theta)+1, c = \beta\lambda_w(\theta)/(1-r)^2$, then

$$\begin{aligned}
0 &= aTr^{T-1} - c(1-r^T) \\
\Leftrightarrow \frac{c}{a} &= Tr^{T-1} + \frac{c}{a} r^T \\
\Leftrightarrow \frac{c}{a} r &= \left(T + \frac{c}{a} r \right) r^T \\
\Leftrightarrow \frac{c}{a} r^{1+\frac{c}{a}r} &= \left(T + \frac{c}{a} r \right) r^{T+\frac{c}{a}r} \\
\Leftrightarrow \frac{c}{a} r^{1+\frac{c}{a}r} \log(r) &= \left(T + \frac{c}{a} r \right) \log(r) e^{(T+\frac{c}{a}r)\log(r)}
\end{aligned}$$

The solution to this equation is given by Lambert W function. It solves equations of type $we^w = z$ for w. The solution is denoted by $W(z)$. Here, $z = \frac{c}{a} r^{1+\frac{c}{a}r} \log(r)$ and $w^* = (T + \frac{c}{a} r)\log(r)$. Hence,

$$\begin{aligned}
W\left(\frac{c}{a} r^{1+\frac{c}{a}r} \log(r) \right) &= (T + \frac{c}{a} r) \log(r) \\
\Leftrightarrow T &= \frac{W\left(\frac{c}{a} r^{1+\frac{c}{a}r} \log(r) \right)}{\log(r)} - \frac{c}{a} r
\end{aligned}$$

The advantages of this formulation are twofold. First, it provides an efficient way to compute the values for T. Second, it allows to characterize the number of solutions.

Next, we show that there is a unique value for $T \geq 1$ satisfying that condition, which we label T^*. To see this, first recall that the Lambert W function exhibits a unique real solution for weakly positive inputs and two (real) solutions for inputs strictly between $-1/e$ and zero. Since a and c are positive and $r \in (0,1)$, $\frac{c}{a} r^{1+\frac{c}{a}r} \log(r) < 0$. Thus, if there are solutions, there are exactly two. Now, clearly one solution for $\frac{\partial \omega}{\partial \sigma_w} = 0$ is $T = 0$. Hence, there has to exist another (real) solution to the previous equation.[36]

[36] An alternative way to see this is the following: since $c/a < 1$, $\frac{c}{a} r^{1+\frac{c}{a}r} \log(r) \in (-e^{-1-1/e}, 0)$ and, hence, the input is in the domain where the function always exibits two real solutions.

Now, since

$$\left.\frac{\partial \omega}{\partial \sigma_w}\right|_{T=1} = \gamma\kappa\frac{\theta}{p(\theta)} > 0$$
$$\left.\frac{\partial \omega}{\partial \sigma_w}\right|_{T\to\infty} = -\gamma\lambda_w(\theta)\kappa\beta\frac{1-\beta(1-\sigma)}{[1-\beta(1-\sigma_w)]^2} < 0$$

and the derivative (in the alternative formulation) is continuous in T, by the intermediate value theorem, there has to be at least one value for T where the derivative is zero. Since there is only one candidate point, $T = \frac{W\left(\frac{c}{a}r^{1+\frac{c}{a}r}\log(r)\right)}{\log(r)} - \frac{c}{a}r, T \neq 0$, this is the unique solution denoted T^*. Furthermore, since there are no other points, where the derivative crosses 0, it holds that it is positive for all $T < T^*$ and negative for all $T > T^*$.

B.3 Alternating-offer bargaining

The alternating-offer bargaining game follows Binmore et al. (1986). Without loss of generality, let the worker be the agent who starts the game by making a wage demand to the firm. If the firm accepts the demand, the game ends and production starts. If the firm rejects it, the bargain either breaks down or continues. It breaks down with probability $1 - e^{-\phi\tau}$, where $\tau > 0$ measures time and $\phi > 0$. In this case, the match separates, the worker returns to unemployment and the firm's vacancy remains unfilled. The bargain continues with probability $e^{-\phi\tau}$ and the firm makes a wage offer. If the worker accepts the firm's offer, the game ends and production starts. If the worker rejects it, the bargain breaks down with probability $1 - e^{-\mu\tau}$, where $\mu > 0$ and continues with probability $e^{-\mu\tau}$. If it continues, the worker makes another wage demand. The game continues until an agreement is reached or the bargain breaks down.

