How do biased labor market expectations affect labor market outcomes?

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Very preliminary and incomplete. Please do not circulate.

Abstract

We investigate individual biases in labor market expectations in German survey data and find that workers significantly overestimate their individual job loss and job finding probabilities. We then address how the bias in beliefs relates to wages and consumption-saving choices. We find a significant negative relationship between the bias in job loss expectations with actual and reservation wages as well as a significant positive relationship with savings. A positive bias in job finding expectations positively and significantly relates to reservation wages and negatively to savings. Substantial heterogeneity in biased beliefs may explain part of the wage differences across demographic groups or submarkets and is therefore important for effective labor market policy. To quantify direct, indirect and offsetting effects of biased beliefs on wages, we relate the findings to a model with search-and-matching on the labor market, Nash bargaining of wages, and savings in incomplete markets.

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1 Introduction

Labor market risk as described by the probability to experience a labor market transition (for example, to lose a job or to find employment) has important consequences for individual decision making. This includes labor market decisions such as wage bargaining (see Mortensen and Pissarides (1994)), human capital accumulation (see Krebs (2003)) or job search intensity (see for example Rogerson et al. (2005)). This also includes the consumption-savings allocation (see Krusell et al. (2010)) or portfolio composition (see Den Haan et al. (2017)). Through its effect on individual behavior, labor market risk therefore has important consequences for different aggregate outcomes such as employment, physical capital accumulation, wage growth and business cycles.

A common approach is to assume that all agents correctly assess the risk they face in the labor market. In this study we investigate individual bias in beliefs about their labor market prospects, i.e. whether and how expected individual job loss and job finding probabilities differ from their realized counterparts. We address how biased beliefs affect wages and reservation wages as one central aspect of individual labor market outcomes. We further address how biased beliefs affect consumption-savings choices both directly and through their effect on wages and how biased beliefs then also affect wages indirectly through asset holdings. First, we derive the effect of beliefs in a search-and-matching model of the labor market in which agents can save to self-insure against adverse labor market outcomes. We then provide new empirical evidence on individual biases in labor market expectations in German survey data and test the model implications about wage outcomes and saving decisions.

We illustrate wage outcomes and consumption-savings choices within the framework of Krusell et al. (2010) which combines an incomplete markets framework with search-and-matching on the labor market. We further extend the model with stochastic job matching in order to be able to derive implications about reservations wages. In this model, we allow, but do not explain that workers and firms form different expectations about job finding and vacancy filling as well as exogenous job destruction probabilities. When splitting the surplus from the job match, the value of a future job is discounted by both worker and firm with the time discount factor, but also by their respective probabilities to keep and lose a job. These discount factors matter for how the surplus is split only when different from each other. Once the worker discounts future returns from a filled match more than the firm, e.g. through expecting a higher job separation rate or a lower job finding rate, the worker values a future job match less and gets a lower share of the surplus. Similarly, if the worker discounts returns from a job match more, his reservation productivity will be lower, ceteris paribus, and so will be the reservation wage.

In complementary work, Balleer et al. (2021), we assess the effect of biased labor market expectations on consumption-saving choices. If agents assess their risk of losing

the job as too high or the chance to find a job as too low, they save too much. Here, we add an additional indirect effect of biased beliefs that affects savings through the effect on labor market income, i.e., the wage. In addition, the wage outcome is affected by non-labor income, as Krusell et al. (2010) have argued. If biased beliefs affect savings, they then also indirectly affect wage outcomes through their effect on asset holdings. This paper quantifies these various and potentially offsetting direct and indirect effects of based beliefs on wages and savings.

We use survey data from the German Socio-Economic Panel (SOEP) on workers' subjective expectations about individual labor market outcomes to empirically investigate how accurately individuals can assess their own risks labor market. The SOEP regularly includes an assessment of individual labor market expectations, such as the probability to lose or find a job, in the questionnaires. Based on realized labor market outcomes, we then determine actual probabilities in a narrowly defined group, i.e. conditional on a large number of demographic and industry characteristics. A bias in individual labor market expectations is then defined as the difference between a person's expected probability of a given labor market event and the respective actual probability of that event. This means that we assume the firms' bias to be time-constant at zero in our empirical assessment.

We find that, on average, workers in Germany significantly overestimate the risk of losing their job. The bias in job loss expectations of employed workers is about 17 percentage points. This means that individuals perceive their risk of losing a job (at about 21%) as too high compared to the actual probability (at about 4%). We also find that, on average, unemployed persons in Germany overestimate their probability to find a job. We estimate the bias in job finding expectations at about 8 percentage points and significant, but consequently substantially smaller than the bias in job loss expectations.

Biases in job loss and job finding expectations are positive and significant across a large number of subsamples among German workers and unemployed persons. We find substantial spatial differences in the degree of households's bias in beliefs in the economy. Biases in job loss expectations are larger, and those in job finding expectations are lower, in East Germany compared to West Germany. The bias in job loss expectations is high in manufacturing and generally decreases with tenure and age,but does not vary by education group or gender. The bias in job finding expectations, in turn, is U-shaped in age and work experience, higher for males than for females, and decreases with education.

We find that a larger bias in job loss expectations negatively relates to individual net hourly wage rates, significantly so both overall and net of controls. This confirms the model predictions. The overall effect states that an increase in the bias by 1 percentage point decreases wages by about 0.2% on average. If the bias increases by one-standard deviation, wages decrease by as much as 5.7%. We also find that a larger bias in job finding expectations positively relates to individual net monthly reservation labor income, which is measured based on a specific survey question in the SOEP for unemployed persons. This

is also in line with the predictions of our model. According to our estimates, an increase in the bias in job finding expectations by one standard deviation increases reservation wages by around 3.2%. An increase in the bias of job loss expectations by 1 percentage point increases monthly savings by about 0.44 Euro on average. An increase in the bias of job finding expectations by 1 percentage point decreases the monthly saving rate from net household income and savings by up to 0.7 Euro on average. These estimates also confirm the model predictions.

Our analysis provides important insights for economic policy. For the design of effective economic policy, it is key for policymakers to understand how biases in individual labor market expectations shape aggregate labor market performance and business cycles. An immediate implication of our findings is that the substantial heterogeneity in biased beliefs in the economy may explain part of the wage differences across demographic groups or submarkets, for example defined by industry or region. Policy makers may then consider to directly reduce the degree of the bias, for instance through enhanced mobility between these submarkets and information or uncertainty management.

Our study broadly relates to how psychological or behavioral factors such as news, learning, informational frictions, sentiment, uncertainty or ambiguity may affect macroeconomic outcomes (see Acemoglu and Woodford (2012), Woodford (2013), or Ilut and Schneider (2014)). One or several of these factors could lie behind our measures of biased beliefs of labor market risk. We leave aside the question about the sources of the bias in this study and focus on their aggregate implications instead.

The existing empirical literature mostly measures biased beliefs using consumer survey data for households' expectations about aggregate outcomes such as inflation, the unemployment rate and the business cycle and relates these expectations to the realized values of these variables (compare Bovi (2009) or Souleles (2004)). In contrast, our measure of biased beliefs reflects households' expectations about individual outcomes. While the existing measures reflect biased beliefs about aggregate risk, our measure combines the influence of aggregate and idiosyncratic risk to the household. Measuring the bias in beliefs about individual outcomes may therefore provide a better estimate of the risk that actually affects households' decisions.