The optimal strategy of the firm is to offer the wage $\underline{\omega}_o$ and to accept any wage $\omega \leq \overline{\omega}_d$ such that $\underline{\omega}_o$ and $\overline{\omega}_d$ satisfy the following conditions

$$\begin{aligned} J(\overline{\omega}_d) &= (1-e^{-\phi\tau})V + e^{-\phi\tau}J(\underline{\omega}_o) \\ E(\underline{\omega}_o) &= (1-e^{-\mu\tau})U + e^{-\mu\tau}E(\overline{\omega}_d) \end{aligned} \tag{B.1}$$

where $E(\cdot)$, U, $J(\cdot)$ and V denote the worker's and the firm's value functions from our model in Section 3.[37] The first condition defines the highest possible wage demand by the worker, $\overline{\omega}_d$, that the firm is willing to accept, given its own optimal offer $\underline{\omega}_o$. $\overline{\omega}_d$ is such that the firm is indifferent between accepting and rejecting it. Any demand $\omega > \overline{\omega}_d$ would be rejected by the firm. Likewise, the second condition states that $\underline{\omega}_o$ is the lowest possible wage the firm can offer. Any offer $\omega < \underline{\omega}_o$ would be rejected by the worker.

Given the firm's bargaining strategy, the worker's best response is to demand the wage $\overline{\omega}_d$

[37] The length of the wage contract T only affects the agents' subjective valuation of payoffs, but not the structure of the bargaining game. We therefore drop the index T in this section for simplicity of notation.

and to accept any offer $\omega \geq \underline{\omega}_o$. As a result of these strategies, the bargained wage will be equal to $\overline{\omega_d}$ satisfying the conditions in (B.1).[38] We can rewrite these conditions as

$$\begin{aligned} J(\overline{w}_d) - V &= e^{-\phi\tau}\big[J(\underline{w}_o) - V\big] \\ E(\underline{w}_o) - U &= e^{-\mu\tau}\big[E(\overline{w}_d) - U\big] \end{aligned}$$

Substituting the worker's and firm's value functions from (1) to (6) into (B.2) and rearranging yields:

$$\begin{aligned} \overline{w}_d &= e^{-\phi\tau}\underline{w}_o + (1 - e^{-\phi\tau})\left[z - (1-\beta)V + \frac{[\beta(1-\sigma)]^T}{\sum_{t=1}^{T}[\beta(1-\sigma)]^{t-1}}\big[J(\omega') - V\big]\right] \\ \underline{w}_o &= e^{-\mu\tau}\overline{w}_d + (1 - e^{-\mu\tau})\left[(1-\beta)U - \frac{[\beta(1-\sigma_w)]^T}{\sum_{t=1}^{T}[\beta(1-\sigma_w)]^{t-1}}\big[E(\omega') - U\big]\right] \end{aligned}$$

Using the second of these expressions to substitute for $\underline{w}_o$ in the first, we obtain:

$$\begin{aligned} \overline{w}_d = \quad & \tfrac{e^{-\phi\tau} - e^{-(\phi+\mu)\tau}}{1 - e^{-(\phi+\mu)\tau}}\left[(1-\beta)U - \tfrac{(\beta(1-\sigma_w))^T}{\sum_{t=1}^{T}(\beta(1-\sigma_w))^{t-1}}\big(E(\omega') - U\big)\right] \\ + \quad & \tfrac{1 - e^{-\phi\tau}}{1 - e^{-(\phi+\mu)\tau}}\left[z - (1-\beta)V + \tfrac{(\beta(1-\sigma))^T}{\sum_{t=1}^{T}(\beta(1-\sigma))^{t-1}}\big(J(\omega') - V\big)\right] \end{aligned}$$

As is standard in the literature, we consider the limiting case of the bargaining game for $\tau \to 0$. Applying L'Hôpital's rule to this expression and defining $\gamma \equiv \frac{\phi}{\phi+\mu}$ as the worker's bargaining power yields the following expression for the bargained wage:

$$\begin{aligned} w &= (1-\gamma)\left[(1-\beta)U - \frac{[\beta(1-\sigma_w)]^T}{\sum_{t=1}^{T}[\beta(1-\sigma_w)]^{t-1}}\big(E(\omega') - U\big)\right] \\ &+ \gamma\left[z - (1-\beta)V + \frac{[\beta(1-\sigma)]^T}{\sum_{t=1}^{T}[\beta(1-\sigma)]^{t-1}}\big(J(\omega') - V\big)\right] \end{aligned}$$

Again substituting for the agents' value functions and rearranging, we obtain:

$$(1-\gamma)\frac{\big[E(\omega) - U\big]}{\sum_{t=1}^{T}\big[\beta(1-\sigma_w)\big]^{t-1}} = \gamma\frac{\big[J(\omega) - V\big]}{\sum_{t=1}^{T}\big[\beta(1-\sigma)\big]^{t-1}}$$

This condition is identical to the optimality condition of the Nash bargaining game shown in 3.3. Therefore, in our setting the alternative-offer bargaining protocol yields the same wage equation as the Nash bargaining game that we assume throughout the paper.