Biased beliefs in individual job finding risk has been addressed in two studies. Conlon et al. (2018) specifically address learning and informational frictions about job offers and, consequently, job finding probabilities. They document empirical evidence on differences between labor market expectations and realizations in US data and show that a model with the corresponding informational frictions fits observed reservations wages better than without. Our direct evidence on the relationship of biased beliefs in job finding risk and reservation wages supports the mechanism in Conlon et al. Mueller et al. (2021) also measure bias in beliefs about the employment prospects, i.e. job finding risk, of unemployed persons in US data. They then explore how this bias affects employment and

unemployment outcomes. Our study is novel in that we address both bias in beliefs in job finding and job loss. In addition, we can link the bias directly to labor market outcomes and savings choices in the data.

Earlier empirical studies document perceived labor market risk in the social science literature (see for example Dominitz and Manski (1997) or Dixon et al. (2013)). Based on earlier waves in the SOEP, Dickerson and Green (2012) document qualitative bias in beliefs of labor market risk. A few studies relate measures of job separation risk, both perceived and actual, but not their relationship, to the evolution of wages and finds a generally negative relationship (Campbell et al. (2007) use the British Household Panel in the years 1996 and 1997, Hübler and Hübler (2006) use SOEP as in this study).

The paper is organized as follows. Section 3 presents the theoretical mechanism between biased beliefs, wage setting and consumption-savings choices. Section 4 presents the empirical evidence. Section 5 concludes.

2 Related literature and contribution

Our project contributes to the existing literature in a number of ways. First, we provide new empirical evidence on individual misperceptions of labor market risk and relate this to individual economic decisions and outcomes such as wages, consumption and savings. Second, we assess how individual misperceptions affect macroeconomic outcomes. Third, we use our measures of misperception to quantify their macroeconomic effects and assess how much of the divide in economic outcomes between East- and West-Germany might be attributed to differences in the degree of misperception.

The first part of the project defines and measures these individual misperceptions and documents how they relate to individual outcomes such as wages, consumption and saving. We define misperception as the difference between a worker's perceived probability of a given labor market event and the respective realized rate of that event. The German Socio-Economic Panel (GSOEP) contains questions about an individual's perception of his or her labor market risk. For instance, respondents are asked to assess the probability to lose their job within the next two years. We compare this individual subjective risk to the realized job loss rate in a narrowly defined control group, which we refer to as the actual or realized probability to lose one's job within the next two years.

To measure misperception, the existing empirical literature mostly relies on consumer survey data for households' expectations about **aggregate** outcomes such as inflation, the unemployment rate and the business cycle and relates these expectations to the realized values of these variables. Bovi (2009) documents systematic forecast errors about macroeconomic outcomes in various consumer surveys in European countries. Based on the Michigan Consumer Sentiment Surveys, Souleles (2004) documents systematic forecasting errors about inflation and the business cycle and shows that these errors greatly

vary with demographic characteristics. In contrast, our measure of misperception reflects households' expectations about **individual** outcomes. While the existing measures reflect misperceptions about aggregate risk, our measure combines the influence of aggregate and idiosyncratic risk to the household. Measuring misperception about individual outcomes may therefore provide a better estimate of the risk that actually affects households' decisions.

The existing studies have mainly focused on the relationship between income and unemployment risk on consumption and savings behavior. Based on the Michigan Consumer Sentiment Surveys, Carroll (1992) and Carroll and Dunn (1997) document that higher unemployment risk as measured by expectations about the unemployment rate is related to higher savings in the Michigan survey. Using the same data source, Souleles (2004) documents a negative relationship between consumer confidence and savings.

Measures of perceived individual labor market risk have caught some attention in the social science literature (see for example Dominitz and Manski (1997) or Dixon et al. (2013)). The economics literature on this topic is relatively scarce. Dickerson and Green (2012) use early waves from the GSOEP to measure and document perceived labor market risk. They then compare it to a measure of actual labor market risk similar to our measure. However, they mostly rely on non-numerical assessment of probabilities (probability goes up or down) due to the use of early waves in the GSOEP. They also do not take composition effects into account when calculating their measure of actual risk. A few studies relate measures of labor market risk, both perceived and actual, to the evolution of wages. Campbell et al. (2007) use the British Household Panel in the years 1996 and 1997 to relate a measure of misperception to wages and finds a negative relationship. Hübler and Hübler (2006) use the question of the GSOEP to look at perceived and objective job insecurity separately. Their measure of objective insecurity is equal to the regional unemployment rate, but does not use the panel information on actual realized outcomes in the GSOEP. HÃ¼bler and HÃ¼bler establish a negative link between job insecurity and wages in the data.

Our study improves upon the existing empirical literature in a number of dimensions. First, we update existing measures and use numerical information about perceived labor market risk. Second, we use the richness of the data set to account for compositional aspects (narrow control groups) in the measure of actual labor market risk. Third, we use the panel structure to address the persistence of misperceptions. Fourth, we provide data facts that can directly be linked to macroeconomic models.

The second part of the project builds a macroeconomic model with individual misperceptions of labor market risk to address how the presence and degree of misperceptions affects both individual outcomes and the macroeconomic equilibrium. A number of studies investigate the effect of labor market risk on the economy. Based on the empirical findings from the Michigan Consumer Sentiment Surveys, both Carroll (1992) and

Den Haan et al. (2017) have formulated how unemployment risk may affect macroeconomic outcomes through increasing precautionary savings. According to Carroll's mechanism, higher risk increases savings through a "buffer-stock"-behavior of economic agents. In den Haan et al., the mechanism works through an economic environment without behavioral factors, but with incomplete markets in which agents need to insure themselves against adverse shocks. Lower consumption or the households' portfolio choice may then intensify a macroeconomic contraction and explain part of the slow macroeconomic recoveries that have been observed after the past two recessions.

We plan to investigate the role of misperceptions for the consumption-savings channel. In particular, we plan to incorporate misperceptions into a baseline macroeconomic framework with incomplete markets. It is important to note that misperceptions do not only reflect risk in this setup, but risk that is perceived to be higher or lower than the statistical risk. The subjective risk of some agents may therefore differ from others and may not reflect actual outcomes which we expect to affect the equilibrium in itself.

Over and above the consumption-savings channel we propose another mechanism through which misperceptions about labor market risk may affect macroeconomic outcomes. Clearly, labor market risk matters for labor market outcomes. Consider a setup in which firms and workers bargain over the surplus from an employment relationship in the presence of search frictions. In this bargaining process, labor market risk affects the expected value of the employment relationship to the worker. If the risk of becoming unemployed is higher or the chance of finding a job is lower, the expected value of the employment relationship falls. If the perceived labor market risk is different for different agents and different from the statistical risk, this may affect the search behavior and bargaining position of the agents. If, for example, workers have negative perceptions, e.g. they assess their job loss risk to be too high, compared to firms, the bargaining position of workers is weakened and may lead to lower wages. Workers may also search less in the labor market and would therefore be more likely to be unemployed.