B.4 Model extension: Worker and firm bias

In this section, we present an extension of our model that allows both workers and firms to have biased expectations about job matching and separation. Let $\lambda_f(\theta)$ and σ_f denote the probability with which a firm expects to fill a vacancy, or to separate from a worker,

[38] If the firm was to move first in the bargaining game, the resulting wage would be equal to $\underline{\omega}_o$.

respectively. Firms' expectations are biased whenever $\lambda_f(\theta) \neq q(\theta)$ or $\sigma_f \neq \sigma$. The firm's value functions are now given by

$$J(\omega) = [z - \omega + \beta\sigma_f V] \sum_{t=1}^{T} [\beta(1-\sigma_f)]^{t-1} + [\beta(1-\sigma_f)]^T J(\omega') \tag{B.2}$$

$$V = -\kappa + \beta\lambda_f(\theta) J(\omega') + \beta(1-\lambda_f(\theta)) V \ . \tag{B.3}$$

The remaining setup and the derivation of equilibrium conditions are analogous to those in Section 3. The wage equation now reads

$$\omega = b + \gamma \left[z - b + \frac{\kappa}{\lambda_f(\theta)} \left(\frac{\sum_{t=1}^{T} \left[\beta(1-\sigma_w)\right]^{t-1}}{\sum_{t=1}^{T} \left[\beta(1-\sigma_f)\right]^{t-1}} \lambda_w(\theta) + \beta^{T-1} \frac{(1-\sigma_f)^T - (1-\sigma_w)^T}{\sum_{t=1}^{T} \left[\beta(1-\sigma_f)\right]^{t-1}} \right) \right] , \tag{B.4}$$

and the job creation condition is given by

$$\frac{z-\omega}{1-\beta(1-\sigma_f)} = \frac{\kappa}{\beta\lambda_f(\theta)} \ . \tag{B.5}$$

The equilibrium of the model with worker and firm bias is described by the pair (ω, θ) that jointly solves (B.3) and (B.5), and the equilibrium unemployment rate is given by $u = \frac{\sigma}{\sigma + p(\theta)}$.

Note that, if $\sigma_w = \sigma_f$ and $\lambda_w(\theta)/\lambda_f(\theta) = p(\theta)/q(\theta)$, the wage equation (B.4) reduces to the standard rational expectations solution, $\omega = b + \gamma(z - b + \kappa\theta)$. Biased expectations regarding job separation thus affect the wage equation only if the biases differ between workers and firms. Biased expectations regarding job matching affect the wage equation only if the relative biases (i.e., the ratio of perceived to actual matching probabilities) differ between workers and firms.

Using $\lambda_w(\theta) = (1 + \Delta_{\lambda w})p(\theta)$ and $\lambda_f(\theta) = (1 + \Delta_{\lambda f})q(\theta)$, we get a proposition analogous to Proposition 1.

Proposition 2 *In the presence of biased expectations of workers and firms, and contracts of length $T \geq 1$, an interior equilibrium with $\theta > 0$ exists if and only if the condition*

$$-\beta^{T-1}\left((1-\gamma)(1-\sigma_f)^T + \gamma(1-\sigma_w)^T\right) \leq (1-\gamma)\frac{z-b}{\kappa}(1+\Delta_{\lambda f}) \sum_{t=1}^{T} \Big(\beta(1-\sigma_f)\Big)^{t-1} - \frac{1}{\beta}$$

i) holds with strict inequality, or
ii) holds with equality and $\gamma\lambda_w/p(\theta) = \gamma(1+\Delta_{\lambda w}) = 0$ and $\lim_{\theta\to 0^+} \theta p'(\theta) = 0$.

If i) holds and $\gamma\lambda_w/p(\theta) > 0$ or $p(\theta)/\theta$ is strictly decreasing, then the equilibrium is unique.

The proof of Proposition 2 can be found in a working paper version of the theoretical part

of the present paper (Balleer et al., 2023).

C Quantitative analysis

C.1 Bias in labor market transition rates, wages and reservation income

C.1.1 Job separation rate bias and wages

We use data on the net hourly wage in order to explore its relationship with biased expectations in job separation rates. The net hourly wage is computed by dividing monthly net labor income by actual working time per week. Table A.4 contains summary statistics of this variable. Table C.1 documents the output from regressing the log hourly wage rate on the difference between perceived and actual job separation rates for the four different measures of this variable. We add education and labor market experience in levels and squared (a basic Mincer regression) as well as further controls and individual fixed effects in the specification (coefficients not shown in the Table). We also add the individual actual job separation risk in order to account for the fact that actual job separate rates are negatively correlated with wages on average. We further allow the link between perceived and actual job separation risk and wages to be potentially different in East and West Germany. Standard errors are bootstrapped.[39]