Assessing labor market risk is related to how economic agents form expectations about future outcomes which is key to deciding about today's labor supply, consumption and savings. How agents assess and perceive risk is in turn related to how they form expectations. As noted in the introduction, misperceptions would not exist or not persist in the presence of rational expectations. Misperceptions may relate to uncertainty about the unemployment risk as is formulated in Carroll (1992) or Den Haan et al. (2017). While uncertainty generally relates to the dispersion of respective outcomes, one would not expect systematic deviations of average perceptions of unemployment risk from their statistical counterpart as we observe in our preliminary results. Systematic deviations may instead be more closely related to ambiguity aversion of economic agents. For a given dispersion of outcomes, ambiguity aversion induces that economic agents make decisions based on the worst possible outcome (see e.g. Ilut and Schneider (2014) for how to formulate and

interpret ambiguity in macroeconomic models). Clearly, rational expectations combined with informational frictions or a slow process of learning about actual outcomes may provide another reason for misperceptions. While it is clearly interesting and relevant to go after the sources of misperception, we will not follow up this issue in this project.

After separate theoretical analyses as described above, we plan to incorporate both the consumption-savings channel and the wage bargaining channel into a unified model framework. This framework will consist of an incomplete markets setup in which consumers need to insure themselves against adverse income shocks, similar to Aiyagari (1994), Bewley (1986) and Huggett (1993). We will then add search-and-matching on the labor market to this framework. This corresponds to a simple version of the model in Krusell et al. (2010), but allowing for misperceptions about labor market risk. This allows us to quantify both channels in the model and compare the respective outcomes of both channels to the empirical relationship between misperception, wages, consumption and savings as well as individual unemployment outcomes. The model can also be used to quantify the effects of misperceptions on the economy as a whole. In particular, in the final part of the project, we will apply our unified macroeconomic framework to address the question whether parts of the East-West-German divide can be attributed to differences in the degree of household misperceptions. The model also allows us to address the role of economic policy and to perform counterfactual experiments.

3 Biased expectations and the labor market equilibrium

This section presents a theoretical framework in which we can assess how a bias in beliefs jointly affects labor market outcomes, in particular reservation wages and realized wages, and saving decisions. We depart from the search-and-matching labor market model with exogenous separations as Diamond (1981) and Mortensen and Pissarides (1994) (DMP henceforth) which is extended in two dimensions. First, allow economic agents to save in an incomplete market environment (as in Krusell et al. (2010)). In this setup, saving choices depend on expected income and, hence, on labor market risk. Moreover, as savings determine non-labor income, they play an important role in wage determination and, hence, labor market income. Second, we allow for job acceptance decisions (See Chapter 6 on Stochastic Job Matchings in Pissarides (2000) or also Hornstein et al. (2011) and others). In this model, firms and workers take into consideration the expected discounted present value from existing employment relationships (jobs) versus non-existing employment relationships (vacancies and unemployment). Decision making of firms and workers is then based on how likely employment relationships are formed (job finding probability) and destroyed (job destruction probability). The model then allows us to define a link between risk assessment, reservation wages and realized wages for unemployed persons which we can measure empirically.

In the textbook model, objective probabilities about how likely a new job match is formed and how likely an existing job match is destroyed are known to all economic agents and are, hence, the same for firms and workers. In our model, we allow individual probabilities to deviate from objective probabilities and differently so for workers and firms. We no further microfound the different dimensions of bias in beliefs, but instead investigate their implications for the labor market equilibrium in general and the wage bargaining outcome in particular, both directly and indirectly through the saving decision.

3.1 The model

Our economy is populated by a measure 1 of infinitely-lived economic agents are either employed or unemployed. Consumers have standard time-additive preferences with discount factor β and derive utility from consumption expressed by $u(c)$, where $u(\cdot)$ is an increasing and (strictly) concave period utility function. Consumers face idiosyncratic employment shocks (governed by exogenous separation rate σ and endogenous contact rate λ_u) for which no insurance markets exist. Consumers earn a period income b when unemployed or obtain a wage working for one of many small, competitive firms. Firms employ one worker and produce a single good using labor and physical capital as an input. Period output of a worker-firm match is given by $zF(k) = zk^{\alpha}$, where z is a match-specific productivity parameter that remains constant over the duration of the match.

In order to hire, firms open vacancies (v) at a cost of κ. The number of contacts per period between vacant jobs and unemployed workers (u) is determined by matching function: $m(u,v) = \chi u^{\eta} v^{1-\eta}$. Here, χ determines scale (efficiency) and $-\eta$ is elasticity of the firms' contact rate with the unemployed. $\theta = \frac{v}{u}$ measures labor market tightness. The actual probability of job contact for unemployed is then given by $\lambda_u = m(u,v)/u = f(\theta) = \theta q(\theta)$, and the actual probability of contact with unemployed for firms is given by $\lambda_f = m(u,v)/v = q(\theta)$. Upon meeting, the match draws an i.i.d. match-specific productivity z from $H(z) : [0, \bar{z}] \to [0,1]$. Matches separate exogenously with the separation probability σ. Once match-specific productivity z is realized, wages $w(a,z)$ are determined using (generalized) Nash bargaining between workers and firms, where γ_w is workers' bargaining power. Note that wages also depend on the asset holdings a of a worker.

We distinguish between expected and actual separation and contact probabilities as follows. Workers' expected probability of job contact when unemployed is equal to $\tilde{\lambda}_u = (1+\Delta_{\lambda u})\lambda_u$, where λ_u is the actual contact probability. Likewise, we define firms' expected probability of contact with the unemployed as $\tilde{\lambda}_f = (1 + \Delta_{\lambda f})\lambda_f$, workers' expected exogenous separation probability as $\tilde{\sigma}_u = (1 + \Delta_{\sigma u})\sigma$, and firms' expected exogenous separation probability as $\tilde{\sigma}_f = (1+\Delta_{\sigma f})\sigma$. Workers and firms base their decisions on their expected rather than actual probabilities. The two are equal when $\Delta_{\lambda u} = 0$, $\Delta_{\lambda f} = 0$, $\Delta_{\sigma_u} = 0$, or $\Delta_{\sigma_f} = 0$, respectively. Otherwise, firms and workers have biased beliefs about the contact and separation probabilities.

Following Krusell et al. (2010), consumers can self-insure by saving and borrowing on an asset market with two types of (riskless) assets: First, consumers may invest in physical capital used in production, k, with a period return, r, and a depreciation rate, δ. Second, consumers can invest in equity, x, with a period dividend of d. Equity is a claim to aggregate firm profits with a total value of firms of p. The total amount of equity is normalized to 1. No arbitrage ensures that $\frac{1}{(1+r-\delta)} = \frac{p}{(p+d)}$. Since capital and equity are equivalent from the consumer's point of view, it is not necessary to keep track of the portfolio composition. Total net asset holdings a are then determined by

$$a \equiv (1 + r - \delta)k + (p + d)x. \tag{1}$$

Asset holdings a are subject to a borrowing constraint $\underline{a}$.