All specifications show that a higher difference between perceived and actual job separation rates is associated with a significantly lower hourly wage on average. This documents that an expectational bias in the separation rate in fact relates to labor market outcomes. In terms of our model above, this is consistent with relatively long contracts ($T > T^*$). Quantitatively, an increase in the difference between the perceived and actual job separation rate by 10 percentage points, is associated with West German wages to be about 0.7% lower and East German wages to be about 1.3% lower on average. While already being more pessimistic with respect to their job stability as documented in Section 2, the wages of East Germans therefore negatively relate twice as much to a change in biased expectations than those of West Germans. Our estimation results predict that if Eastern Germans' pessimistic bias in job separation expectations was at West German levels, hourly wages would be about 1% higher when job separation bias is allowed to affect wages differently in East and West.[40]

We interpret our estimated relationship to reflect how biased expectations and wages are linked. As already discussed in Section 2, the difference between perceived and actual job separation rates might reflect rounding errors, a small degree of private information or other forms of measurement error with respect to a true bias in expectations. In that case, attenuation bias implies a true coefficient that is larger than the estimated one and, hence, our quantitative assessment provides a lower bound. If measurement error is

[39] The bootstrap includes both the predicted labor market probability from the probit regression as described in Section 2, the computation of the difference between perceived and actual separation rates and the wage regression.

[40] For the counterfactual East German wages, we assign the difference in bias from Table A.10 (column 1), and use the estimated effect of job separation bias from Table C.1 (column 1).

the same across different groups in the population, it matters less for estimates of group differences.

Table C.2 shows results in a subsample of fulltime employed with permanent contracts only as well as in a subsample that excludes the most extreme job separation expectations (this sample excludes expected job loss above the 90th and below the 10th percentile as also done in Appendix A). The empirical relationship between wages and the difference in perceived and actual job separation rates in robust for all measures.

Table C.1: Wage and job separation bias: East versus West

	log hourly wage rate			
	general	dismissal	selected	spell
Perc.-Act.	-0.000693***	-0.000766***	-0.000669***	-0.000686***
	(0.0000907)	(0.0000780)	(0.0000959)	(0.000108)
East	-0.214***	-0.202***	-0.199***	-0.200***
	(0.00609)	(0.00716)	(0.00804)	(0.00903)
East × (Perc.-Act.))	-0.000585***	-0.000445**	-0.000395**	-0.000265
	(0.000178)	(0.000199)	(0.000197)	(0.000222)
N	212114	212114	212114	212114

Bootstrapped standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Controls: predicted job separation, educational attainment, full time work experience, East/West dummy, German citizenship, gender,actual hours worked, tenure, tenure squared, industry, occupation, firm size, survey year fixed effects

Table C.2: Wages and bias in job separation rates: Robustness

	log hourly wage rate			
	general	dismissal	selected	spell
	Fulltime and permanently employed			
Perc.-Act. JS	-0.000601***	-0.000726***	-0.000642***	-0.000637***
	(0.0000842)	(0.0000853)	(0.0000850)	(0.0000906)
N	118681	118681	118681	118681
	Trimmed sample			
Perc.-Act. JS	-0.000654***	-0.000865***	-0.000757***	-0.000607***
	(0.0000737)	(0.0000965)	(0.0000831)	(0.0000894)
N	85136	85136	85136	85136

Bootstrapped standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Mincer specification: educational attainment, full time work experience

Additional controls: East/West dummy, German citizenship, gender, actual hours worked, tenure, tenure squared, industry, occupation, firm size, survey year fixed effects

C.1.2 Results for the U.S.

We also confirm this negative relationship using data for the U.S. This builds on the analysis in Balleer et al. (2021). Here, we use expectations about flows between different employment states from the Survey of Consumer Expectations (SCE) to measure perceived job separation and finding rates. We use actual labor market transition rates from the Current Population Survey (CPS) and perform a prediction for individual separation rates based on observable characteristics closely related to the one performed here. We obtain wage information from the SCE. The composition of the sample, the labor market transition rates and the measure of hourly wages are substantially different between the U.S. and the German data. Table C.3 provides a more detailed comparison of the two samples. See also Balleer et al. (2021) for more details on the U.S. data.

As documented in Balleer et al. (2021), employed persons in the U.S. are optimistically biased about leaving their current job, as expected separation rates are lower than actual separation rates on average (see Table C.4). However, when we perform a regression comparable to Table C.1, we find a similarly negative and significant link between the difference between perceived and actual job separation rates and wages as Table C.5 shows. Hence, wages of those workers that are more pessimistic (or less optimistic) with respect to their job stability are lower on average also in the U.S.