Time is discrete in our model and the economy is described by the following equations. Workers/consumers maximize the discounted present value of utility from consumption. The value to a worker of being employed in a job with asset holdings a and match productivity z is given by

$$\begin{aligned} W(a,z) = \; & u\big(w(a,z) + a - qa'\big) \\ & + \beta\Big\{\tilde{\sigma}_u U(a') + (1-\tilde{\sigma}_u)\max\big[W(a',z), U(a')\big]\Big\} \end{aligned} \tag{2}$$

where $a' = \psi_e(a,z)$ denotes the decision rule for employed workers and $q = 1/(1+r-\delta) = p/(p+d)$ is the inverse of the gross real interest rate. The value to a worker of being unemployed in a job with asset holdings a reads

$$\begin{aligned} U(a) = \; & u\big(b + a - qa'\big) + \\ & + \beta\Big\{\tilde{\lambda}_u \int_0^{\bar{z}} \max\big[W(a',z), U(\psi_u(a))\big] dH(z) + (1-\tilde{\lambda}_u)U(a')\Big\} \end{aligned} \tag{3}$$

with $a' = \psi_u(a)$ the decision rule for unemployed workers.

Firms maximize the discounted present value of the profits for shareholders. The value to a firm of posting a vacancy satisfies

$$V = -\kappa + q\Big\{\tilde{\lambda}_f \int_{\underline{a}}^{\bar{a}} \int_0^{\bar{z}} \max\big[J(a',z), V\big] dH(z) dG(a'|u) + (1-\tilde{\lambda}_f)V\Big\} \tag{4}$$

where $a' = \psi_u(a)$ is the optimal savings choice of an unemployed worker, and $G(a'|u)$ denotes the cumulative density of the distribution of assets among the currently unemployed workers next period. The value to a firm of a filled job with a worker with asset holdings

a and match productivity z satisfies

$$J(a,z) = \max_k zF(k) - rk - w(a,z) + q\Big\{\tilde{\sigma}_f V + (1-\tilde{\sigma}_f)\max\big[J(a',p),V\big]\Big\} \tag{5}$$

where $a' = \psi_e(a,p)$ is the optimal savings choice of the employed worker.

Based on equation (5) and (2), one can then derive conditions for the existence of a worker's and firm's reservation productivity according to which the participation constraints of both worker and firm hold, i.e., above which the job match realizes upon contact and denote the maximum of these two reservation productivities as $\hat{z}^*$.

Using the free entry condition of firms $V = 0$ together with equations (5) and (4) yields the following job creation condition

$$\kappa = q\tilde{\lambda}_f \int_{\underline{a}}^{\bar{a}} \int_0^{\bar{z}} \max\big[J(\psi_u(a),z),0\big] dH(z) dG(a|u), \tag{6}$$

where $G(a|u)$ denotes the c.d.f. of assets among currently unemployed workers.

The wage $w(a,z)$ of a match between a firm and a worker with assets a and match productivity z is set so as to maximize the generalized Nash product of the worker's and the firm's surpluses:

$$\max_{w(a,z)} \quad \big[W(a,z) - U(a)\big]^{\gamma_w} \ \big[J(a,z) - V\big]^{1-\gamma_w}, \tag{7}$$

where γ_w is the workers' bargaining power.

3.2 Some comparative statics

To form intuition about how biased beliefs affect wages, reservation wages and savings, we consider two special cases for which comparative statics can be derived. We further consider biased beliefs of workers only, i.e., $\Delta_{\lambda f} = 0$ and $\Delta_{\sigma_f} = 0$, since this we have empirical evidence about these. First, if utility is linear, savings play no role for wage determination. It is then possible to derive the following wage equation for a given z

$$w(z) = (1-\gamma_w)b + \gamma_w\Big[z + \frac{(1+\Delta_{\lambda u})[1-\beta(1-\sigma)]}{[1-\beta(1-(1+\Delta_{\sigma u}))\sigma]}\theta\kappa\Big] \tag{8}$$

Without biased beliefs, the wage equation reduces to the usual wage equation in DMP. Biased beliefs interact with how labor market conditions affect the wage, i.e. with labor market tightness θ. When splitting the surplus, the value of a future job is discounted by both worker and firm with the time discount factor, but also by the respective probabilities to keep and lose a job. These discount factors matter for how the surplus is split only when different from each other. The agent who assesses a higher probability to an intact future job match values this more and gets a larger share of the surplus. When labor

market conditions improve for the worker, the workers implicit bargaining power increases and wage increase, but less so if the worker perceives the job separation rate to be larger than the firm, which is the case when $\Delta_{\sigma u} > 0$. He then discounts the value of the future job match more. Put differently, wages decrease in the worker's biased expectation with respect the job separation rate, ceteris paribus. We will test the implication on workers bias in beliefs about job separation rates in the data in Section 4.

Parallel to the above explanation, workers value the future match more the higher the job finding probability relative to the actual and hence, to that of the firm. In this case, their implicit bargaining power increases and wages increase (more when labor market conditions improve for the worker). Put differently, wages increase in the worker's biased belief in the job finding rate, ceteris paribus.

In addition to wages, we can consider the effect of biased beliefs on reservations wages in this case. Using that $w(z^*) = z^*$, one can derive the reservation wage as

$$z^* = b + \frac{\gamma_w}{(1-\gamma_w)} \frac{(1+\Delta_{\lambda u})[1-\beta(1-\sigma)]}{[1-\beta(1-(1+\Delta_{\sigma u})\sigma]} \theta\kappa \tag{9}$$

The reservation productivity and hence the reservation wage increases in unemployment benefits and in the cost of hiring which is higher when the labor market is tight. Interacting with this latter cost, biased beliefs affect the reservation wage parallel to the wage equation. Consequently, if workers assess the job separation rate as too high relative to the actual and, hence, the one expected by firms, reservation wages decrease. Reservation wages increase in the worker's biased belief in the job finding rate, ceteris paribus. We will test this implication in the data in Section 4.

The job creation condition and the wage equation determine the equilibrium wage w and labor market tightness θ as the intersection of the two curves. As exhibited in equation (8), the wage equation formulates a positive relationship between wages and labor market tightness. Biased beliefs change the slope of the wage equation with respect to θ. The shift of the wage curve then depends on the relative bias of workers with respect to job finding and job separation. If workers perceive their job separation risk higher and their job finding risk as lower than the actual and, hence, than firms, the wage curve increases less in θ. Job creation formulates a negative relationship between wages and labor market tightness. Job creation is only affected by biased beliefs of the firm and depends on biased beliefs of the worker only through wages.

With non-linear utility, accumulated assets will constitute a non-labor income relevant in the wage bargaining, as Krusell et al. (2010) have shown. In the quantitative assessment in this study, wages increase in asset holdings. If biased beliefs about the job finding and separation rate lead workers to save and accumulate assets differently, this may therefore intensify or offset the previously mentioned effects. We can consider this in a second comparative statics exercise in which we allow utility to be non-linear, but assume matches

to be homogenous. The Euler equation of employed workers is then given by

$$u'(c_e) = \beta \left\{ \tilde{\sigma}_u (1+r) u'(c'_u) + (1-\tilde{\sigma}_u) \Big[w'(a') + (1+r) \Big] u'(c'_e) \right\} \tag{10}$$

and that of unemployed workers is given by

$$u'(c_u) = \beta \left\{ \tilde{\lambda}_u \Big[w'(a') + (1+r) \Big] u'(c'_e) + (1-\tilde{\lambda}_u)(1+r) u'(c'_u) \right\}. \tag{11}$$

Based on this, it is possible to show that savings of employed increase in the bias in beliefs about job separation Δ_{σ_u} and the savings of unemployed decrease in the bias in beliefs about job finding Δ_{λ_u}. This holds when the wage response to savings $w'(a')$ is constant. Otherwise, higher wages due to higher savings may counteract these effects. We will test this implication in the data in Section 4.

4 Empirical evidence

4.1 Data set and sample

For our empirical analyses, we use individual and household data from the German Socio-Economic Panel (SOEP), an annual representative longitudinal survey of private households in Germany. The core survey started in 1984 in West Germany and was enlarged in 1990 to include a representative sample from East Germany. It covers a large number of topics, ranging from work, employment and income to health and family and to time use, attitudes, and personality. In each year (or wave), around 15,000 households and 30,000 persons currently participate in the SOEP survey. Within Europe, the SOEP is unique in regularly including questions on individual labor market expectations since more than 20 years.

We use data based on the core individual and household questionnaires covering the period 1999 to 2017. The reason why we start the time period of our sample in 1999 is that the questions on labor market expectations that are of core interest to our study are available in probabilistic (numeric) instead of qualitative answer format since 1999. We further restrict our sample to individuals between 25 and 65 years of age.

4.2 Measuring biases in labor market expectations

4.2.1 Biases in job loss expectations

Between 1999 and 2015, every second year, respondents of the individual questionnaires of the GSOEP who were working at the time of the interview were asked to assess the probability of losing their job within the next two years on a scale from 0% to 100%

(in steps of 10%).[1] The corresponding variable provides us with a direct measure of an individual's *expected job loss probability*.

Our estimation of individuals' actual job loss probabilities consists of two steps: First, we construct an indicator whether a respondent lost his or her job within 24 months following the interview at which expectations of job loss were asked. Second, we use this indicator to estimate a probit model of actual job loss probabilities.

The job loss indicator is based on individual retrospective information from the two waves following the interview at which they were asked about their expected job loss probabilities. From the start of the GSOEP, respondents of the individual questionnaires are asked at each interview whether they experienced a job ending since the last interview.[2] If they did, they are asked in which month the last job ended, and what the reason for ending the job was. Our baseline indicator of job loss is equal to one for all individuals who experienced at least one job ending due to dismissal or closure of the work place within 24 months after the interview at which they were asked about their expected job loss probabilities.

With this indicator, we estimate a probit model of individuals' actual job loss probabilities, controlling for individual characteristics such as gender, age, family status, education, region, nationality, etc. and job characteristics such as industry, occupation, tenure, hours worked, etc. The predicted values of this probit model constitute our baseline estimates of individuals' *actual job loss probabilities*. Details of the probit estimation are reported in Table 7 in Appendix A.

The difference between the (reported) expected and the (predicted) actual job loss probabilities constitutes our estimate of individuals' *bias in job loss expectations*. Table 1 reports the average expected and actual job loss probabilities together with the difference between the two in our sample. On average, workers in Germany expect to lose their job with close to 21% probability over a period of two years, while their estimated actual probability to do so, on average, is only around 4%. The difference between expected and actual loss probabilities, according to our baseline estimate, is around 17 percentage points and is highly significant. Workers in Germany, on average, thus have a pessimistic bias in their job loss expectations, significantly overestimate the risk of losing their job.

The significant pessimistic bias in job loss expectations among German workers also holds across a large number of subsamples defined by characteristics such as age, education, industry, occupation, work experience, tenure etc. However, the size of the bias varies between those groups. In particular, the pessimistic bias is higher in East Germany (22.41pp) than in West Germany (14.82pp). Across sectors, it is highest for industry and manufacturing (19.06pp) and lowest for public administration, health, social work and education (13.68pp). Across occupations, it is highest for apprentices and trainees

[1] Prior to 1999, the answer options were verbal instead of numeric. The question was excluded in 2011.
[2] Precisely, they are asked whether they left a job since the beginning of the previous calender year.

Job loss probability:			
	Expected (%)	Actual (%)	Expected-Actual (pp)
Mean	20.58	3.92	16.66***
Std.	(24.67)	(4.39)	(23.71)

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (Standard t-test)

Table 1: Expected vs. actual job loss probabilities, whole sample

(40.95pp) and lowest for civil servants (between 2.99pp and 6.47pp). The bias in job loss expectations declines with age (from 18.35pp for workers below 36 to 12.30pp for workers above 55 years) and with tenure (from 23.74pp for tenure below one year to 11.71pp or above for tenure of more than 24 years). It increases with unemployment experience (from 14.75pp for workers with none to 23.65pp or above for workers with more than seven years of unemployment experience). While there are small differences in the size of the bias between education groups (ranging from 14.77pp for the lowest to 16.25pp for the highest and 16.92pp for the middle education group), we do not find evidence for differences between men and women.

Figure 1 depicts average expected and actual job loss probabilities together with their difference over time. The graph shows no clear pattern for the average degree of biased job loss expectations over time.

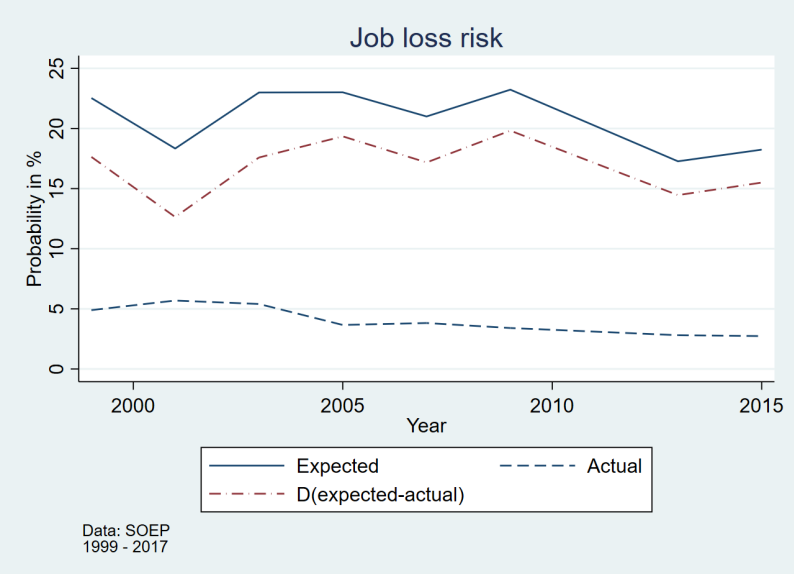

Figure 1: Expected vs. actual job loss probabilities over time, whole sample

4.2.2 Biases in job finding expectations

Analogous to the survey question on subjective job loss probabilities, between 1999 and 2015, every second year, respondents of the individual questionnaires of the GSOEP who were not working at the time of the interview were asked to assess the probability of taking up a paid job within the next two years on a scale from 0% to 100% (in steps of 10%). The corresponding variable provides us with a direct measure of an individual's *expected job finding probability*.

Our estimation of individuals' actual job finding probabilities again consists of two steps: First, constructing an indicator whether a respondent took up paid employment within 24 months following the interview at which expected job finding was asked. Second, we use this indicator to estimate a probit model of actual job finding probabilities.