Table C.3: Sample comparison, Germany versus US

Germany	US
Sample	
Age: 25 – 65 Years: 1999, 2001, 2003, 2005, 2007, 2009, 2013, 2015	Age: 25 – 65 Time: 2014/07 – 2021/03 not in school, only full-time employed, not self-employed (sample restriction due to unobserved hours worked)
Job-separation expectations	
Definition: General job-separation probability about **next 2 years**	Definition: Being in a certain labor market state **in 4 months**
Actual job-separation	
Probit regression with control variables: age, age squared, female, married, children, East/West, born German, tenure, Tenure squared, unemployment experience, unemployment experience squared, training, new job since previous year, work satisfaction, education, industry, occupation, firmsize; for outcome in **next 2 years**	Probit regression **based on information in CPS** with control variables: education, year, age, age squared, sex, race, family income, part-time, state, children; **for outcome in next 3 and 9 months, 4 months linearly interpolated**
Wage regression	
Definition: net earnings last month divided by 4 times the actual working hours per week	Definition: gross annual earnings last month divided by 12x4x40 (no information on hours worked)
Regression of log hourly wage on difference between perceived and actual job separation rate, actual job separation rate, education, employment experience, East, German born, gender, actual hours worked, tenure, tenure squared, industry, occupation, firm size, survey year	Regression of log hourly wage on perceived and actual job separation rate, actual job separation rate, education, age, U.S. state, race, gender, tenure, tenure squared, industry, type of employer, year

Table C.4: Expected, predicted and bias in job separation rates: US

	Mean	std.dev.	min	max	P10	P50	P90	Obs.
Expected	3.0692	9.6884	0	100	0	0	10	11274
Actual	3.3483	1.9861	0.7521	18.708	1.4998	2.8240	5.8594	11274
Bias	-0.2791	9.7471	-18.708	98.721	-5.2715	-2.3141	6.2439	11274

Source and data details, see: Balleer et al. (2021).

Table C.5: Wages and bias in job separation rates: US

	log hourly wage rate		
Perc.-Act. JS	-0.00490***	-0.00494***	-0.00498***
	(0.000912)	(0.000941)	(0.000903)
Actual JS	-0.186***	-0.139***	-0.282***
	(0.00811)	(0.00558)	(0.0106)
N	11117	11130	11117
Mincer spec.	No	Yes	Yes
Add. controls	No	No	Yes

Standard errors in parentheses (not bootstrapped).

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Mincer specification: educational attainment, age

Additional controls: US federal states (dummy), gender, race tenure, tenure squared, industry, job type, year fixed effects

C.1.3 Job finding rate bias and reservation income

Our model implies that optimism with respect to job finding rates is associated with higher reservation wages. The SOEP also asks unemployed persons to state their monthly net salary at which they would take a job (reservation income). Table A.6 contains summary statistics of this variable. Table C.6 documents the output from regressing the log reservation income on our baseline difference in perceived and actual job finding rates. As for wages and job separation rates, we add actual job finding rates as a control, and subsequently include education and labor market experience (a basic Mincer regression), as well as further controls and individual fixed effects in the different specifications. Standard errors are bootstrapped. All specifications show that unemployed persons with a higher actual job finding rate have significantly higher reservation incomes on average. Net of actual rates, optimism in job finding rates is significantly and positively related to higher reservation income on average. With all controls and fixed effects, a 10 percentage points larger difference between perceived and actual job finding rates is associated with 0.06 percent higher reservation incomes. When controlling for education and experience only, the reservation income is about 2 percent higher. Table C.7 confirms the significantly positive average relationship between bias in job finding rates and reservation incomes for all measures of job finding rates in the subsample excluding the most extreme job finding expectations (as also used in Section 2).

Table C.8 shows the regression with all controls and fixed effects for our baseline measure of job finding rates when allowing the relationship between the difference in perceived and actual job finding rates and reservation incomes to differ between East and West Germany. In this case, differences between perceived and actual job finding rates are not linked significantly differently to reservation incomes in East Germany compared to West Germany. Section 2 has documented that East Germans are less optimistic with respect to their job finding rates than West Germans. If we assign the more optimistic Western job finding bias level to the East, the East German reservation income would be about 0.62% higher.

Table C.6: Reservation income and bias in job finding rates: Out of U

	log reservation income			
Perc. - Act. JF	0.00145***	0.00165***	0.000692**	0.0000625
	(0.000312)	(0.000316)	(0.000304)	(0.000306)
Actual JF	0.00362***	0.00413***	0.00292***	0.000506
	(0.000460)	(0.000509)	(0.000593)	(0.00141)
N	18789	18789	18789	18789
mincer spec.	No	Yes	Yes	Yes
add. controls	No	No	Yes	Yes
indiv. FE	No	No	No	Yes

Bootstrapped standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Mincer specification: educational attainment, full time work experience

Additional controls: East/West dummy, German citizenship, gender, relationship status, kids less 16 years, unemployment experience, survey year fixed effects

Table C.7: Reservation income and bias in job finding rates: Robustness

	log reservation income	
	out of U	out of U or O
	Trimmed sample	
Perc. - Act. JF	0.000769***	0.000935***
	(0.000276)	(0.000224)
N	6576	14390

Bootstrapped standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Mincer specification: educational attainment, full time work experience

Additional controls: East/West dummy, German citizenship, gender, relationship status, kids less 16 years, unemployment experience, survey year fixed effects

Table C.8: Reservation income and bias in job finding rates: East/West

	log reservation income	
	out of U	out of U or O
Perc.-Act.	0.000639*	0.000790***
	(0.000338)	(0.000227)
East	-0.110***	-0.0442***
	(0.0176)	(0.0160)
East × (Perc.-Act.))	0.000117	0.000224
	(0.000587)	(0.000439)
N	18789	71584

Bootstrapped standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Controls: predicted job finding, educational attainment, full time work experience
East/West dummy, German citizenship, gender, relationship status,
kids less 16 years, unemployment experience, survey year fixed effects

C.2 Calibration and quantitative results: Additional tables

C.2.1 Baseline calibration and counterfactual experiments

Table C.9: Baseline calibration: Additional parameter values

		b			κ		
		T			T		
		67	106	159	67	106	159
γ	0.35	0.5838	0.5789	0.5765	0.6852	0.7362	0.7606
	0.50	0.6126	0.6097	0.6082	0.3871	0.4175	0.4321
	0.65	0.6293	0.6276	0.6268	0.2141	0.2314	0.2398

Notes: The model is calibrated to East Germany at a quarterly frequency. Values for unemployment benefits b and vacancy costs κ for different combinations of workers' bargaining power γ and contract length T.

Table C.10: Baseline counterfactual experiments: Additional results

	$\Delta[ln(\omega)]$	$\Delta[ln(\underline{\omega})]$	$\Delta[u]$	$\Delta[ln(\mathcal{I}_W)]$	$\Delta[ln(\mathcal{I}_U)]$	$\Delta[ln(\mathbb{E}\mathcal{I}_{W,U})]$
$\gamma = 0.35$ $T = 67$						
JS bias west	0.0113	0.0199	0.0046	0.0076	0.0079	0.0090
JF bias west	0.0072	0.0127	0.0028	0.0049	0.0051	0.0057
all bias west	0.0184	0.0323	0.0079	0.0121	0.0125	0.0144
$\gamma = 0.35$ $T = 106$						
JS bias west	0.0145	0.0244	0.0055	0.0101	0.0103	0.0116
JF bias west	0.0077	0.0129	0.0028	0.0054	0.0055	0.0062
all bias west	0.0220	0.0369	0.0089	0.0150	0.0153	0.0175
$\gamma = 0.35$ $T = 159$						
JS bias west	0.0159	0.0262	0.0058	0.0112	0.0113	0.0128
JF bias west	0.0079	0.0131	0.0028	0.0057	0.0057	0.0064
all bias west	0.0236	0.0389	0.0092	0.0162	0.0165	0.0188
$\gamma = 0.50$ $T = 67$						
JS bias west	0.0066	0.0155	0.0050	0.0026	0.0034	0.0044
JF bias west	0.0042	0.0099	0.0031	0.0017	0.0022	0.0029
all bias west	0.0107	0.0251	0.0086	0.0039	0.0052	0.0070
$\gamma = 0.50$ $T = 106$						
JS bias west	0.0085	0.0187	0.0060	0.0037	0.0045	0.0058
JF bias west	0.0045	0.0100	0.0031	0.0021	0.0025	0.0032
all bias west	0.0129	0.0283	0.0097	0.0052	0.0066	0.0086
$\gamma = 0.50$ $T = 159$						
JS bias west	0.0093	0.0201	0.0064	0.0042	0.0051	0.0064
JF bias west	0.0047	0.0101	0.0030	0.0022	0.0027	0.0033
all bias west	0.0138	0.0297	0.0101	0.0058	0.0072	0.0093
$\gamma = 0.65$ $T = 67$						
JS bias west	0.0037	0.0128	0.0052	-0.0005	0.0006	0.0016
JF bias west	0.0024	0.0082	0.0033	-0.0002	0.0005	0.0011
all bias west	0.0061	0.0208	0.0090	-0.0012	0.0007	0.0024
$\gamma = 0.65$ $T = 106$						
JS bias west	0.0048	0.0153	0.0064	-0.0003	0.0010	0.0022
JF bias west	0.0026	0.0082	0.0032	-0.0000	0.0006	0.0013
all bias west	0.0073	0.0230	0.0102	-0.0009	0.0012	0.0031
$\gamma = 0.65$ $T = 159$						
JS bias west	0.0053	0.0163	0.0068	-0.0001	0.0012	0.0025
JF bias west	0.0027	0.0082	0.0032	0.0001	0.0007	0.0013
all bias west	0.0078	0.0240	0.0107	-0.0007	0.0015	0.0035