The job finding indicator is based on monthly spell data from respondents' activity calendars.[3] The data set contains information on the beginning and ending, at monthly precision, of individuals' activities such as full-time employment, registered unemployment, parental leave, school or college attendance, retirement, etc. We assign each of the possible spell types to one of three labor market states: employment (E), unemployment (U) and non-participation (N). The status of employment comprises full-time, part-time and marginal employment, short-time work, second job and minijob, as well as vocational training, first job training and apprenticeship. The status of unemployment is restricted to registered unemployment. All other spell types are categorized as non-participation. We then rank the three states according to the prioritization $E > U > N$ and assign to each month the highest ranking labor market state across all of an individual's spells that cover this month. Our baseline indicator of job finding is equal to one for all individuals for whom at least one month is classified as employment (E) within 24 months after the interview at which they were asked about their expected job finding probability.

With this indicator, we estimate a probit model of individuals' actual job finding probabilities, controlling for individual characteristics such as gender, age, family status, education, region, nationality, work and uneployment experience, etc. In our baseline estimation, we include observations of all individuals who were unemployed at the time of the interview. The predicted values of this probit model constitute our baseline estimates of individuals' *actual job finding probabilities*. Details of the probit estimation are reported in Table 8 in Appendix A.

The difference between the (reported) expected and the (predicted) actual job finding probabilities constitutes our estimate of individuals' *bias in job finding expectations*. Table 2 reports the average expected and actual job finding probabilities together with the difference between the two in our sample. On average, unemployed persons in Germany expect

[3] The "ARTKALEN" data set contains spells (monthly) for events starting in January 1983. The information on activity status is collected on a monthly basis in the yearly individual questionnaire and stored in the file "ARTKALEN".

to take up a paid job with 57% probability over a period of two years, while their estimated actual probability to do so, on average, is only around 49%. The difference between expected and actual job finding probabilities, according to our baseline estimate,around 8 percentage points and is highly significant. Unemployed persons in Germany, on average, thus have an optimistic bias in their job finding expectations, significantly overestimate their chance of finding a job.

Job finding probability:			
	Expected (%)	Actual (%)	Misperception (pp)
Mean	57.02	48.84	8.18***
Std.	(32.33)	(19.31)	(28.60)

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (Standard t-test)

Table 2: Expected vs. actual job finding probabilities, whole sample

The significant optimistic bias in job finding expectations among German unemployed also holds across a large number of subsamples defined by characteristics such as age, education, gender, work and unemployment experience, etc. As was the case for job loss, the size of the bias varies between subsamples, too. More specifically, the optimistic bias is higher in West Germany (12.76pp) than in East Germany (1.94pp). It is slightly higher among male (9.95pp) than among female (7.31pp) unemployed, and it strongly decreases with education, declining from 16.26pp for the lowest to 4.27pp for the highest education group. The size of the bias in job finding expectations is U-shaped in age, starting at more than 10pp for persons below 36, decreasing to less than 6pp for those between 36 to 45 years, and rising again to nearly 10pp for persons above 55 years. It is also U-shaped in (full-time) work experience, starting at more than 12pp for up to 5 years of experience, decreasing to less than 4pp for 15 to 25 years, and rising again to more than 11pp for more than 35 years. Across nationalities, it ranges from 6.62pp for German citizens over roughly 17pp for people with other European or with American nationalities to more than 24pp for people with African nationalities.

Figure 2 depicts average expected and actual job finding probabilities together with their difference over time. The graph clearly shows an increasing pattern for the degree of biased job finding expectations, since the expected job finding probability exhibits no clear pattern, while the actual job finding probability falls.

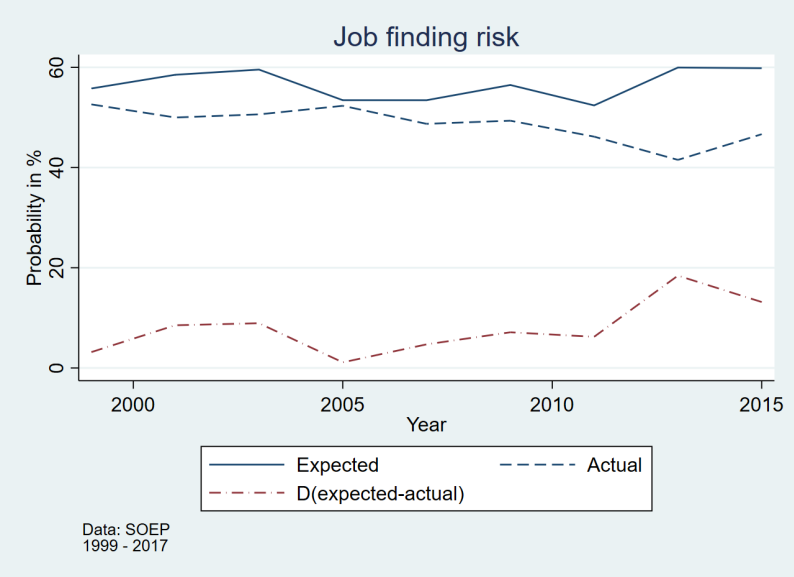

Figure 2: Expected vs. actual job finding probabilities over time, whole sample

4.3 Biased labor market expectations and labor income

Based on the comparative statics exercise for the case of linear utility (that is, where savings play no role) in Section 3, we formulate the following two hypotheses regarding the relation between biases in labor market expectations and individual labor income:

- *Current wages of employed decrease in the bias of their job loss expectations.*
- *Reservation wages of unemployed increase in the bias of their job finding expectations.*

To test these hypotheses, we regress employed individuals' current net wage rate and unemployed individuals' reservation income on the difference between their expected and actual job loss or job finding probabilities. Our measure of the current net wage rate is based on information from individual questionnaires on employed respondents' current net labor income and current actual work hours. Our measure of reservation income is based on information from the individual questionnaires in which respondents who are unemployed at the time of the interview are asked what their monthly net income would have to be for them to accept a job.

Table 3 reports estimation outputs for three specifications of regressing employed persons' current net wage rate on the bias of their job loss expectations. In model (1), the log net wage rate is regressed on the difference between expected and actual job loss probability only. In model (2), education and age variables as in a standard Mincer wage regression are added. Model (3) contains additional variables controlling for individual characteristics (gender, family status and region) and job characteristics (industry, occupation, tenure

and contract duration) as well as year dummies.[4]

The coefficient on the bias in job loss expectations is negative and highly significant across all specifications.[5] In the most basic model (1), an increase in the difference between expected and actual job loss probability by one percentage point decreases the current net wage rate by around 0.2%. To relate this to the order of magnitude of the average bias in job loss expectations in the sample, if this bias increases by one standard deviation (23.71pp, see Table 1), net wages decrease by as much as 5.7%. When controlling for a large number of characteristics, as in model (3), an increase in the bias by one standard deviation is associated with a decrease in net wages by around one percent.