Notes: Baseline model for East Germany calibrated to respective samples (c.f. Table 3) for different combinations of values for γ and T. Counterfactual experiments assign Western bias in job separation (JS bias west) or job finding (JF bias west) or both (all bias west) rates. Model not recalibrated in counterfactuals. Reported numbers: changes in equilibrium values relative to initial steady state. Reported variables: wage (ω), reservation wage ($\underline{\omega}$), unemployment rate (u), ex-ante unbiased expected employment income ($\mathcal{I}_W$), ex-ante unbiased expected unemployment income ($\mathcal{I}_U$), ex-ante unbiased expected lifetime income ($\mathbb{E}\mathcal{I}_{W,U}$). See Equations (14), (15) and (16) for the definitions and ex-ante unbiased expected lifetime income ($\mathbb{E}\mathcal{I}_{W,U}$).

C.2.2 Sensitivity

The SOEP questionnaire asks respondents to report their individual expectations about job loss, which may not necessarily refer to all types of job separations, and, in particular, not to voluntary quits. Our model does not distinguish between different types of separation, therefore, as first sensitivity analysis, we calibrate it, assuming that workers' separation expectations are biased only with respect to involuntary job loss, but not with regard to other reasons for separations. More specifically, write the actual and the workers' expected total probability of job separation, σ and σ_w, as $\sigma = \sigma^{dis} + \sigma^{res}$ and $\sigma_w = \sigma_w^{dis} + \sigma_w^{res}$, where the superscript *dis* denotes separations due to dismissal (or plant closure), and the superscript *res* denotes separations due to all other reasons. Workers' expectation bias regarding total job separations can then be written as $\sigma_w - \sigma = (\sigma_w^{dis} - \sigma^{dis}) + (\sigma_w^{res} - \sigma^{res})$. Assuming that workers have biased expectations regarding dismissals ($\sigma_w^{dis} \neq \sigma^{dis}$), but not regarding any other type of separation ($\sigma_w^{res} = \sigma^{res}$), we set $\sigma_w - \sigma = \sigma_w^{dis} - \sigma^{dis}$ equal to our bias estimate for East Germany based on the dismissal measure of job separations. Tables C.11 and C.12 report the calibrated parameter values and the main results from the quantitative experiments, respectively.

Table C.11: Calibration: Separation bias regarding dismissals only

Parameter	Description	Value	Source/Target
β	discount factor	0.9900	annual interest rate (4%)
η	matching fnct elasticity	0.6500	Kohlbrecher et al. (2016)
b	unemployment income	[0.56,0.63]	replacement rate (65%)
κ	vacancy costs	[0.25,0.91]	normalization ($\theta = 1$)
χ	matching fnct efficiency	0.1850	JF rate (JF out of U, GSOEP)
σ	separation rate	0.0174	JS rate (JS general, GSOEP)
$\sigma_w - \sigma$	job separation bias	0.0336	own estimate (JS dismissal, GSOEP)
$\lambda_w(\theta) - p(\theta)$	job finding bias	0.0044	own estimate (JF out of U, GSOEP)
T	duration of wage contract	67/106/159	
γ	workers' bargaining power	0.35/0.50/0.65	

Notes: The model is calibrated to East Germany at a quarterly frequency. JF refers to job finding out of unemployment only, JS general (dismissal) to the general (dismissal) measure of job separation.

Table C.12: Counterfactual experiments: Separation bias regarding dismissals only

		$\Delta[ln(\omega)]$			$\Delta[ln(\mathbb{E}\mathcal{I}_{W,U})]$		
		T			T		
		67	106	159	67	106	159
γ	0.35	0.0188	0.0216	0.0226	0.0152	0.0178	0.0187
	0.50	0.0111	0.0129	0.0135	0.0078	0.0093	0.0099
	0.65	0.0063	0.0074	0.0077	0.0031	0.0039	0.0043

Notes: Baseline model for East Germany calibrated to respective samples (c.f. Table C.11) for different combinations of values for γ and T. Counterfactual experiment assigns Western bias in job separation and job finding rates. Model not recalibrated in counterfactuals. Reported numbers: changes in equilibrium values relative to initial steady state. Reported variables: wage (ω) and ex-ante unbiased expected lifetime income ($\mathbb{E}\mathcal{I}_{W,U}$).

Our baseline calibration implies an East German unemployment rate that is too low compared to official statistics. As second sensitivity analysis, we therefore calibrate the model, setting the job separation rate to $\sigma = 0.027$, such that the unemployment rate in the initial steady state is about 13%. Tables C.13 and C.14 report the calibrated parameter values and the main results from the quantitative experiments, respectively.

Table C.13: Calibration: Higher separation rate

Parameter	Description	Value	Source/Target
β	discount factor	0.9900	annual interest rate (4%)
η	matching fnct elasticity	0.6500	Kohlbrecher et al. (2016)
b	unemployment income	[0.57,0.62]	replacement rate (65%)
κ	vacancy costs	[0.19,0.65]	normalization ($\theta = 1$)
χ	matching fnct efficiency	0.1850	JF rate (JF out of U, GSOEP)
σ	separation rate	0.0270	unemployment rate (13%)
$\sigma_w - \sigma$	job separation bias	0.0194	own estimate (JS general, GSOEP)
$\lambda_w(\theta) - p(\theta)$	job finding bias	0.0044	own estimate (JF out of U, GSOEP)
T	duration of wage contract	67/106/159	
γ	workers' bargaining power	0.35/0.50/0.65	

Notes: The model is calibrated to East Germany at a quarterly frequency. JF refers to job finding out of unemployment only, JS to the general measure of job separation.

Table C.14: Counterfactual experiments: Higher separation rate

		$\Delta[ln(\omega)]$			$\Delta[ln(\mathbb{E}\mathcal{I}_{W,U})]$		
		T			T		
		67	106	159	67	106	159
	0.35	0.0200	0.0224	0.0230	0.0146	0.0165	0.0170
γ	0.50	0.0119	0.0133	0.0137	0.0068	0.0078	0.0081
	0.65	0.0068	0.0076	0.0078	0.0020	0.0024	0.0025

Notes: Baseline model for East Germany calibrated to respective samples (c.f. Table C.13) for different combinations of values for γ and T. Counterfactual experiment assigns Western bias in job separation and job finding rates. Model not recalibrated in counterfactuals. Reported numbers: changes in equilibrium values relative to initial steady state. Reported variables: wage (ω) and ex-ante unbiased expected lifetime income ($\mathbb{E}\mathcal{I}_{W,U}$).

Finally, our estimate of workers' expectation biases from the SOEP refer to biennial changes in labor market states, while our baseline calibration is at the quarterly frequency. As third sensitivity analysis, we therefore calibrate the model at the biennial frequency. Tables C.15 and C.16 report the calibrated parameter values and the main results from the quantitative experiments, respectively.

Table C.15: Calibration: Biennial frequency

Parameter	Description	Value	Source/Target
β	discount factor	0.9200	annual interest rate (4%)
η	matching fnct elasticity	0.6500	Kohlbrecher et al. (2016)
b	unemployment income	[0.51,0.61]	replacement rate (65%)
κ	vacancy costs	[0.14,0.44]	normalization ($\theta = 1$)
χ	matching fnct efficiency	0.4997	JF rate (JF out of U, GSOEP)
σ	separation rate	0.1502	JS rate (JS general, GSOEP)
$\sigma_w - \sigma$	job separation bias	0.1257	own estimate (JS general, GSOEP)
$\lambda_w(\theta) - p(\theta)$	job finding bias	0.0188	own estimate (JF out of U, GSOEP)
T	duration of wage contract	8/13/20	
γ	workers' bargaining power	0.35/0.50/0.65	

Notes: The model is calibrated to East Germany at a biennial frequency. JF refers to job finding out of unemployment only, JS to the general measure of job separation.

Table C.16: Counterfactual experiments: Biennial frequency

		$\Delta[ln(\omega)]$			$\Delta[ln(\mathbb{E}\mathcal{I}_{W,U})]$		
		T			T		
		8	13	20	8	13	20
γ	0.35	0.0256	0.0311	0.0330	0.0170	0.0209	0.0223
	0.50	0.0161	0.0197	0.0210	0.0083	0.0105	0.0113
	0.65	0.0096	0.0117	0.0125	0.0023	0.0032	0.0036

Notes: Baseline model for East Germany calibrated to respective samples (c.f. Table C.15) for different combinations of values for γ and T. Counterfactual experiment assigns Western bias in job separation and job finding rates. Model not recalibrated in counterfactuals. Reported numbers: changes in equilibrium values relative to initial steady state. Reported variables: wage (ω) and ex-ante unbiased expected lifetime income ($\mathbb{E}\mathcal{I}_{W,U}$).