	Dependent variable: Log net hourly wage		
	(1)	(2)	(3)
Job Loss: Expected-Actual	-0.00240***	-0.00220***	-0.000444***
	(0.0000827)	(0.0000770)	(0.0000653)
Middle education		0.144***	0.0847***
		(0.00934)	(0.00764)
High education		0.463***	0.298***
		(0.00975)	(0.00844)
Age		0.0353***	0.0117***
		(0.00159)	(0.00141)
Age, squared		-0.000322***	-0.000115***
		(0.0000180)	(0.0000161)
Additional controls	No	No	Yes[a]
Observations	54338	54338	54338
R^2	0.015	0.151	0.452
Adjusted R^2	0.015	0.151	0.452

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (Standard t-test)

[a] See Table 9 in Appendix A for the full estimation output of model (3).

Table 3: Regressions of wage rate on job loss expectations bias, whole sample

Table 4 reports estimation outputs for three for three specifications of regressing unemployed persons' reservation income on the bias of their job finding expectation. In model (1), the log net reservation income is regressed on the difference between expected and actual job finding probability only. In model (2), education and age variables as in

[4] See Table 9 in Appendix A for the full specification and estimation of model (3).

[5] This finding is robust across a much larger number of specifications not reported here.

a standard Mincer wage regression are added. Model (3) contains additional variables controlling for individual characteristics (gender, family status, region, work and unemployment experience) as well as year dummies.[6]

The coefficient on the bias in job finding expectations is positive and highly significant across all specifications.[7] In the most basic model (1), an increase in the difference between expected and actual job finding probability by one percentage point increases net reservation income by around 0.1%. Relating this to the order of magnitude of the average bias in job finding expectations in the sample, if this bias increases by one standard deviation (28.60pp, see Table 2), net reservation income increases by as much as 3.2%. When controlling for a large number of characteristics, as in model (3), an increase in the bias by one standard deviation is associated with an increase in net reservation income by around 1.7%.

	Dependent variable: Log net reservation income		
	(1)	(2)	(3)
Job Finding: Expected-Actual	0.00113***	0.00135***	0.000609***
	(0.000242)	(0.000241)	(0.000225)
Middle education		0.0432**	0.0599***
		(0.0182)	(0.0173)
High education		0.283***	0.324***
		(0.0254)	(0.0243)
Age		0.00904	0.0142**
		(0.00569)	(0.00632)
Age, squared		-0.000114*	-0.000257***
		(0.0000654)	(0.0000730)
Additional controls	No	No	Yes[a]
Observations	4141	4141	4141
R^2	0.005	0.040	0.221
Adjusted R^2	0.005	0.039	0.217

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (Standard t-test)

[a] See Table 10 in Appendix A for the full estimation output of model (3).

Table 4: Regressions of reservation income on job finding expectations bias, whole sample

[6] See Table 10 in Appendix A for the full specification and estimation of model (3).

[7] Again, this finding is robust across a much larger number of specifications not reported here.

4.4 Biased labor market expectations and savings

Based on the comparative statics exercise for the case of homogeneous matches in Section 3, we formulate the following two hypotheses regarding the relation between biases in labor market expectations and individual savings:

- *Savings of employed increase in the bias of their job loss expectations.*
- *Savings of unemployed decrease in the bias of their job finding expectations.*

To test these hypotheses, we regress individuals' monthly savings on the difference between their expected and actual job loss or job finding probabilities. Our measures of monthly income and savings are based on information from household questionnaires on monthly net household income and monthly amount of savings.

Table 5 reports estimation outputs for three specifications of regressing employed persons' amount of savings on the bias of their job loss expectations. In model (1), the monthly amount of savings is regressed on the difference between expected and actual job loss probability only. In model (2), monthly net household income is included. Model (3) contains additional variables controlling for individual characteristics (age, family status and region) as well as interactions between income and year and income and region. The coefficient on the bias of job loss expectations is positive and highly significant as soon as the level of household income is controlled for.[8]

	Dependent variable: Monthly amount of savings		
	(1)	(2)	(3)
Job loss: Expected-Actual	-1.503206 ***	0.448609 ***	0.458594***
	(0.1665469)	(0.1362888)	(0.1369411)
Observations	30710	30094	30094
R^2	0.0026	0.3516	0.3660
Adjusted R^2	0.0026	0.3516	0.3657
Add HH income	No	Yes	Yes
Additional controls	No	No	Yes

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Regressions of savings on job loss expectations bias, whole sample

Table 6 reports estimation outputs for three specifications of regressing unemployed persons' amount of savings on the bias of their job finding expectation. In model (1),

[8] This finding is robust across a much larger number of specifications not reported here.

the monthly amount of savings is again regressed on the difference between expected and actual job finding probability only, while in model (2), monthly net household income is included. Model (3), as before, contains additional variables controlling for individual characteristics (age, family status and region) as well as interactions between income and year and income and region. The coefficient on the bias of job finding expectations is negative and highly significant when the level of household income is controlled for, but not in all specifications including additional controls. However, with a large number of control variables, the coefficient is again negative and highly significant when the level of the actual job finding probability is added.

	Dependent variable: Monthly amount of savings		
	(1)	(2)	(3)
Job Finding: Expected-Actual	-0.3517272	-0.7409637***	-0.2566191
	(0.2488602)	(0.1989447)	(0.225528)
Observations	1359	1338	1338
R^2	0.0015	0.3122	0.3316
Adjusted R^2	0.0007	0.3112	0.3235
Add HH income	No	Yes	Yes
Additional controls	No	No	Yes

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Regressions of savings on job finding expectations bias, whole sample

5 Conclusion

This study investigates individual bias in beliefs about individual job loss and job finding rates. First, we derive the effect of biased beliefs in job loss risk on Nash-bargained wages in a search-and-matching model of the labor market and find that over-pessimistic job loss risk expectations decrease wage outcomes. Over-optimistic job finding risk expectations would lead to an increase in reservations wages in models of job search behavior. Biased beliefs in labor market risk also affect consumption-savings choices. Over-pessimistic job loss expectations increase savings and over-optimistic job finding risk expectations decrease savings relative to a situation without bias.

We then provide new empirical evidence on individual bias in beliefs of labor market risk in German survey data and find the bias in both job loss and job finding risk to be positive and significant. In line with the theory, we document empirically that over-

pessimistic job loss risk expectations ar associated with lower wages and higher savings. Over-optimistic job finding risk expectations are associated with higher reservation wages and lower savings.

We find substantial spacial differences in the degree of households's bias beliefs in the economy across regions, industries and individual characteristics such as age, tenure, education or gender. This substantial heterogeneity in biased beliefs in the economy may explain part of the wage differences across demographic groups or submarkets. For the design of effective economic policy, it is key for policymakers to understand how the bias in individual labor market risk shapes aggregate labor market performance and business cycles. Policy makers may want to take into account how biased beliefs intensify or hinder labor market policy choices. Policy makers may also consider to directly reduce the degree of bias in beliefs, for instance through enhanced mobility between these submarkets and information or uncertainty management.

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A Data appendix

	Actual job loss (dismissal/closure)	
Female	0.0139	(0.80)
Age	-0.00227	(-0.26)
Age, squared	0.0000924	(0.93)
Single	0.0668***	(3.17)
Divorced	0.0743***	(3.29)
Widowed	0.0970*	(1.84)
Children under 16 in household	-0.0655***	(-3.86)
Good health	-0.0352	(-1.43)
Satisfactory health	-0.0513*	(-1.95)
Poor health	-0.00749	(-0.24)
Bad health	-0.0609	(-0.97)
East-Germany	0.134***	(8.46)
Born in Germany	-0.0253	(-0.99)
Nationalities: European/Russian (w/out Germany)	0.0246	(0.69)
Nationalities: America	0.0266	(0.18)
Nationalities:	0.0792	(1.54)
Nationalities: Africa	0.302*	(1.75)
No nationality	-0.179	(-0.48)
Middle education (Vocational)	-0.0290	(-0.91)
High education (University)	-0.101***	(-2.73)
Industry, Manufacturing	-0.0887*	(-1.92)
Energy, Construction	0.102**	(2.13)
Services, Tourism, Trade, Business, Transport	-0.110**	(-2.39)
Public Admin., Health, Social Work, Education	-0.462***	(-9.60)
Private Households, Membership Organizations	-0.253***	(-4.45)
Manual Worker	0.245	(1.45)
Employees With Simple Tasks	0.264	(1.57)
Qualified Professional / Managerial	0.198	(1.17)
Low-Level Civil Service	-0.334	(-0.84)
Middle-Level Civil Service	0.114	(0.61)
High-Level Civil Service	-0.287	(-1.45)
Executive Civil Service	-0.278	(-1.24)
Tenure in Firm	-0.0428***	(-16.19)
Tenure in Firm, squared	0.000822***	(11.64)
Work experience (full/part time)	0.000812	(0.21)
Work experience (full/part time), squared	0.0000816	(0.99)
Unemployment experience in years	0.0712***	(8.74)
Unemployment experience in years, squared	-0.00398***	(-5.25)
Permanent job	-0.0429*	(-1.76)
Agreed work time per week in hrs	0.000730	(0.20)
Agreed work time per week in hrs, squared	0.0000392	(0.65)
Overtime per week in hrs	-0.00974**	(-2.32)
Overtime per week in hrs, squared	0.000464*	(1.81)
Working in occupation trained for	-0.0447***	(-2.99)
Company size: 20-199	-0.203***	(-11.98)
Company size: 200-1999	-0.353***	(-16.97)
Company size: GE 2000	-0.431***	(-19.78)
New job since last year	0.159***	(7.86)
Satisfaction With Work	-0.0745***	(-21.89)
Observations	141205	
Pseudo R^2	0.119	

t statistics in parentheses

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

Table 7: Probit estimation, actual job loss probability

	Actual job start	
Female	-0.187***	(-5.86)
Age	0.0919***	(6.60)
Age, squared	-0.00153***	(-9.72)
Single	0.00336	(0.08)
Divorced	0.0739*	(1.84)
Widowed	0.0789	(0.81)
Children under 16 in household	0.0249	(0.73)
Good health	-0.00460	(-0.08)
Satisfactory health	-0.0844	(-1.42)
Poor health	-0.369***	(-5.87)
Bad health	-0.743***	(-9.61)
East-Germany	0.0324	(1.01)
Born in Germany	0.101**	(2.23)
Nationalities: European/Russian (w/out Germany)	-0.0939	(-1.55)
Nationalities: America	0.191	(0.65)
Nationalities:	-0.323***	(-4.65)
Nationalities: Africa	-0.439**	(-2.28)
No nationality	0.114	(0.36)
Middle education (Vocational)	0.267***	(7.02)
High education (University)	0.482***	(8.85)
Work experience (full time)	0.0466***	(8.79)
Work experience (full time), squared	-0.000913***	(-7.02)
Work experience (part time)	0.0493***	(5.41)
Work experience (part time), squared	-0.00144***	(-3.18)
Unemployment experience in years	-0.0751***	(-8.62)
Unemployment experience in years, squared	0.00217***	(4.57)
Observations	9362	
Pseudo R^2	0.137	

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

Table 8: Probit estimation, actual job finding probability

	Log net hourly wage	
Job Loss Risk: Expected-Actual	-0.000444***	(-6.79)
Low education	0	(.)
Middle education	0.0847***	(11.07)
High education	0.298***	(35.33)
Age	0.0117***	(8.31)
Age, squared	-0.000115***	(-7.11)
East-Germany	-0.223***	(-62.79)
Female	-0.213***	(-64.68)
Couple living together	0.0253***	(7.28)
Children under 16 in household	-0.0811***	(-22.84)
Tenure in Firm	0.0172***	(35.07)
Tenure in Firm, squared	-0.000238***	(-17.44)
Permanent job	0.0693***	(11.22)
Agriculture, Forestry, Fishery, Mining	0	(.)
Industry, Manufacturing	0.204***	(16.48)
Energy, Construction	0.138***	(10.43)
Services, Tourism, Trade, Business, Transport	0.0904***	(7.28)
Public Admin., Health, Social Work, Education	0.108***	(8.59)
Private Households, Membership Organizations	0.0457***	(3.16)
Apprentice / Trainee	0	(.)
Manual Worker	0.257***	(6.43)
Employees With Simple Tasks	0.307***	(7.65)
Qualified Professional / Managerial	0.499***	(12.47)
Low-Level Civil Service	0.490***	(9.62)
Middle-Level Civil Service	0.577***	(13.96)
High-Level Civil Service	0.680***	(16.63)
Executive Civil Service	0.812***	(19.54)
Survey Year=1999	0	(.)
Survey Year=2001	0.0391***	(5.85)
Survey Year=2003	0.0865***	(12.70)
Survey Year=2005	0.125***	(18.65)
Survey Year=2007	0.120***	(18.10)
Survey Year=2009	0.144***	(21.53)
Survey Year=2013	0.231***	(34.13)
Survey Year=2015	0.271***	(42.81)
Observations	54338	
R^2	0.452	
Adjusted R^2	0.452	

t statistics in parentheses

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

Table 9: Regression of wage rate on job loss expectations bias: Model (3) with additional controls (whole sample)

	Log net reservation income	
Job Finding Risk: Expected-Actual	0.000609***	(2.70)
Low education	0	(.)
Middle education	0.0599***	(3.47)
High education	0.324***	(13.34)
Age	0.0142**	(2.24)
Age, squared	-0.000257***	(-3.52)
East-Germany	-0.118***	(-8.67)
Female	-0.250***	(-18.15)
Couple living together	-0.0526***	(-3.89)
Children under 16 in household	-0.0374**	(-2.54)
Unemployment experience in years	-0.00901**	(-2.34)
Unemployment experience in years, squared	0.000625***	(3.13)
Work experience (full time)	0.0110***	(4.53)
Work experience (full time), squared	-0.0000383	(-0.62)
Work experience (part time)	-0.00811**	(-2.01)
Work experience (part time), squared	0.000498**	(2.52)
Survey Year=1999	0	(.)
Survey Year=2001	0.00144	(0.05)
Survey Year=2003	0.123***	(4.28)
Survey Year=2005	0.0486*	(1.68)
Survey Year=2007	0.0861***	(2.89)
Survey Year=2009	0.156***	(5.20)
Survey Year=2011	0.206***	(6.07)
Survey Year=2013	0.212***	(6.87)
Survey Year=2015	0.265***	(9.55)
Observations	4141	
R^2	0.221	
Adjusted R^2	0.217	

t statistics in parentheses

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

Table 10: Regression of reservation income on job finding expectations bias: Model (3) with additional controls (whole sample)